



Pyrenees Phase 4 Infill Drilling Program Environment Plan

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Revision Label	Revision Date	Comments
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Environment Plan Summary

This Environment Plan (EP) Summary has been prepared from material provided in this EP. This summarises the items as required by Regulation 11(4) of the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009.

EP Summary Material Requirement	Relevant Section of EP
Details of the titleholder's nominated liaison person for the activity	Section 1.6
The location of the activity	Section 3.2
A description of the activity	Section 3
A description of the receiving environment	Section 4
Consultation already undertaken and plans for ongoing consultation	Section 5
Details of the environmental impacts and risks	Section 7 Section 8 OPEP Appendix G
The control measures for the activity	Section 7 Section 8
The arrangements for ongoing monitoring of the titleholder's environmental performance	Section 9 OPEP Appendix G
Response arrangements in the oil pollution emergency plan	OPEP Appendix G

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Acronyms and Glossary

Term	Description
"	inch
μ	Micron
AMFA	Australian Fisheries Management Authority
AHO	Australian Hydrographic Office
AHS	Australian Hydrographic Service
AHTS	Anchor Handling Tug Supply (vessel)
AIS	Automatic identification system
ALARP	As low as reasonably practicable
AMOSC	Australian Maritime Oil Spill Centre
AMSA	Australian Maritime Safety Association
ANZECC	Australian & New Zealand Environment and Conservation Council
APPEA	Australian Petroleum Production and Exploration Association
APU	Australian Production Unit
AS	Australian Standard
ASBTIA	Australian Southern Bluefin Tuna Industry Association
AUV	Autonomous underwater vehicle
bbl/d	Barrels per day
bpm	Barrel per minute
BACI	Before-After-Control-Impact
BHP	BHP Petroleum (Australia) Pty Ltd
BIA	Biologically important area
BOP	Blowout preventer
BTEX	Benzene, Toluene, Ethyl benzene, Xylene
CAMBA	Agreement between the Government of Australia and the Government of the People's Republic of China for the protection of Migratory Birds and their Environment. (China Australia Migratory Birds Agreement)
CBTA	Competency-based training and assessment
CEM	Crisis and emergency management
CHARM	Chemical hazard and risk management
CRG	Community Reference Group
Cwlth	Commonwealth
CWTS	Controlled waste tracking system
DAWE	Department of Agriculture, Water and the Environment
DBCA	Department of Biodiversity, Attractions and Conservation
DFES	Department of Fire and Emergency Services
DIIS	Department of Industry Innovation and Science

DMIRS	Department of Mines, Industry Regulation and Safety (formerly the Department of Mines and Petroleum [DMP])
DMP	WA Department of Mines and Petroleum
DNP	Director of National Parks
DoEE	Department of Environment and Energy
DoT	Department of Transport
DP	Dynamic positioning
DPIRD	WA Department of Primary Industries and Regional Development
EAG	Executive Advisory Group
ECC	Emergency and Crisis Centre
EES	Exclusive economic zone
EFL	Electrical flying lead
EMBA	Environment that may be affected
EMT	Emergency Management Team
ENVID	Environment Impact (and risk) Identification
EP	Environment Plan, prepared in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPG	Environment Protection Group
EPO	Environmental Performance Outcome
EPS	Environmental Performance Standard
ERP	Emergency Response Plan
ESD	Ecologically Sustainable Development
FPSO	Floating storage and offloading (facility)
FR	Flush return
FRT	Field Response Team
GHG	Greenhouse gas
GIH	Grease injection head
HBJ	Hydraulic bridging jumper
HFL	Hydraulic flying lead
HMA	Hazard Management Agency
IAP	Incident Action Plan
IAPP	International air pollution prevention
IBC	International bulk carriers
ICS	Incident Command Structure
IEG	Industry Guidance Note
IMO	International Maritime Organisation
IMS	Introduced marine species
IMT	Incident Management Team
IOPP	International oil pollution prevention

ISPP	International sewage prevention pollution
ITC	Internal tree cap
ITOPF	International Tank Owners Federation
JAMBA	Agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment. (Japan Australia Migratory Birds Agreement)
JRCC	AMSA's Joint Rescue Coordination Centre
KEF	Key ecological feature
km	Kilometre
L	Litre
LOWC	Loss of well control
LPG	Liquid petroleum gas
m	Metre
mm	Millimetre
m³	Cubic metre
m/s	Metres per second
MC	Measurement Criteria
MEE	Maritime environment emergency
MARPOL	The Convention for the Prevention of Pollution from Ships (MARPOL Convention)
MDO	Marine diesel oil
MMbbl	Million barrels
MNES	Matters of National Environmental Significance, according to the EPBC Act
MODU	Mobile Offshore Drilling Unit
MOP	Marine oil pollution
MoU	Memorandum of Understanding
nm	Nautical mile
NAT-DET	National Plan dispersant effectiveness field test kit
SIMA	Net environmental benefit analysis
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Petroleum Titles Administrator
NSW	New South Wales
NT	Northern Territory
NTM	Notice to Mariners
NWMR	North West Marine Region
NWS	North West Shelf
OCNS	Offshore Chemical Notification Scheme
ODS	Ozone-depleting substance
OIM	Offshore Installation Manager
OIW	Oil-in-water
OPGGs Act	<i>Offshore Petroleum and Greenhouse Gas Storage Act 2006</i>

OPEP	Oil Pollution Emergency Plan
OSPAR	Oslo and Paris Convention (for the Protection of the Marine Environment of the North-East Atlantic)
OSRA	Oil Spill Response Agency
OSRC	Oil spill response coordination
OSRL	Oil Spill Response Limited
OSTB	Oil spill tracking buoys
OSTM	Oil spill trajectory modelling
OSV	Offshore support vessel
ppb	Parts per billion
ppm	Parts per million
ppt	Parts per thousand
PAH	Polycyclic aromatic hydrocarbons
PIC	Person in charge
PLONOR	OSPAR definition of a substance that Poses Little Or No Risk to the environment
PMS	Preventative maintenance system
PPA	Pearl Producers Association
PPE	Personal protective equipment
PROWRP	Pilbara Region Oiled Wildlife Response Plan
QET	Quick-effectiveness test
ROC	Retention on cuttings
ROV	Remotely operated vehicle
RSEZ	Rig Safety Exclusion Zone
SA	South Australia
SCAT	Shoreline clean-up assessment technique
SCS	Source Control Section
SCCP	Source Control Contingency Plan
SDS	Safety Data Sheet
SEL	Sound exposure level
SFRT	Subsea First Response Toolkit
SINTEF	The Foundation for Scientific Research at the Norwegian Institute of Technology
SLDMB	Self-locating datum marker buoys
SMPEP	Shipboard Marine Pollution Emergency Plan
SOPEP	Shipboard Oil Pollution Emergency Plan
SSDI	Subsea dispersant injection
SSTT	Subsea Test Tree
STP	Standard Temperature & Pressure
SXT	Subsea Xmas Tree
TD	Total depth
TH	Tubing hanger
TPH	Total petroleum hydrocarbons
TRP	Tactical Response Plan
WA	Western Australia
WAFIC	Western Australian Fishing Industry Council
WAOWRP	WA Oiled Wildlife Response Plan
WBM	Water-Based Mud (Drill Fluid)
WMP	Waste Management Plan

WOMP	Well Operations Management Plan
WWC	Wild Well Control

1 Introduction

1.1 Overview of Proposed Activity

BHP Petroleum (Australia) Pty Ltd (BHP) proposes to undertake infill development drilling activities at up to three existing well locations at two well centres (Crosby South and Stickle) within production licence area WA-42-L in Commonwealth waters, which forms part of the Pyrenees Development. The Pyrenees Development covers crude production from fields located in both WA-42-L and neighbouring WA-43-L, with development drilling having been undertaken in a phased approach:

- Phase 1 saw the development of the Middle Pyrenees fields of Ravensworth, Crosby and Stickle;
- Phase 1.5 saw the drilling of the infill well Stickle-8H4;
- Phase 2 saw the development of the Upper Pyrenees Wild Bull and Tanglehead fields and the development of the Middle Pyrenees Moondyne field and the appraisal of the Middle Pyrenees Harrison contingent resource;
- Phase 3 saw the infill of the Middle Pyrenees fields of Ravensworth, Crosby and Stickle.

The proposed petroleum activities described within this Environment Plan (EP) represent Phase 4 of the ongoing development of the Pyrenees field development program.

Crosby-3H1 is a dual-lateral well originally drilled as a single lateral well in 2009, and worked over to isolate the existing lateral and convert to a dual-lateral well with two new laterals drilled in November 2015. In late 2020, the well was re-entered using a Light Well Intervention (LWI) vessel, in an attempt to isolate the lower lateral, thereby reducing excessive water production and increase oil production performance from the upper lateral section. This activity was undertaken in accordance with the Crosby-3H1 Light Well Intervention Environment Plan (PYHSE-E-0010) as accepted by the National Offshore Petroleum and Environmental Management Authority (NOPSEMA) in August 2020. Due to technical difficulties with removal of the Tubing Hanger Plug from the wellbore, this water shut-off activity could not be conducted. It is proposed that this work scope is recommenced with the use of a semi-submersible Mobile Offshore Drilling Unit (MODU) rather than a LWI vessel given the increased technical capability of a MODU.

Stickle-4H1 well was originally drilled in 2009 and completed as a single lateral oil producer into the Stickle reservoir. The proposed infill drilling activity includes the re-entry of the Stickle-4H1 well to isolate the existing lateral, and then drilling of two new horizontal lateral production bores. The first new lateral production bore (Stickle-4H1L1) will access unrecovered hydrocarbons within the Stickle field by extending into the adjoining fault blocks Hackle and HackNE, with the aim of accessing additional hydrocarbon volumes from the reservoir. Subsurface analysis indicates connectivity between the Hackle, HackNE and Stickle faults within the reservoir. Should Stickle-4H1L1 not yield the desired production outcomes, it would be isolated and only completed for production within the Stickle fault block. The second lateral (Stickle-4H1L2) will also target the Stickle reservoir and will only be extended into the adjoining faults dependant on the successful outcome of the initial Stickle-4H1L1 lateral.

Whilst on location above the Crosby South Drill Centre, there is potential for the re-entry of the Crosby-4H2 to isolate an existing lateral production bore and drill a new lateral production bore. At the time of writing, this well re-entry is being considered as a contingent work scope for the Program. If drilled, the well would be accessed via the same mooring pattern as the Crosby-3H1 well.

Both the well intervention for water shut-off at Crosby-3H1 and the two re-entry side-track laterals at the Stickle-4H1 well location, and the potential contingent side-track lateral at Crosby-4H2 well will be short in duration. Given the work scopes would be undertaken consecutively, contingent on weather conditions and unforeseen circumstances, the total campaign duration is estimated to be 3-4 months including MODU mobilisation and positioning at each well centre.

The exact timing of the activity is yet to be confirmed with the earliest expected start time being Q2 2022. To account for this unconfirmed schedule, the environmental assessment encompasses the petroleum activity occurring at any time over calendar years 2022 and 2023.

The well intervention and infill drilling activities from here on will be referred to as the petroleum activity and form the scope of this EP. A detailed description of the activity is provided in Section 3.

1.2 Defining the Petroleum Activity

The petroleum activity to be undertaken in Petroleum Production Licence WA-42-L comprises the drilling of up to two lateral wellbores from the Stickle-4H1 well centre, subsea well intervention on the Crosby-3H1 well, and a contingent single lateral side-track at the Crosby-4H2 well location. These activities constitute petroleum activities as defined in Regulation 4 of the Environment Regulations. As such an EP is required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (referred to as the Environment Regulations), administered by the NOPSEMA.

1.3 Purpose of this Environment Plan

In accordance with the objectives of the Environment Regulations, the purpose of this EP is to demonstrate that:

- the potential environmental impacts and risks from planned (routine and non-routine) activities and unplanned events (including emergency situations) of the petroleum activity are identified and described;
- appropriate management controls are implemented to reduce impacts and risks to a level that is 'as low as reasonably practicable' (ALARP) and acceptable;
- the petroleum activity is carried out in a manner consistent with the principles of ecologically sustainable development (as defined in Section 3A of the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act)).

The EP describes the process used by BHP to identify and evaluate potential environmental impacts and risks arising from the petroleum activity, and defines environmental performance outcomes, performance standards and measurement criteria to be applied to manage the impacts and risks to ALARP and acceptable levels. This EP includes an implementation strategy for the monitoring, audit, and management of the petroleum activity to be performed by BHP and its contractors. The EP documents and considers consultation with relevant authorities, persons and organisations.

1.4 Scope of this Environment Plan

The scope of this EP covers the activities described in Section 3 inclusive of those undertaken during potential emergency conditions. The spatial boundary of the petroleum activity has been described and assessed using the operational area that encompasses a radius of 2 km from each of the well centres (or potential relief well locations) whilst the MODU is on location. The extent of the operational area has been defined based on the physical footprint of the MODU (inclusive of mooring equipment) as detailed in this EP.

The scope of this EP does not include the movement of the MODU outside of the operational area (e.g., travel to and from Permit Area WA-42-L or between well centres). These activities will be undertaken in accordance with other relevant maritime and aviation legislation, most notably, the *Navigation Act 2012* (Cwlth) and *Civil Aviation Act 1988* (Cwlth).

1.5 Overview of HSE Management System

All BHP controlled activities associated with the petroleum activity will be conducted in line with:

- BHP Charter (Appendix A);
- BHP Environment and Climate Change – Our Requirements;
- BHP Petroleum Health, Safety and Environment (HSE) Standard;
- BHP Wells and Seismic Delivery (W&SD) Management System;
- BHP Australian Production Unit (APU) Management System; and

- Any specific commitments laid out in this EP.

All Petroleum sites must maintain up-to-date practices that adhere to the requirements contained in the Petroleum HSE Management System and HSE Standard. Activity-specific environmental management measures specific to the activities are implemented through this EP.

Whilst BHP HSE Management Systems apply to the manner in which BHP execute their responsibilities under this EP, operational control of the MODU remains the responsibility of the MODU Contractor and shall be managed in accordance with Contractor Management Systems as detailed within the NOPSEMA accepted Safety Case for the facility.

1.6 Titleholder Details

The nominated Titleholder for this activity is BHP Petroleum (Australia) Pty Ltd, on behalf of the Pyrenees Joint Venture Partners within production permit WA-42-L:

- BHP Petroleum (Australia) Pty Ltd; and
- Santos WA PVG Pty Ltd.

BHP has exploration, development, and production activities in more than a dozen countries around the globe, including a significant deep-water position in the Gulf of Mexico, as well as operations in Australia, the United Kingdom, Trinidad and Tobago, Algeria and Pakistan. BHP's Australian assets include:

- Macedon Gas Plant – Natural gas and Condensate (Operator);
- Bass Strait – Crude oil, condensate, LPG and natural gas (Non-operator); and
- North West Shelf – Crude oil, condensate and LNG (Non-operator).

In accordance with Regulation 15(1) of the Environment Regulations, details of the titleholder are provided in Table 1-1.

Table 1-1: Titleholder details

Name	BHP Petroleum (Australia) Pty Ltd
Business address	125 St Georges Terrace, Perth, Western Australia 6000
Telephone number	+61 8 6321 0000 or 1300 554 757 (Switchboard)
Email address	Reception.Perth@bhp.com
ACN	39 006 923 879

In accordance with Regulation 15(2) of the Environment Regulations, details of the titleholder’s nominated liaison person are provided in Table 1-2.

Table 1-2: Titleholder nominated liaison person

Name	Darryl Nottingham
Position	Asset Manager APU
Business address	125 St Georges Terrace, Perth, Western Australia 6000
Telephone number	+61 8 6321 0000 or 1300 554 757 (Switchboard)
Email address	Reception.Perth@bhp.com

In the event of any change in the titleholder, titleholder parent company, a change in the titleholder’s nominated liaison person or a change in the contact details for either the titleholder or the liaison person, BHP will notify the regulator in writing in accordance with Regulation 15(3) of the Environment Regulations.

2 Legislative Framework

2.1 Commonwealth Legislation

Environmental aspects of petroleum activities in Australian Commonwealth waters are controlled by two main statutes, the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGS Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Each of these, as applicable to the proposed infill drilling program, is described in the following sections. There are also a number of applicable Commonwealth and West Australian statutes and regulations, International Agreements and Conventions and other applicable standards, guidelines, and codes under which the activities are implemented. These are listed in Appendix B of this EP.

2.1.1 Offshore Petroleum and Greenhouse Gas Storage Act (2006)

The OPGGS Act provides the regulatory framework for all offshore exploration and production activities in Commonwealth waters (those areas beyond three nautical miles from the Territorial sea baseline and with the Commonwealth Petroleum Jurisdiction Boundary). The Offshore Petroleum and greenhouse Gas Storage (Environment) Regulations (referred to as the Environment Regulations) have been made under the auspices of the OPGGS Act for the purposes of ensuring (as described in section 3) “...that any petroleum activity or greenhouse gas activity carried out in an offshore area is:

- carried out in a manner consistent with the principles of ecologically sustainable development set out in section 3A of the EPBC Act; and
- carried out in a manner by which the environmental impacts and risks of the activity will be reduced to as low as reasonably practicable; and
- carried out in a manner by which the environmental impacts and risks of the activity will be of an acceptable level”.

This EP meets the requirements of the Environment Regulations by providing a plan that:

- Is appropriate for the nature and scale of the activity;
- Demonstrates that the environmental impacts and risks of the activity will be reduced to as low as reasonably practicable (ALARP);
- Demonstrates that the environmental impacts and risks of the activity will be of an acceptable level;
- Provides for appropriate environmental performance outcomes, environmental performance standards and measurement criteria;
- Includes an appropriate implementation strategy and monitoring, recording, and reporting arrangements;
- Does not involve the activity or part of the activity, other than arrangements for environmental monitoring or for responding to an emergency, being undertaken in any part of a declared World Heritage property with the meaning of the EPBC Act; and
- Demonstrates that:
 - an appropriate level of consultation, as required by Division 2.2A, has been carried out;
 - the measures (if any) adopted, or proposed to adopt, because of consultations are appropriate; and
 - complies with the OPGGS Act and the Environment Regulations.

2.1.2 Environment Protection and Biodiversity Conservation Act 1999

Under the Commonwealth government streamlining arrangements, the National Offshore Petroleum Safety and Environmental Management Authority’s assessment of this EP provides an appropriate level of consideration of the impacts to matters of national environmental significance (MNES) protected under Part 3 of the EPBC Act.

2.2 State Legislation

In the event of a hydrocarbon release from a loss of well control (LOWC) event or a tank rupture from a vessel collision, there is the potential for the spill to impact on State waters and/ or shorelines. Relevant state legislation is listed in Appendix B.

2.3 Environmental Guidelines, Standards and Codes of Practice

A number of international codes of practice and guidelines are relevant to environmental management of the petroleum activity. Those considered most relevant are listed in Appendix B.

3 Description of Activity

3.1 Overview

This section has been prepared in accordance with Regulation 13(1) of the Environment Regulations, and describes the petroleum activity to be performed under this EP.

BHP proposes to undertake petroleum activities at existing well locations (Stickle-4H1, Crosby-3H1, , and potentially at Crosby-4H2 well – both Crosby wells are located at the Crosby South Drill Centre), within production licence area WA-42-L in Commonwealth waters, which forms part of the Pyrenees Development.

The proposed activity scope includes well intervention for purposes of water shut-off at Crosby-3H1 location; two horizontal side-track laterals at the Stickle-4H1 well location; and potentially a single side-track lateral at the Crosby-4H2 well location.

The proposed infill drilling activity includes the re-entry of the Stickle-4H1 well to isolate the existing lateral, and then drilling of two new horizontal laterals. The first new lateral (Stickle-4H1L1) will access unrecovered hydrocarbons within the Stickle field with an extension of the lateral into the adjacent fault blocks Hackle and HackNE with the aim of accessing additional hydrocarbon volumes. In the success case this lateral would be drilled to a total depth of approximately 5,155 mMD with approximately 3,870 m of reservoir intersected across the Stickle, Hackle and HackNE fields. Should this lateral extension not yield the desired reservoir outcomes, it would be isolated and only completed for production within the Stickle reservoir. The second lateral (Stickle-4H1L2) will also target the Stickle reservoir and will only be extended into adjacent fault blocks dependant on the successful outcome of the initial Stickle-4H1L1 lateral. In the success case this lateral will be drilled to a total depth (TD) of approximately 4,930 mMD with approximately 3,630 m of reservoir exposed.

The Crosby-3H1 well requires artificial gas lift operation to produce from the well. In order to reduce excessive water production from the dual-lateral well, BHP proposes to install a mechanical plug into the multi-lateral junction to isolate the water producing lower lateral to advantage the upper lateral and increase oil production performance.

The contingent scope for the Crosby South Drill Centre includes the re-entry of the Crosby-4H2 well to isolate the existing lateral and then the drilling of a new horizontal lateral to access unrecovered hydrocarbons within the Crosby field.

Both the well intervention for water shut-off at Crosby-3H1 and the re-entry side-track laterals will be short in duration. Given the work scopes would be undertaken consecutively, contingent on weather conditions and unforeseen circumstances, the total campaign duration is estimated to be 3-4 months including MODU mobilisation and positioning at each well centre.

3.2 Location

The proposed activities will occur in Petroleum Production Licence WA-42-L located in Commonwealth waters on the North West Shelf of Western Australia (WA) (Figure 3-1). The location coordinates of the Crosby-3H1 and Stickle-4H1 well centres are provided in Table 3-1. Crosby-4H2 is located adjacent to Crosby-3H1 within the Crosby South Drill Centre and if the contingent lateral is drilled, the MODU would maintain the same mooring pattern to facilitate the scope. The closest landfall is the North West Cape peninsula, Exmouth, approximately 27 km to the south-east. The proposed activities are located approximately 13 km outside the northern boundary of the Ningaloo Marine Park. The water depth in the operational area is approximately 200 m, with Crosby-3H1 and Stickle-4H1 located in 197 m.

Table 3-1: Location coordinates for petroleum activity

Well Centre	Approx. Water Depth (m)	Latitude	Longitude	Production Licence
Crosby-3H1	197 m	21° 32' 43.063" S	114° 05' 42.504" E	WA-42-L

Crosby-4H2	197 m	21° 32' 42.00" S	114° 05' 40.468" E	WA-42-L
Stickle-4H1	197 m	21° 31' 23.679" S	114° 06' 35.289" E	WA-42-L

3.3 Operational Area

The operational area for the petroleum activity is a 2 km radius around each of the well centres. The operational area sets the spatial boundary within which activities described in this EP will occur, as shown in Figure 3-3.

3.4 Pyrenees Development Infrastructure

The location of subsea infrastructure for the Pyrenees Development is shown on Figure 3-2.

The Pyrenees Development was referred to the Department of Agriculture Water and the Environment (DAWE) (formerly the Department of Environment) under the EPBC Act in March 2005 (referral number 2005/2034). A Draft Environmental Impact Statement (EIS) was prepared and released for public consultation in September 2005. The scope of the EIS included development of the Pyrenees oil fields for oil production and associated infrastructure, as well as future infill drilling and installation of infrastructure to link known fields and other unknown fields within the notional Pyrenees Development Area. The final EIS was submitted to the Commonwealth Minister for the Environment and Heritage for assessment in February 2006 together with an EIS Supplement to address the issues raised by stakeholders. Approval of the Pyrenees Development, subject to conditions, was granted by the Minister on 26 April 2006 (Environment Minister, 2006). Further, as part of the Commonwealth streamlining process, a Variation to Conditions – Pyrenees Oil Fields Project (EPBC No 2005/2034) was issued on the 8th September 2015. A list of the conditions for the Pyrenees Development, with those relevant to the petroleum activity covered under this EP is provided in Appendix C.

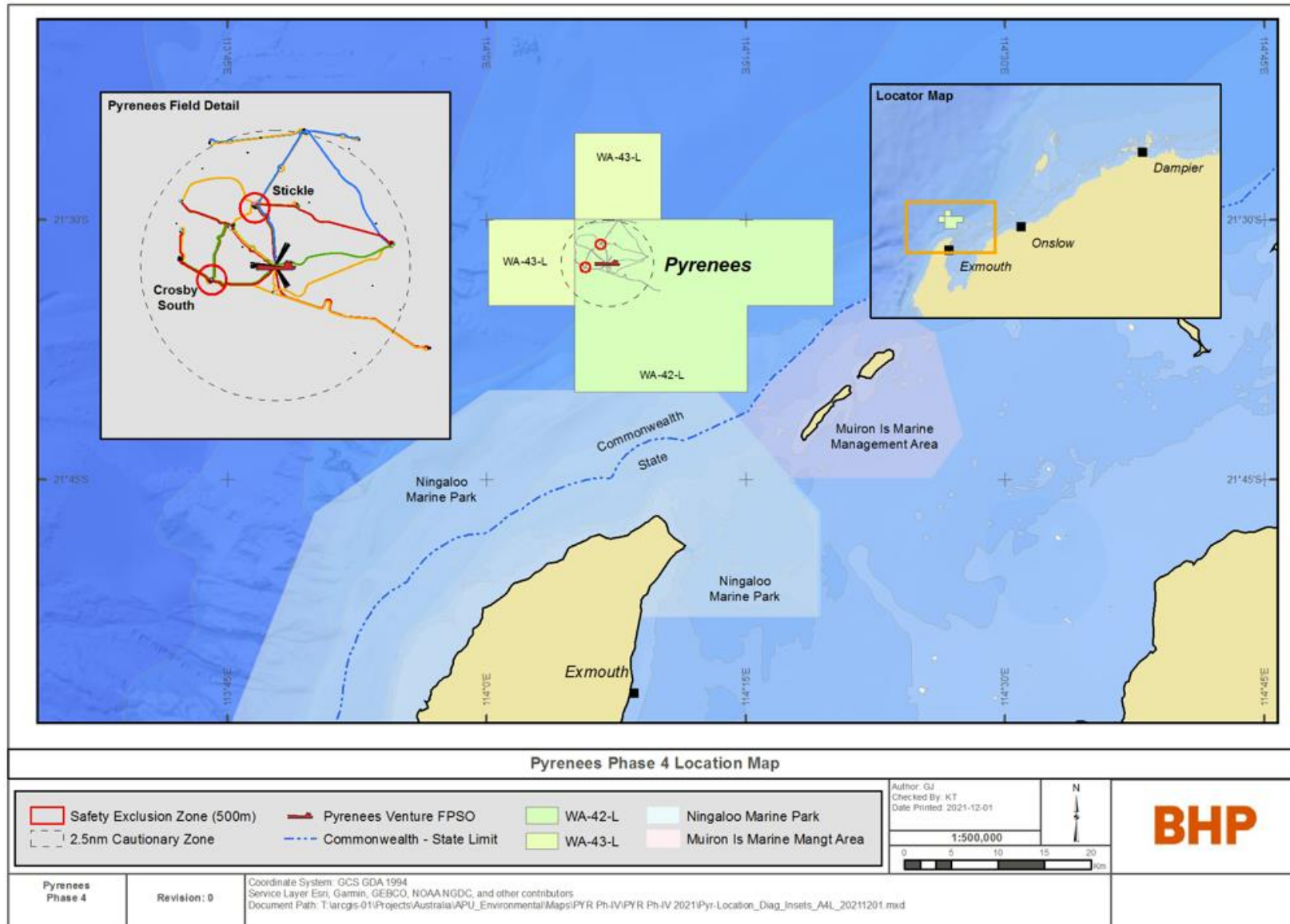


Figure 3-1: Crosby and Stickle Location Map

3.5 Timing and Duration

The earliest expected commencement date for infill drilling activities is Q2 2022, although for contingency purposes due to MODU availability and weather constraints, this EP allows for the petroleum activity to occur any time between over calendar years 2022 and 2023.

The proposed activities will be short in duration, with the MODU expected to be on location in the production licence area for approximately 3-4 months, contingent on final activity scope, weather conditions and unforeseen circumstances. The activity will be undertaken 24 hours a day, 7 days a week.

3.6 Pyrenees Field Characteristics

The Pyrenees field development produces crude from six fields: Stickle, Crosby, Ravensworth, Moondyne, Tanglehead and Wildbull. Initial production from the Pyrenees field commenced in 2010 and was extended in 2013 by the addition of the wells in the Moondyne, Tanglehead and Wildbull fields. The Ravensworth field is located both in production licences WA-42-L and WA-43-L, and the Crosby and Stickle Fields are located in WA-42-L in the Exmouth Sub-basin. Note that the Macedon field that dominates the central and eastern portion of WA-42-L is a gas field. There are no known oil prospects east of the Moondyne field (indicated in Figure 3-2 by the West Muiron-5 well).

Crude oil contained within these reservoirs consists mainly of heavily biodegraded hydrocarbons. Values of $\delta^{13}C$ and branched-cyclic biomarker data from the Moondyne, Ravensworth, Crosby and Stickle reservoirs are very similar indicating a similar degree of biodegradation. This data also suggests that the Moondyne, Ravensworth, Crosby and Stickle crudes were expelled from mature sediments that were deposited under sub-oxic (probably marine) conditions and contain a mixed marine and land-plant-influenced organic matter suite. Steranes-based maturity parameters calculated from the branched-cyclics data indicate that Pyrenees Development draws from a range of reservoirs that produce crude oil that is essentially the same as each other. The relevant characteristics of Pyrenees crude oil are listed within Table 3-2.

Table 3-2: Characteristics of Pyrenees crude

Target Reservoir Characteristics	
Parameter	Pyrenees Crude Oil
Specific Gravity	0.935 g/cc
API Gravity	19.0
Pour Point	< -32° C
Viscosity at 20°C	196 cSt

3.7 General MODU Details and Operations

The proposed activity would be undertaken by a semi-submersible mobile offshore drilling unit (MODU). BHP have contracted the Diamond Ocean Apex MODU to undertake the work scope.

3.7.1 MODU Dimensions and Capacities

The general MODU details and layout described in the section have been used to inform the environmental impact and risk assessment within this EP.

The dimensions of the Ocean Apex are provided in Table 3-3.

Table 3-3: Ocean Apex dimensions

MODU Indicative Dimensions	
Length	361 ft. (110 m)
Width	320 ft. (97 m)
Height	128 ft. (39 m)
Drilling Draft	76 ft. (23 m)
Drilling Displacement	49,855 tn
Transit Draft	28 ft. (8.5 m)
Accommodation	Up to 140 POB

The storage capacities of the Ocean Apex are provided in Table 3-4.

Table 3-4: Ocean Apex capacities

MODU Capacities	
Diesel oil	Approximately 4,000 m ³
Heli fuel	N/A – no offshore refuelling planned
Potable water	1,002 bbl (159 m ³)
Drill water	15,456 bbl (2,457 m ³)
Brine	2,000 bbl (318 m ³)
Base oil	N/A – no synthetic fluid planned
Liquid mud	10,798 bbl (1,706m ³)(active & reserve combined)
Bulk material (cement/mud)	27,010 cu ft. (765 m ³)
Sack storage	5,000 sacks (approx. 200 m ³)

Given the water depths of approximately 200 m at the well locations and the operational constraints with a jack-up or fully dynamic-positioning (DP) MODU at these depths, the contracted MODU is a semi-submersible suited to these conditions.

3.7.2 Mooring and positioning equipment

The MODU will be tethered via a mooring system anchored to the seafloor.

The standard mooring system aboard the Diamond Ocean Apex consists of eight (3 ¼") x 4,200 ft. RQ5 chains, eight (3 ¾") x 8,800 ft. wires, and eight 15T Stevpris MK6 anchors with an individual footprint of approximately 30 m². A detailed mooring analysis will be undertaken and may require the use of pre-laid moorings. If undertaking the activity during cyclone season, the capacity of the standard mooring system is expanded and a 12-point mooring system is used.

Each of the mooring lines will be tethered to drum winches aboard the MODU enabling the tensioning of individual moorings to compensate for MODU movement during the activity.

3.7.3 Blowout Preventer

The MODU has a subsurface blowout preventer (BOP), enabling attachment to the wellhead and providing primary well control barrier during drilling activities. In accordance with BHP standards, and consistent with APIS53, the BOP is required to contain at least one annular sealing element and one blind-shear ram capable of shearing and then sealing the wellbore; and contain at least four rams, one of which shall have shear capability.

The specific BOP stack aboard the Ocean Apex is a Shaffer 18 ¾" 15,000 psi five-ram stack with dual 18 ¾" 10,000 psi annular preventers, a sealing shear ram, and a casing shear ram

3.7.4 Power Generation

Power generation aboard the MODU is generally facilitated by five 2,400 HP diesel engines, with a single backup generator providing alternate power as required. The average diesel fuel usage during Drilling operations for a typical semi-submersible MODU is in the order of 15,000 L per day.

3.7.5 Water Generation

The MODU has capacity to generate potable water via reverse osmosis during drilling operations.

3.7.6 Drainage Systems

Potentially contaminated bilge and chemical drainage will be directed through a closed-circuit drainage system routed through an oil water separator for treatment prior to discharge. Uncontaminated stormwater is directed through an open drainage system directly overboard.

3.7.7 Sewage Treatment

The MODU has a sewage treatment plant (STP) for the treatment of black and greywater during drilling operations.

3.7.8 Solids Control Equipment

The MODU has solids control equipment inclusive of shale shakers for the treatment of recirculated drill fluids and drill cutting during drilling operations.

3.7.9 Fluids Handling Package

The MODU has a fluids handling package, enabling the recovery, treatment and storage of residual reservoir hydrocarbons aboard the MODU and, subject to pressures and volumes, the cold venting from a safe location overboard, or flaring via the burner boom, of residual reservoir gases.

3.7.10 Navigation Equipment

During both transit to site and drilling operations, the MODU will display navigational lighting and external lighting, as required for safe operations. Lighting levels will be determined primarily by operational safety and navigational requirements.

Navigation, bridge, and communication equipment will be compliant with appropriate marine navigation and vessel safety requirements. The MODU is also fitted with an Automatic Identification System (AIS).

3.8 Support Vessel Operations

The MODU will be supported by up to three anchor handling tug supply (AHTS) vessels. The vessels will primarily be used to deploy anchors, for towing, transport equipment, materials, and fuel between the MODU and Dampier Port. AHTS vessels will likely have 'Work-Class' ROV capability (refer Section 3.13).

AHTS vessels will be transiting to and from the operational area multiple times per week for the duration of the activity, with at least one vessel stationed in close proximity to the MODU at all times to service the MODU as required and act as a guard vessel to prevent unauthorised interactions between the MODU and other marine users.

A temporary 500-m Rig Safety Exclusion Zone (RSEZ) around the MODU will be established for the duration of the activity, and interactions between the support vessels and the MODU within this zone will be under the direction of the MODU.

Each vessel will be subject to BHP's Marine Management Procedure. All required audits and inspections will assess compliance with the laws of the international shipping industry, which includes safety and environmental management requirements, and maritime legislation including *International Convention for the Prevention of Pollution from Ships 1973* as modified by the Protocol of 1987 (MARPOL) and other International Maritime Organisation (IMO) standards.

Each vessel will display navigational lighting and external lighting, as required for safe operations. Lighting levels will be determined primarily by operational safety and navigational requirements under relevant legislation, specifically the *Navigation Act 2012*. The vessel will be lit to maintain operational safety on a 24-hour basis.

Vessels use dynamic positioning (DP) to maintain position near the well centre. DP uses satellite navigation and radio transponders in conjunction with thrusters to maintain the position.

Cetacean interaction procedures for support vessels are consistent with Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000 and are further detailed in Section 8.8.

3.9 MODU Mobilisation

The contracted MODU will be mobilised from within regional waters of the N.W. shelf.

3.10 MODU Positioning and Mooring

Prior to the MODU arriving in the permit area a 'Rig Move and Positioning Plan' will be prepared. This plan details the configuration of the anchors necessary to keep the MODU securely on location. The final mooring configuration and design will be dependent on the outcome of this assessment.

Each anchor or pre-laid mooring would be attached to MODU by a chain / wire mooring line and extend out from the MODU by up to 2 km. The tension of each mooring would be continually monitored aboard the MODU and adjusted according to the parameters determined within the detailed mooring analysis, thereby reducing the potential for anchor drag along the seabed.

Anchors may be pre-laid on the sea floor with AHTS vessels prior to the mobilisation of the MODU to the operational area. Pre-lay operations may occur up to 1 month prior to the MODU being mobilised to the operational area.

Transponders may be required to inform anchor positioning. The expected frequency (Hz) and source level (dB re 1 μ Pa @ 1 m) of the signal from transponders is 18 – 36 kHz, 196 dB (ref. 1 μ Pa @ 1 m).

Consistent with the requirements of section 572 of the OPGGS Act, all mooring equipment shall be removed from the seabed upon completion of the infill drilling activity.

3.11 MODU Refuelling and Bulk Transfer

The MODU will be refuelled via AHTS vessels.

MODU refuelling will likely occur 2-3 times per week for the duration of the proposed activity (approximately 3-4 months, dependent on finalised work scope, weather conditions and unforeseen circumstances).

The transfer of fuel and bulk chemicals will be by hose and pumped from the AHTS vessels in accordance with conditions for preventing spills to the marine environment. These controls are discussed in Section 8.6.

3.12 Helicopter Crew Change

Crew changes will be performed using helicopters with transit occurring approximately 3-5 times per week.

Helicopter operations within the operational area are limited to helicopter take-off and landing on the helideck.

Cetacean interaction procedures for aircraft are consistent with Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000 and are further detailed in Section 8.8.

3.13 Remotely Operated Vehicles

The MODU is equipped with a 'Work Class' remotely operated vehicle (ROV). The ROV is linked to the MODU by a neutrally buoyant tether and a load carrying umbilical cable along with their management systems. The ROV systems will be maintained and operated by a specialised contractor on-board the MODU.

The ROV is equipped with lights and can be fitted with various tools, pumps and camera systems to capture and record live (via video feed) and still (photographic) imagery of the subsea equipment and immediate surrounding environment.

During the infill drilling activities, ROVs will be used for monitoring, cleaning and operating subsea equipment, seabed surveys prior to and/or after drilling, and in the event of dropped objects.

3.14 Well Design and Drilling/Completion Methodology

The planned scope for Pyrenees Phase 4 program consists of well intervention activities at the Crosby-3H1 well and re-entering the existing Stickle-4H1 well and drilling two lateral well bores. Contingent scope includes re-entering of the existing Crosby-4H2 well and drilling an additional lateral well bore.

The following description represents the base-case for the proposed well design and drilling/completion methodology with final well design to be confirmed prior to undertaking the activity.

The Stickle-4H1 re-entry opportunity will utilise the existing Stickle-4H1 subsea tree/wellhead and upper casing strings. The existing lateral will be abandoned, and then lateral sidetracks will be drilled to access Middle Pyrenees reservoir (Figure 3-4). Each lateral is designed to be drilled approximately two meters below the top of the reservoir.

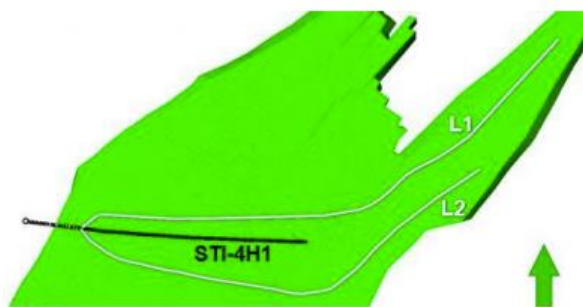


Figure 3-4: Plan view of existing Stickle-4H1 well and planned lateral wells

Once the rig is on location, a BOP and riser system will be connected from the rig to the seafloor via the wellhead / production tree connection, which will act as a fixed conduit from the subsea well back to the rig at the ocean surface.

The existing upper completion will be pulled and existing wellbore isolated. The existing production casing will be partially removed and a new intermediate hole section (e.g., 12 ¼" hole diameter) will be drilled along with installing new casing (10 ¾" x 9 5/8") using a water-based mud system (WBM).

New lateral sections (8 ½" - 9 ¼" hole diameter) will be drilled to total depth per planned trajectory using WBM. A lower completion sand screen assembly will be installed across the newly drilled lateral section(s).

The flow from each lateral wellbore will be comingled at a multi-lateral junction system installed in the lower completion. The well will have a new upper completion installed prior to the rig departing location.

Given this is a re-entry well operation, there are no "top hole" or riserless drilling planned for this campaign and therefore, there will be no planned cuttings or fluid returns discharged directly to the seafloor.

A summary of activities to be undertaken for *Pyrenees Phase 4 Infill Drilling Program* are detailed below, with further detail is provided within the activity-specific Well Operations Management Plan (WOMP).

3.14.1 Drilling and Completion Operations – Multi-lateral Well

The nominal drilling program for an extension of an existing lateral well is summarised as:

- Move MODU onto location and run anchors;
- Deploy ROV and perform calcium washes – this involves the discharge of calcium wash;
- Establish barriers from FPSO and production system;
- Install, latch and pressure and function test BOP to Subsea Xmas Tree – this involves the discharge of water-soluble biodegradable ROV / BOP control fluids;
- Establish control of well from MODU through IWOCS deployed from MODU;
- Recover Internal Tree cap (ITC) on drillpipe.
- Conduct flushing operations above tubing hanger (TH) barrier plug.
- Run and test landing string, subsea tree test and surface flow tree via ROV valve manipulation with associated control fluid discharges;
- Remove existing upper completion and flush wellbore via the bullheading of brine / inhibited seawater / high viscosity gels. Flushing fluid is either pumped downhole (bullheaded) or circulated back to the MODU for treatment and filtration prior to discharge*. At this stage there is potential for a small volume of residual gas in the tubing and annulus to be returned to MODU and vented to atmosphere.
- Isolate existing lower completion lateral (with contingency to discharge cement wash in the event of inability to execute cementing job);
- Cut and recover existing 9 5/8" x 10 ¾" production casing within 13-3/8" casing.
- Sidetrack and drill 12 ¼" hole with associated discharge of cuttings and fluids;
- Install; 9 5/8" x 10 ¾" casing and cement annular space to provide zonal isolation at the shoe (with contingency to discharge cement wash in the event of inability to execute cementing job);
- Drill 8 ½" - 9 ¼" horizontal hole in reservoir with associated discharge of cuttings and fluids;
- Install lower lateral completion, including sand screens and annular isolation as required;
- Create lateral exit and drill second horizontal lateral in reservoir (as per above).
- Install upper lateral completion, including sand screens and annular isolation complete with co-mingled multi-lateral junction.
- Install upper completion;

- Re-install well barriers – this involved flushing of wellbore and circulation of brine / inhibited seawater. As above, flushing fluid is either pumped downhole or returned to the MODU for treatment and filtration prior to discharge*;
- Install TH Plug as well barrier.
- Recover landing string and BOP and circulate brine / inhibited seawater from riser and return to MODU for treatment and filtration prior to discharge*;
- Install Internal Tree Cap (ITC) on drillpipe.
- Return well to Production via ROV valve manipulation with associated control fluid discharges (clean-up operations conducted direct to FPSO);
- Pull anchors and move off.

*Returned brine is filtered via filtration package to remove solids and the fluids handling package aboard the MODU to remove residual reservoir fluids prior to discharge.

3.14.2 Dual Lateral Process

The Pyrenees multi-lateral wells can utilise two variants of multilateral equipment; the first is a ReFlexRite system, which allows an existing single lateral well to be converted to a multilateral well and secondly a FlexRite system which allows the drilling of a new multilateral well. In essence there is no difference between the two systems, except for how the junction is created. In the FlexRite system a purpose build aluminium joint of casing is added to the casing string as it is run to provide an easily millable window; whereas the ReFlexRite system utilises a robust milling machine to create the window in the existing standard steel joint of casing prior to drilling to TD horizontally in 8-1/2" - 9 1/4" hole.

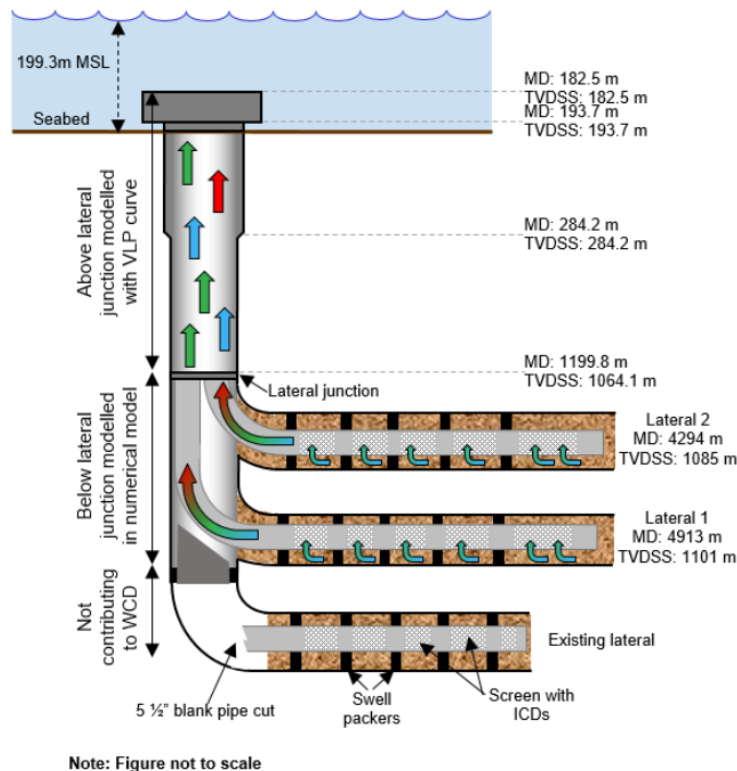


Figure 3-5: Stickle-4H1 re-entry dual lateral schematics

3.14.3 Drilling and Completion Operations – Single-lateral Well

The nominal drilling program for an extension of an existing lateral well is summarised as:

- Move MODU onto location and run anchors;

- Deploy ROV and perform calcium washes – this involves the discharge of calcium wash;
- Establish barriers from FPSO and production system;
- Install, latch and pressure and function test BOP to Subsea Xmas Tree – this involves the discharge of water-soluble biodegradable ROV / BOP control fluids;
- Establish control of well from MODU through IWOCS deployed from MODU;
- Recover Internal Tree cap (ITC) on drillpipe.
- Conduct flushing operations above tubing hanger (TH) barrier plug.
- Run and test landing string, subsea tree test and surface flow tree via ROV valve manipulation with associated control fluid discharges;
- Remove existing upper completion and flush wellbore via the bullheading of brine / inhibited seawater / high viscosity gels. Flushing fluid is either pumped downhole (bullheaded) or circulated back to the MODU for treatment and filtration prior to discharge*. At this stage there is potential for a small volume of residual gas in the tubing and annulus to be returned to MODU and vented to atmosphere.
- Isolate existing lower completion lateral (with contingency to discharge cement wash in the event of inability to execute cementing job);
- Drill new 8 ½" - 9 ¼" horizontal hole in reservoir with associated discharge of cuttings and fluids;
- Install lower lateral completion, including sand screens and annular isolation as required;
- Install upper completion;
- Re-install well barriers – this involved flushing of wellbore and circulation of brine / inhibited seawater. As above, flushing fluid is either pumped downhole or returned to the MODU for treatment and filtration prior to discharge*;
- Install TH Plug as well barrier.
- Recover landing string and BOP and circulate brine / inhibited seawater from riser and return to MODU for treatment and filtration prior to discharge*;
- Install Internal Tree Cap (ITC) on drillpipe.
- Return well to Production via ROV valve manipulation with associated control fluid discharges (clean-up operations conducted direct to FPSO);
- Pull anchors and move off.

*Returned brine is filtered via filtration package to remove solids and the fluids handling package aboard the MODU to remove residual reservoir fluids prior to discharge.

3.14.4 Well Intervention Operations

The nominal program for a MODU-based well intervention operation at the Crosby-3H1 well location is summarised as:

- Move MODU onto location and run anchors;
- Deploy ROV and perform calcium washes – this involves the discharge of calcium wash.
- Install, latch and pressure and function test BOP to Subsea Xmas Tree (SXT) – this involves the discharge of water-soluble biodegradable ROV / BOP control fluids;
- Recover Internal Tree Cap (ITC) on drillpipe.
- Conduct flushing operations above TH barrier plug.
- Run and test landing string, SST and SFT via ROV valve manipulation with associated control fluid discharges;
- Remove well barriers – there is potential for residual gas lift and reservoir gas to be present in the tubing which would be returned to MODU and vented to atmosphere or flared;

- Flushing of wellbore/SXT and circulation of brine / inhibited seawater. Flushing fluid is either pumped downhole or returned to the MODU for treatment and filtration prior to discharge*;
- Conduct well intervention activity (e.g., install mechanical plug for water shut-off) – this may include bullheading of inhibited seawater / brine downhole to assist in deployment of plug;
- Re-install well barriers – this involves flushing wellbore/SXT and circulation of brine / inhibited seawater. As above, flushing fluid is either pumped downhole or returned to the MODU for treatment and filtration prior to discharge*;
- Recover landing string and circulate brine / inhibited seawater from riser and return to MODU for treatment and filtration prior to discharge*;
- Install Internal Tree Cap (ITC) on drillpipe.
- Recover BOP
- Return well to Production via ROV valve manipulation with associated control fluid discharges (clean-up operations conducted direct to FPSO);
- Pull anchors and move off.

*Returned brine is filtered via filtration package to remove solids and the fluids handling package aboard the MODU to remove residual reservoir fluids prior to discharge.

Contingency operations on the Crosby-3H1 well may include recovery and reinstallation of the upper completion should the internal bore of the tubing hanger be damaged during attempts to recover the lower crown plug to gain access to the wellbore.

3.14.5 BOP Installation and Function Testing

A BOP is installed on the SXT prior to re-entering the existing wells and is a primary well control device to prevent the uncontrolled flow of reservoir fluids to surface.

The following tests are performed after the subsea BOP stack is initially installed on each well:

- A BOP function-test (including ROV test for closure of rams), and wellhead connector pressure-test; and
- A full pressure-test no later than 21 days from previous BOP pressure test.

After the initial test, and for the duration of the drilling activity, all BOP components (excluding hydraulic connectors and shear rams) shall be function tested every seven (7) days and pressure tested at intervals not exceeding 21 days.

Function testing is undertaken by activating the hydraulic control system aboard the MODU to confirm functionality of the BOP systems, whilst a pressure test is undertaken to verify seals on the BOP stack.

Greater detail on the performance standards for the BOP system, inclusive of design, functionality, and preventative maintenance, is provided in the WOMP.

3.14.6 Drill Fluids and Cuttings

The proposed drilling program is based upon the exclusive use of water-based muds (WBM) for all hole sections. The basic formulation of WBM likely to be used has brine as the base fluid with additives for controlling formation pressure, borehole stability, improving drilling performance and reliability. The seawater and seawater-based sweeps is discharged directly to the seabed along with drill cuttings.

Table 3-5 provides an estimation of drill cuttings volume from each section of each proposed well extension and the discharge point of cuttings. The total approximate volume of cuttings for both lateral extensions at Stickle-4H1 and a potential lateral at Crosby-4H2 would be discharged incrementally according to each well section drilled over an 18-day period. Surplus fluids may be discharged at the end of the campaign.

Table 3-5: Estimated drill cuttings volumes

Borehole Diameter (inches)	Cuttings Volume (m ³)	Well Section	Discharge Point
12 ¼"	55.2	Intermediate section	1-2m below sea surface
9 ¼"	194.1	STI4H1-L1 (including contingent sidetrack) ~3,301 m (MDRT)	
9 ¼"	97.1		
9 ¼"	194.1	STI4H1-L2 ~3,004 m (MDRT)	
8 ½"	143.7	Crosby-4H2 New lateral (contingent well)	
Total (base case)	540.5	-	-
Total inc contingent	684.2	-	-

3.14.7 Solids Control Equipment

Drilled cuttings are circulated out of the well and processed with a variety of solids control equipment at surface on the rig, namely shale shakers with various mesh screen inserts, desanders / desilters (and/or mud cleaners), and centrifuge(s) to remove cuttings and low gravity solids (LGS) from the active drilling fluid volume. The recovered solids and cuttings would be discharged from the rig down a suspended drape hose. Based on the nature of drilled cuttings being circulated out of the well via drilling “mud” system, the cuttings will be “wet” with the base fluid, which includes fine particles mixed into the drilling “mud” to enhance the fluid properties.

Shale Shakers

Shale shakers primarily remove large amounts of coarse cuttings from drilling mud, whereby wire-cloth screens vibrate while drilling mud and cuttings returned from the well flow over the screens. The drilling mud flows through the shale shakers and is directed back to the MODU mud storage pits.

Centrifuges

Following processing by the shale shakers, the recovered mud from the cuttings may then be directed to the centrifuges, which are used to separate barite and remove fine solids (below 4.5 to 6 microns). The centrifuge uses a rotating bowl to create high centrifugal forces to affect the separation of coarse and fine particles from the mud. Solids from the centrifuge are discharged and the mud recirculated into the fluid system.

Given synthetic-based mud (SBM) is not proposed for use as a drilling fluid during the infill drilling program, the use of cuttings dryers shall not be required.

3.14.8 Cementing Operations

Cementing operations are undertaken to ensure well integrity and include the following:

- Cementing the conductor in place (although not relevant for this infill drilling program);

- Sealing the annulus between the casing string and the formation; and
- Well abandonment and / or sealing specific well sections within the wellbore, such as in a failure-case drilling operation.

Cement is transported as dry bulk to the MODU by the AHTS vessels and is mixed with water and chemicals in the cementing unit onboard the MODU to form wet grout/concrete slurry immediately prior to use. The grout/concrete slurry is then injected down to the well using high pressure pumps.

Excess volumes of cement slurry may be discharged to sea under the following circumstances:

- When testing cementing unit aboard the MODU (approx. 1-2 m³);
- When abandoning the motherbore of the well (approx. 10 m³); or
- Disposing of excess slurry due to a failed cement job (approx. 55 m³ based upon 9-5/8" casing).
- Disposal of excess cement at the end of campaign that cannot be utilised by next operator.

3.14.9 Formation Evaluation

Formation data may be gathered whilst drilling via the use of downhole well logging tools.

No vertical seismic profiling (VSP) or other wireline formation logging is planned during the infill drilling program.

3.14.10 Well Completion, Flowback and Testing

During well re-entry and re-completion operations, residual reservoir gas purged from the production annulus may be either cold vented or flared via the fluids handling package aboard the MODU.

Upon well completion, the well will be secured and handed back to production (via the BHP well handover / acceptance process) prior to flowback and testing aboard the Pyrenees Venture FPSO.

3.14.11 Mechanical Isolation of Unsuccessful Laterals

In the event that the extension of the Stickle-4H1-L1 or Stickle-4H1-L2 fails to result in the desired reservoir outcomes, the extended lateral well section will not be completed and will be mechanically isolated during lower completion installation and production will continue from the remainder of the Stickle lateral in the Stickle field.

3.15 Chemical Selection and Assessment

The chemicals required for the drilling activities will be stored on-board the MODU within dedicated holding tanks for liquid chemicals / chemical mixtures and the sack room for dry chemicals. Hazardous chemicals are stored within bunds or in secure areas to prevent accidental overboard discharges. All chemicals that may be operational released or discharged to the marine environment from either planned activities or unplanned events are accompanied with relevant Safety Data Sheets (SDS).

The management, approval and control of SDSs must also comply with the requirements outlined in the APU Hazardous Materials Acquisition Environmental Supplement (AO-HSE-S-0002) and Environmental Supplement Form (AO-HSE-S-0002-0001), which provides guidance on environmental standards, assessment process and authorisation for material selection and use. Hazardous chemicals proposed for use intended to be directly or indirectly discharged to the marine environment must be assessed by this process to reduce the impacts to ALARP. Four steps are followed to determine the acceptability:

1. New material request;
2. Designated Low Ecotoxicity Materials - Offshore Chemical Notification Scheme (OCNS) Gold or Group E or D (lowest environmental hazard) with no substitution warning. If the chemical does not meet these criteria, a full risk assessment will be undertaken, as described below;

3. Material Specific Ecotoxicity Assessment:

- Acute ecotoxicity;
- Biodegradability; and/or
- Bioaccumulation potential.

4. ALARP Assessment

- Frequency of use, dose concentration and dilution factor of material potentially discharged to the environment;
- Estimated fate of the material;
- Environmental receptors;
- Assessment of less harmful alternative materials demonstrates, alternatives unavailable;
- Requirement for the material use can be technically justified (cannot be eliminated or redesigned);
- Define risk mitigation measures to limit discharge to the environment (i.e., maximum dose rate or volume); and
- Measures to ensure risk is monitored and controlled.

Water-Based Mud (WBM)

WBMs consist of between 90-98% fresh or saline water, with the remaining 2-10% made up of drilling fluid additives that are either completely inert in the marine environment, naturally occurring benign materials or readily biodegradable organic polymers with a very fast rate of biodegradation in the marine environment. Drilling additives typically used include potassium chloride, barite, and calcium carbonate. The indicative formulation of the WBM is described in Table 3-6.

Table 3-6: Indicative WBM formulation

WBM Formulation	
Additive	Concentration
Potassium Chloride (KCL)	8-10% wt.
Shale Inhibitor – Amine Based	2-4% vol
API Barite	75 ppb (based on 9.9 ppg WBM)
Soda Ash	0.2 ppb
Xanthan Gum Blend	1.0 – 2.0 ppb
PAC – Low Viscosity	2.0 – 3.0 ppb
Encapsulator	0.75 - 2.5 ppb
Caustic Soda	0.2 ppb
Bacteriacide	0.05 - 0.3 ppb
Citric Acid	2 ppb
Oxygen Scavenger	0.1 ppb

Drilling fluid performs several functions including; cooling and lubrication of the drill bit; transportation of drill cuttings to the surface; and maintaining hydrostatic pressure in excess of formation pressure, thus preventing the influx of hydrocarbons from the formation into the wellbore, this is the primary well control barrier.

The drill fluid Service Contractor engaged by BHP perform quality control testing as outlined in American Petroleum Institute (API) Specification 13A: Drilling Fluid Materials.

Whilst not covered under API 13A, testing of barite is also undertaken for heavy metal content, in particular mercury (Hg <1ppm) and cadmium (Cd <3ppm) consistent with limits established by the US Environmental Protection Agency (EPA) under the National Pollutant Discharge Elimination System (NPDES) General Permit for the Gulf of Mexico and Environmental, Health, and Safety Guidelines Offshore Oil and Gas Development (IFC, June, 2015).

Drilling fluid, bulk dry products, brine, and drill water are transferred to the MODU from AHTS vessels and stored in tanks and pits. Dry and liquid additives are mixed into the fluid system from sacks or containers.

Drilling Lubricants

The addition of drilling lubricants in water-based mud is occasionally required to reduce torque due to friction during the drilling of deviated or extended reach wells. Drilling lubricants are added to the mud system on an as required basis only. Drilling lubricants are typically rated Gold on the Offshore Chemical Notification Scheme (OCNS) and are added to the mud system on an as required basis only. Products in the Gold banding present the least hazard to the environment based on toxicity, bioaccumulation, and biodegradation data.

Oxygen Scavenger

Ammonium bisulphite and sodium bisulphite, which are the active ingredients in common oxygen scavengers, are commonly used in the oil and gas industry to scavenge oxygen from water and water-based mud systems. Under the OCNS, ammonium bisulphite and sodium bisulphite solutions have the least hazardous Group E rating (CEFAS, 2021). It is considered by OSPAR (2019) to be pose little or no risk to the environment (i.e., a PLONOR substance).

Caustic Soda

Sodium hydroxide is mixed with drilling fluids (and completion brines) to raise the pH. Under the OCNS scheme, sodium hydroxide has the least hazardous Group E rating (CEFAS, 2021). It is considered to be a PLONOR substance.

Biocide

Biocides are used in WBM and generally have (by design) relatively high toxicities. However, only fluids that are assessed as posing low or no risk to the environment are considered for discharge, using information such as is made available by the UK OCNS, OSPAR PLONOR listings, the product Safety Data Sheet (SDS) or other available environmental testing information. A biodegradable product with a Gold or Silver CHARM rating on the OCNS will be used (e.g., Safe-Cide). Biodegradable biocides rapidly dissipate in surface waters due to photo-oxidation and other natural oxidation processes.

Lost Circulation Material (LCM)

Should a 'lost circulation zone' be penetrated the volume of mud used and its composition will change. Circulation is said to be lost when the drilling fluid flows into one or more geological formations instead of returning up the annulus. Although preferred, ceasing lost circulation completely is not always possible or required. Controlled losses allow drilling to continue while keeping the wellbore full, preventing an influx of gas or fluid into the wellbore. A number of contingencies are available when lost circulation occurs, depending on the severity:

- Minor losses may be controlled by increasing the viscosity of the fluid with bentonite and/ or polymers, or loss control material (LCM) additives;
- Severe losses will require the addition of other LCM; and
- Cement the zone where the losses occurred, and drill through the cement and recommence drilling the well.

Control Fluid

During BOP testing and subsea valve actuation, control fluid, which generally consists of water mixed with a glycol-based detergent or equivalent water based anti-corrosive additive suitable for open hydraulic systems, is released to ocean. An example of a common BOP control fluid concentrate is Stack Magic EcoF, which is diluted to 2 to 3% in water on the MODU to make up the BOP control fluid. Each function test of the BOP will result in up to approximately 1500 L of the fluid (base chemical diluted in water) being discharged to the ocean.

Table 3-7 details the indicative chemicals used during the activity, and potential discharge volume.

Table 3-7: Indicative chemical types, discharge volumes and discharge frequencies

Chemical	Purpose/ Uses	Anticipated volume per discharge	Indicative Discharge frequency
Calcium wash (scale dissolver)	Removal of marine growth and carbonate scale; wellhead/ connector cleaning	100 L	Pre-BOP deployment on each well
Biocide	Treatment of water/seawater that may enter wellbore and reservoir	500 bbls brine with diluted biocide	After completion activities, any remaining filtered brine may be discharged
Hydraulic control fluid	Subsea valve actuation including full BOP functioning	1500 L	BOP installation, then every 7 days thereafter whilst BOP is installed
Hydraulic fluid	ROV control fluid	10 L	ROV valve manipulation

3.16 Contingent Activities

Contingency activities are those that are not planned, but which may be required in the event of operational issues or unforeseen circumstances.

3.16.1 MODU Disconnect

In the event of an impending cyclone, the MODU would disconnect from the well following the displacement of the WBM within the marine riser with seawater with no loss of WBM to the marine environment. The MODU would be reconnect in reverse order once the cyclone passes.

3.17 Decommissioning

Consistent with the in-force *Pyrenees Facility Operations Environment Plan* (PYHSE-E-0001), and *APU Pyrenees Closure Management Plan* (PM-PYR-PET-PN-0001), BHP has committed to decommissioning at the end of the Pyrenees Facility life. Further, BHP commits to developing a Decommissioning Environment Plan for regulatory acceptance at least 12 months prior to decommissioning (at end of field life).

The end of field life date is subject to production performance and economic considerations amongst other factors.

Whilst not within scope of this Drilling EP, the *APU Pyrenees Closure Management Plan* considers the removal of all subsea infrastructure as a base case for field closure.

All field decommissioning will be in accordance with relevant legislative requirements, including those under Section 572 (3) of the OPGGS Act.

4 Description of Environment

The purpose of this section is to address the requirements of Regulation 13(2) and 13(3) through describing the environment that may be affected (the EMBA), including relevant values and sensitivities, by both routine/planned activities and non-routine/unplanned events. The information contained in this section has been used to inform the evaluation and assessment of the environmental impacts and risks presented in Section 7 and Section 8. The level of detail is appropriate to the nature and scale of the impacts and risks to the particular values and sensitivities.

4.1 Determination of the Environment that May Be Affected

To describe the EMBA, it is necessary to consider the spatial extent of all planned activities (impacts) and unplanned events (risks). The description of the environment is based on two spatial areas:

- The operational area. The operational area for the petroleum activity is a 2 km radius around each of the existing well centres. The operational area sets the spatial boundary within which activities described in this EP will occur (Figure 3-3).
- The wider EMBA. This is the environment that may be affected by a worst-case hydrocarbon spill (Figure 4-1), noting the spatial area of this EMBA is an over-representation of a single potential worst-case spill scenario.

The spatial extent of the wider EMBA has been defined using stochastic hydrocarbon fate and transport modelling of the worst-case hydrocarbon spills, based on the hydrocarbon exposure values (concentrations) for a subsea release of crude oil from a loss of well control (LOWC) from the Stickle-4H1 well (Section 8.3) and a marine diesel oil (MDO) surface spill at the Crosby South Drill Centre well arising from a vessel-to-vessel or vessel to MODU collision (Section 8.5). Stochastic oil spill modelling was undertaken for each spill scenario. The LOWC scenario was modelled based on a release from the Stickle-4H1 well, given this well represents the highest potential total spill volume from an unplanned LOWC. The MDO scenario was modelled based on a surface release of MDO at the Crosby South Drill Centre, given it being marginally closer to shoreline receptors. Each scenario consisted of 150 individual oil spill simulations based upon five years of historical hydrodynamic and wind data and covering all seasonal variations.

The oil spill modelling considered four key hydrocarbons phases that pose differing environmental and socio-economic risks: surface (floating) oil, total submerged hydrocarbons (entrained oil droplets in the water column), dissolved oil in the water column, and shoreline accumulated oil. The modelling used defined oil exposure values (concentrations) to aid interpretation of the modelling, to identify when and where areas might be contacted by oil and to inform the subsequent environmental risk evaluation and spill response planning. The oil exposure values used to define the EMBA were guided by NOPSEMA’s *Environment Bulletin – Oil Spill Modelling Guideline* (NOPSEMA, 2019) and are provided in Table 4-1. Section 8.2.5 provides information on the selection of the oil spill modelling exposure values.

Table 4-1: Hydrocarbon exposure values

Hydrocarbon phase	Exposure Value		
	Low	Moderate	High
Surface (floating) oil	1 g/m ²	10 g/m ²	50 g/m ²
Shoreline (accumulated) oil	10 g/m ²	100 g/m ²	1,000 g/m ²
Total submerged oil in the water column (a combination of entrained and dissolved oil components)	10 ppb	100 ppb	-
Dissolved oil in the water column	10 ppb	50 ppb	400 ppb

The EMBA presented in Figure 4-1, shows the combined stochastic modelling outputs for the worst-case crude spill and marine diesel oil (MDO) spills, based on 150 individual spills for each spill scenario. By overlaying all of the individual spills onto a single figure, the stochastic modelling shows all the potential areas that could be

affected in the event of a spill. While the EMBA's represent the area that could be contacted in the event of a spill, a single spill event would have a much smaller spatial extent.

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

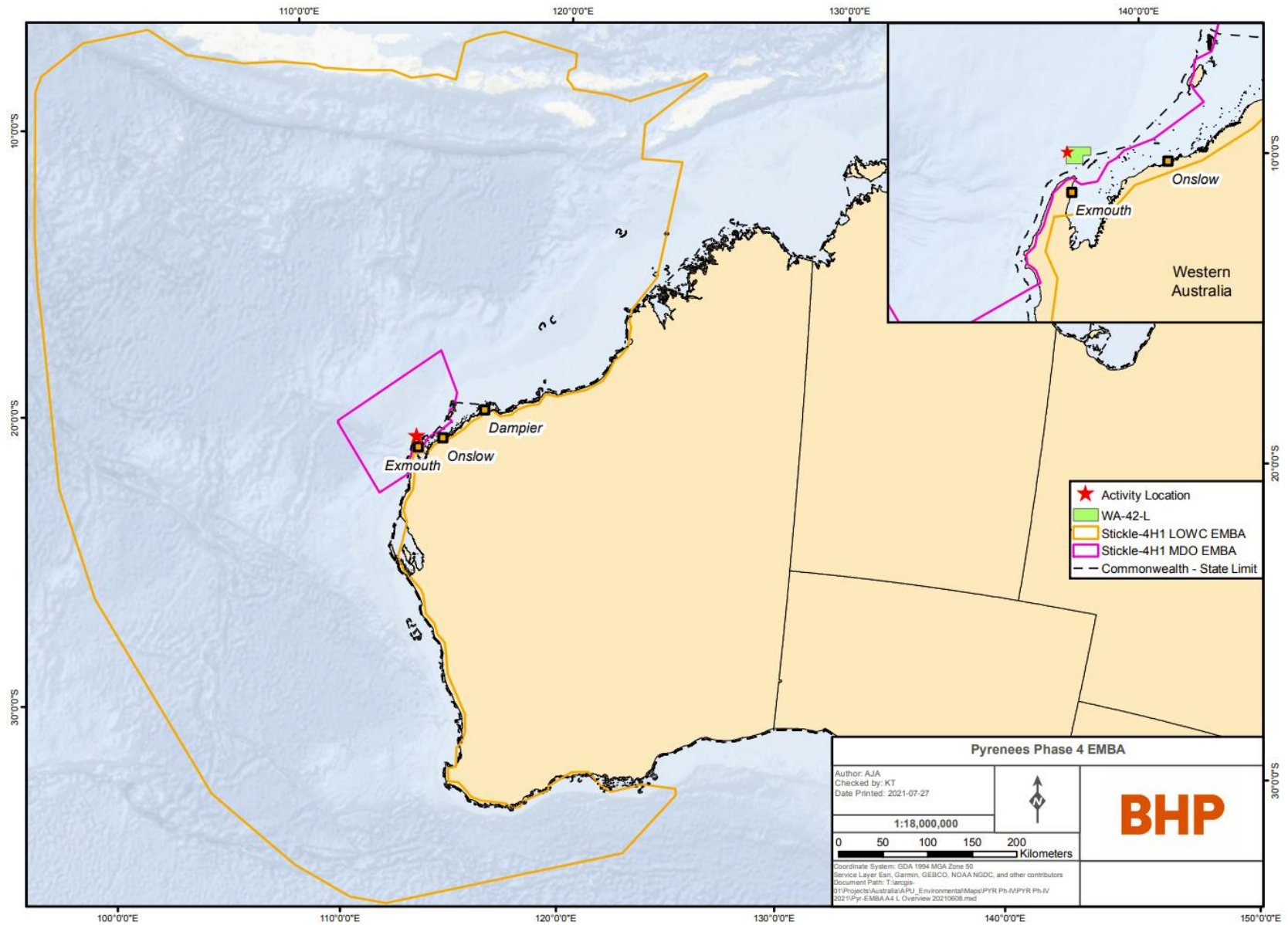


Figure 4-1: Pyrenees Phase 4 EMBA based on low hydrocarbon contact thresholds

4.2 Regional Setting

Australia’s offshore waters have been divided into six marine regions to facilitate their management by the Australian Government under the EPBC Act. The EMBA intersects both the North-West Marine Region (NWMR), and the South-West Marine Region (SWMR) of Australia, along with the Indonesian Exclusive Economic Zone. Within Australia, the EMBA intersects 15 bioregions based upon the Integrated Marine and Coastal Regionalization of Australia (IMCRA v4.0); eight of these bioregions are within the NWMR, five are within the SWMR and two others within the EMBA (the Christmas Island Province and the Cocos (Keeling) Island Province) are within the Australian Exclusive Economic Zone (EEZ) (Table 4-2).

The operational area for this activity is located in Commonwealth waters within the Northwest Province and Central Western Shelf Transition, in water depths of approximately 197-200 m (Figure 4-2). These bioregions fall within the NWMR, as defined under the Integrated Marine and Coastal Regionalization of Australia, these bioregions are based on fish, benthic habitats, and oceanographic data (IMCRA v4.0).

Table 4-2 Australian Bioregions within the EMBA

Bioregion	Presence		
	Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
North-West Marine Region			
Northwest Shelf Transition	x	✓	✓
Northwest Shelf Province	x	✓	✓
Northwest Province	✓	✓	✓
Northwest Transition	x	✓	✓
Timor Province	x	✓	✓
Central Western Transition	x	✓	✓
Central Western Shelf Transition	✓	✓	✓
Central Western Shelf Province	x	✓	✓
South-West Marine Region			
Central Western Province	x	✓	✓
Southwest Shelf Transition	x	✓	✓
Southwest Transition	x	✓	✓
Southwest Shelf Province	x	✓	✓
Southern Province	x	✓	✓
Other			
Christmas Island Province	x	✓	✓
Coco (Keeling) Island Province	x	✓	✓

4.2.1 North-West Marine Region

The NWMR encompasses Commonwealth waters from the WA/NT border in the north, to Kalbarri in the south (Director of National Parks, 2018). The region's north-western boundary is defined in accordance with the Perth Treaty negotiated with the Republic of Indonesia and includes area over which Australia exercises jurisdiction over both the water column and the seabed and its associated resources (DSEWPaC, 2012a).

The NWMR consists entirely of continental slope and is characterised by muddy sediments and water depths that predominantly range between 1,000-3,000 m (DEWHA, 2008a). The Exmouth Plateau is the dominant topographical feature within the North West Province and is an important feature as it modifies the flow of deep waters and contributes to uplifting of deeper, more nutrient-rich waters.

The inner shelf component of the North West Province with water depth ranges from 30-60 m is virtually flat and overlain by sparse sandy substrata. Relict sediments are also present and rhodolith beds of coralline red algae growing on rocks occur between 30-90 m (DEWHA, 2007). In the deeper waters of the mid shelf (60-100 m), sediments are comprised of sands and gravels on cemented hard grounds. It is reasonably barren substratum with 50% comprising relict reworked material (e.g., ooid old shoal) and hence there is little recent organic material, and the substrata support a generally low biota (DEWHA, 2007). The sediments of the outer shelf (100-200 m) comprise sands and gravels, transitioning to muds with increasing distance offshore. Detrital rain transports some organic material to the seafloor however there is believed to be very few benthic living organisms on this outer shelf (DEWHA, 2007).

4.2.2 South-West Marine Region

The SWMR comprises Commonwealth waters from the eastern end of Kangaroo Island in South Australia to Shark Bay in WA and can be divided into four major physiographic provinces: Rottneest, South-West, Great Australian Bight and Spencer and St. Vincent Gulfs.

The marine environment of the SWMR has high biodiversity and large numbers of species native to the region (known as endemism). The region is increasingly recognised as an area of global conservation significance for species of rare and endangered marine mammals and seabirds. The biological productivity of the SWMR is low in comparison with other marine regions. The most significant known influence on ecosystem structure and function in the SWMR is the Leeuwin Current. The current is stronger in winter than in summer and has three main influences: suppressing upwelling, maintaining warm-water communities much further south than they would normally occur, and driving inter annual variability in settlement of western rock lobster (DSEWPaC, 2012c).

4.2.3 Christmas Island Province

This bioregion surrounds Christmas Island and covers a total area of 277,180 km² with water depths ranging from 0 - 6,545 m. This bioregion contains the fourth largest abyssal plain/deep ocean floor area and smallest area of slope of all the bioregions (DEH, 2005a). Waters support a suite of marine species typical of Indian Ocean tropical reefs. The recorded marine species diversity includes 88 coral species and over 600 fish species, including the whale shark (*Rhincodon typus*) and several other shark species, as well as hybrid fish. The green turtle (*Chelonia mydas*) and hawksbill turtle (*Eretmochelys imbricata*), are found in the offshore waters (DNP, 2014a).

4.2.4 Cocos (Keeling) Island Province

This bioregion surrounds Cocos (Keeling) Island and covers a total area of 467,260 km² with water depths ranging from 0-6,468 m. This bioregion contains the largest abyssal plain/deep ocean floor area of all the bioregions. Due to the similar geomorphology and location adjacent to Indonesia, the fauna contained in this bioregion is probably similar or related to the fauna associated with the Christmas Island Province (DEH, 2005b).

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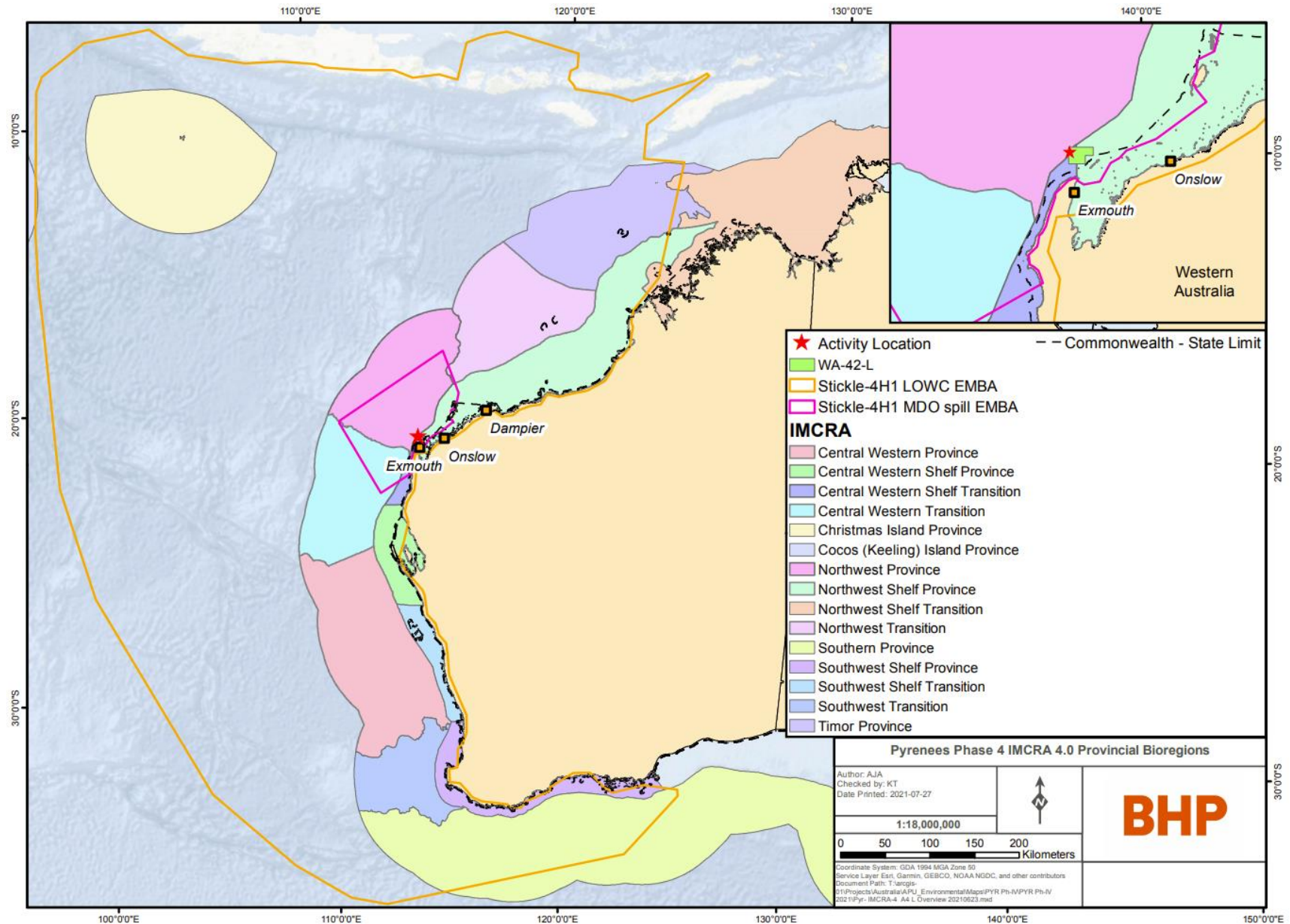


Figure 4-2: IMCRA provincial Australian bioregions within the EMBA

4.2.5 Indonesian Exclusive Economic Zone

The EMBA extends into the Indonesian Exclusive Economic Zone (EEZ) (Figure 4-3) along the southern borders of Banten, West Java, Central Java, East Java, Bali, West Nusa Tenggara and East Nusa Tenggara. These areas support commercial and subsistence fishing, industry, recreation and tourism.

Due to the similar geomorphology and location adjacent to Cocos (Keeling) and Christmas Island Province, the fauna of these areas of Indonesia are expected to be similar or related to fauna from these Australian Bioregions (DEH, 2005a).

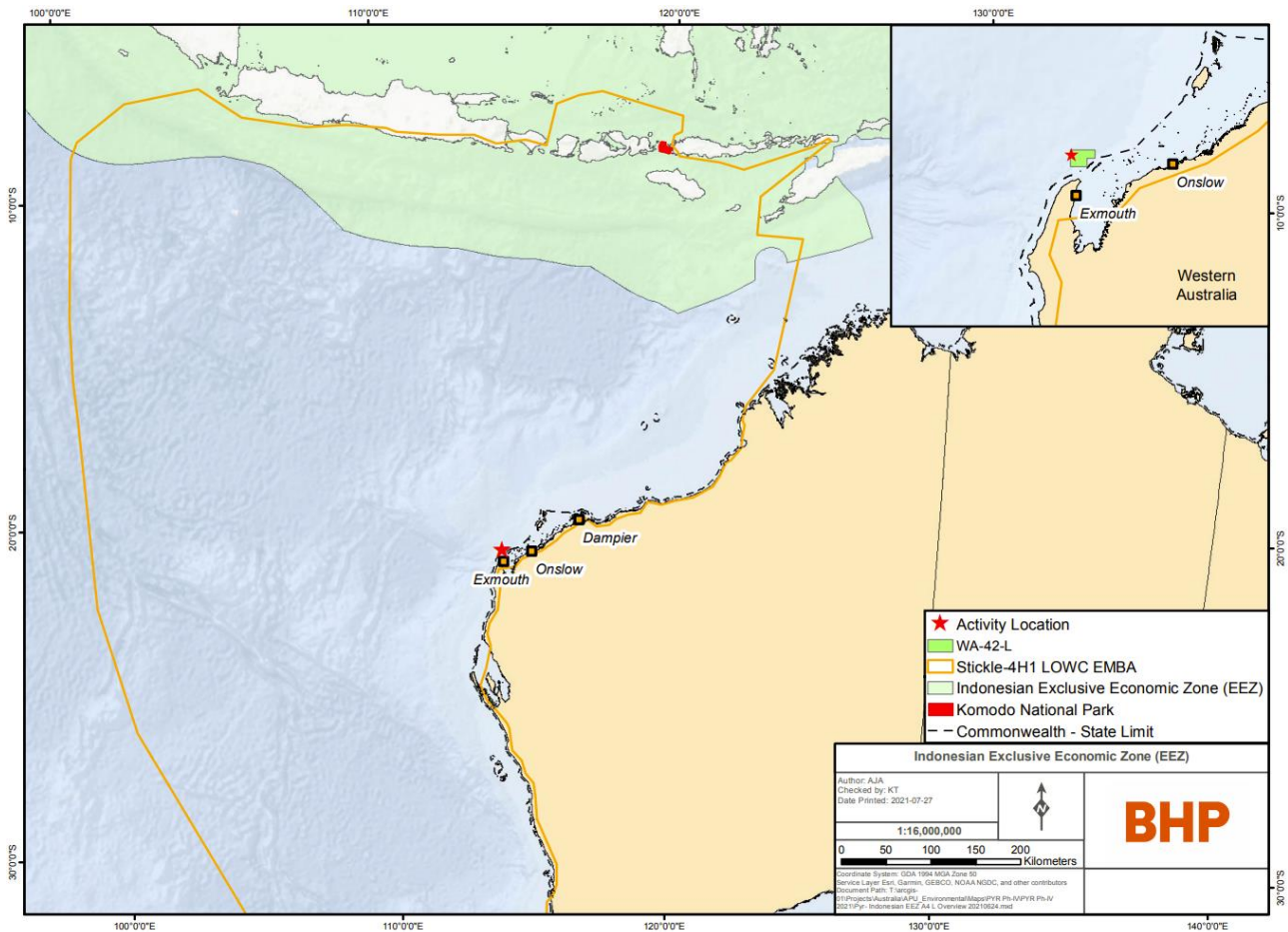


Figure 4-3: Indonesian Exclusive Economic Zone

4.3 Physical Environment

4.3.1 Climate and Meteorology

North-West Marine Region

The NWMR experiences an arid sub-tropical climate and a distinct summer monsoonal “wet” season from November to February followed by a typically cooler winter “dry” season (ANRA, 2013). Historical rainfall data shows the highest mean monthly rainfall occurs from January to March (BoM, 2020). The climate is controlled by two major atmospheric pressure systems: Indian Tropical Maritime air moving in from the west or north-west, and the tropical continental air from the inland (ANRA, 2013).

The northwest coast between Broome and Exmouth experiences on average about five tropical cyclones between November and April each year (BOM, 2012a). Cyclones can bring vast amounts of rain to the area, with strong swell and rough seas common during these meteorological events. Most cyclones approach the region from the east-northeast, veering to a southerly track the further south they go (BOM, 2012a). Observations from the Learmonth weather station are summarised in Table 4-3.

Sea surface wind data was sourced by GHD (2021a) from the National Centre’s for Environmental Predictions (NCEP) Climate Forecast System, version 2 (CFSv2) (Suranajana *et al.*, 2014). Average monthly wind direction and monthly wind roses for the CFSv2 node nearest to the operational area are provided in Figure 4-4 and Figure 4-5. Wind data shows May to August inclusive are characterised by predominately southerly to easterly average winds. South-westerly average winds prevail from October to March. April and September are transitional periods with predominantly southerly average winds.

Table 4-3: Meteorological conditions (for Learmonth) representative of the operational area within the NWMR

Month	Mean Maximum Monthly Temperature (°C)	Mean Minimum Monthly Temperature (°C)	Mean Rainfall (mm)
January	37.9	23.0	31.2
February	37.5	24.1	41.1
March	36.4	22.9	41.4
April	33.2	20.4	17.8
May	28.5	16.1	43.3
June	24.8	13.1	42.5
July	24.2	11.4	22.3
August	26.4	12.1	11.7
September	29.4	13.8	1.9
October	32.8	16.4	1.6
November	34.6	18.5	1.8
December	36.9	20.8	6.2
Annual Average	31.9	17.7	259.6

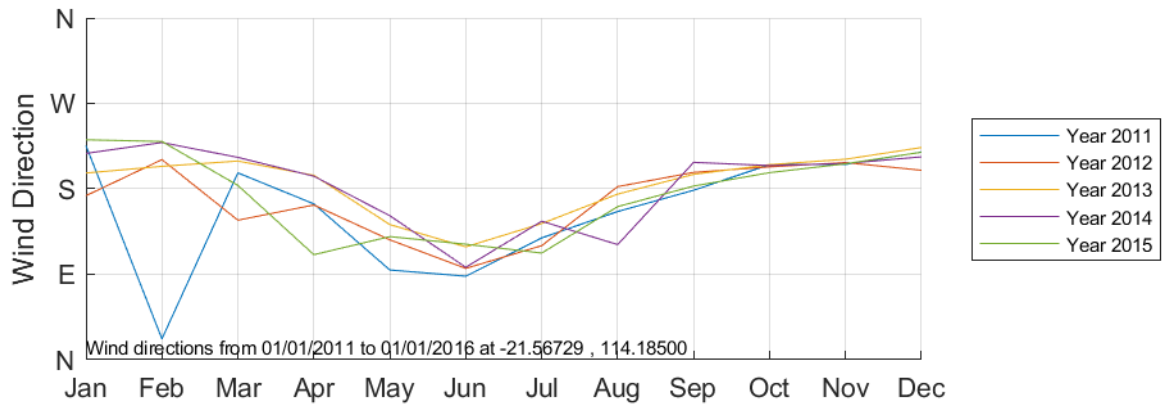
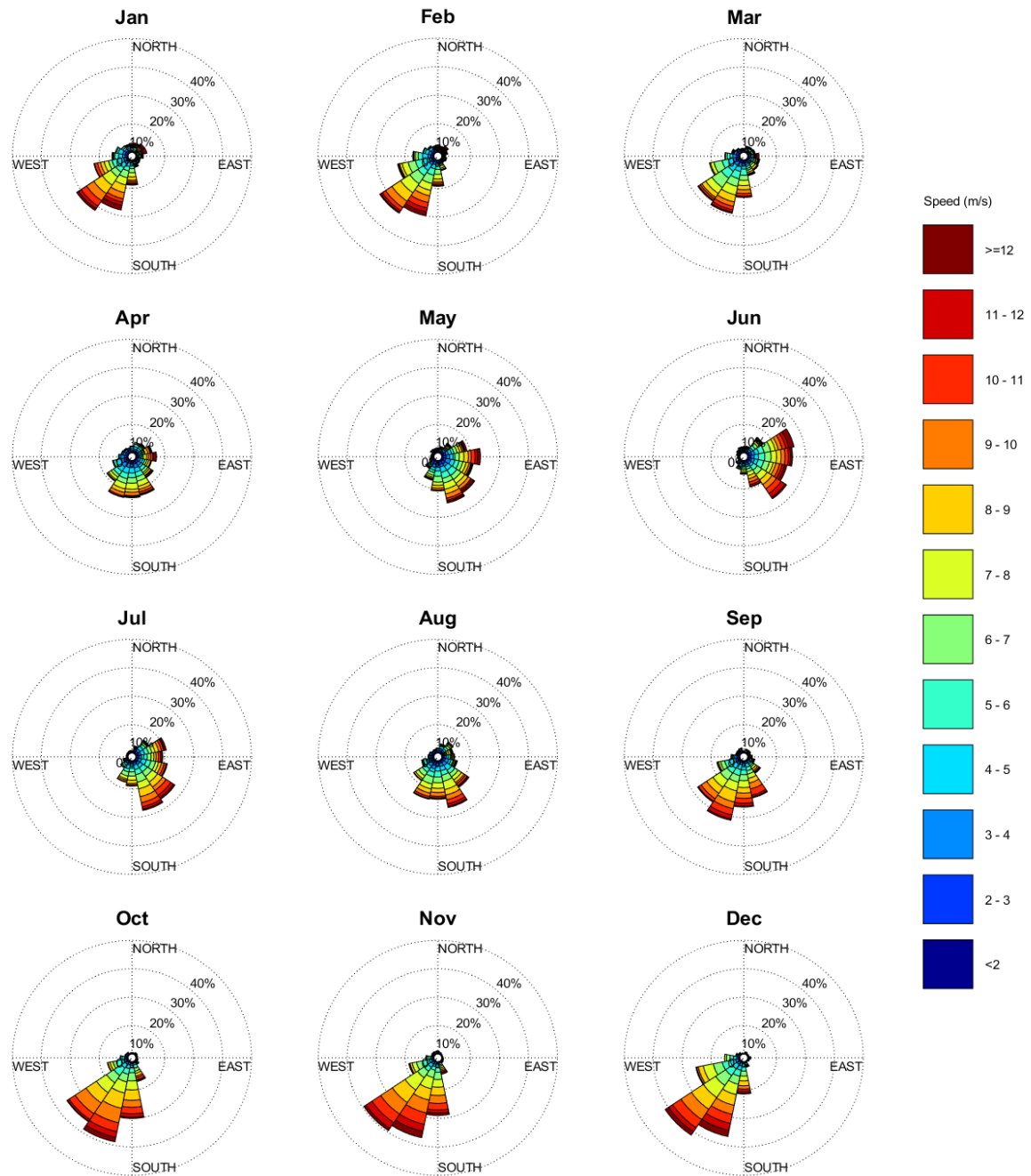


Figure 4-4: Average monthly wind direction representative of the operational area



Wind roses from 01/01/2011 to 01/01/2016 at -21.56729 , 114.18500

Figure 4-5: Average monthly wind roses representative of the operational area

South-West Marine Region

Waters in the south-west and southern WA experience a Mediterranean style climate. In winter, with warm wind from the north, the temperature can exceed 20°C, while at other times, a bit of cold air of Antarctic origin can arrive, lowering the night temperature almost to freezing. During summer, hot and dry wind from the north-east, which comes from the desert, can become really intense, with air temperatures reaching above 40°C. Historical rainfall data indicate that the highest rainfall occurs in winter (June to August), while the lowest rainfall occurs in summer (December to February) (Charles *et al.*, 2010).

The south-west and southern WA wind patterns are characterised by a prevailing westerly wind stream in winter. This enables winter cold fronts and strong westerly winds to regularly penetrate the south-west, with

cold fronts crossing the coast every week or so. Apart from the passage of storms, the weather is otherwise mild in winter with winds variable and relatively weak. In summer, cold fronts rarely penetrate into the south of the state with any strength and hot easterly winds prevail.

4.3.2 Oceanography

Currents and Tides

The NWMR region is a dynamic oceanographic environment, influenced by strong tides, cyclonic storms, long-period swells and internal tides (DEHWA, 2008a), while the SWMR has complex and unusual oceanographic patterns, driven largely by the Leeuwin Current and its associated currents (DEHWA, 2008b).

North-West Marine Region

The oceanography of the NWMR is strongly influenced by the warm, low salinity waters of the Indonesian Through Flow (ITF), which influences the upper 1,250 m of the water column (DEHWA, 2007b). While the origin and movement of shelf waters such as those in the permit area are not well understood, it is believed that ITF waters flood the shelf via the Eastern Gyral Current and the Leeuwin Current (Table 4-4).

Surface currents are subject to strong seasonal variations; the Eastern Gyral Current intensifies during July-September and the Leeuwin Current is strongest in autumn and weakens from December to March.

Below the main thermocline the water column is influenced by Banda Intermediate Water from the north, and Sub-Antarctic Mode Water and Antarctic Intermediate Water from the south (DEHWA, 2007). In addition to the major surface and subsurface currents, a number of smaller, localised currents also occur nearshore such as the Capes Current, the Ningaloo Current and the Shark Bay Current (Figure 4-6). In addition to seasonal variability, the oceanography of the region exhibits inter-annual variability, with winds driving the thermocline to shallower depths reducing sea level and sea surface temperature resulting in a weakening of the ITF and Leeuwin Current during El Niño/Southern Oscillation and reversing in La Niña years (DEHWA, 2007). There is evidence of a strong northward current between 200 m and 500 m in this area which may be an off shoot of the Eastern Gyre (DEHWA, 2007).

Table 4-4 presents the average and maximum combined current speeds (ocean plus tides) in the vicinity of the operational area. Data shows monthly average ranges from between 1.9 m/s and 0.35 m/s, with currents predominantly flowing towards the south-south-west.

Tides in the region are semi-diurnal (i.e., there are two high tides and two low tides each day). Spring tides (the highest tidal range each month) are about 1.6 m, while neap tides (the lowest tidal range) are about 0.6 m. The tides run on a northeast and southwest axis, and the maximum speed of the tidal streams is about 0.5 m/sec. Wind driven surface currents reflect the prevailing seasonal wind directions, which are predominantly from the south-west during summer and from the east, southeast and south during winter. These prevailing winds generate surface currents of about 0.2 to 0.3 m/sec in the direction of the prevailing wind (Woodside, 2002).

South-West Marine Region

Similar to the NWMR, the SWMR is influenced by a complex system of ocean currents (DEHWA, 2008d). The Leeuwin Current however has a major influence on the biological productivity of ecosystems and biodiversity in the region. It originates in tropical waters of the Indian Ocean as a result of a large-scale difference in water density between warmer, lower salinity waters flowing through the Indonesian Archipelago and the cooler more saline waters off south-western Australia (DEHWA, 2008b). The Leeuwin current flows all year round although the strength of the flow is significantly stronger in winter and weaker in the summer (DEHWA, 2008d). Meso-eddies are formed through the interaction of the Leeuwin Current with seafloor features at the shelf break (DEHWA, 2008d).

Tides in the South-West Province are micro-tidal and have a small tidal range of <0.5 m around the Rottnest Shelf and Albany, to 0.7 m around Esperance (Sanderson *et al.*, 2002 cited in Richardson *et al.*, 2005).

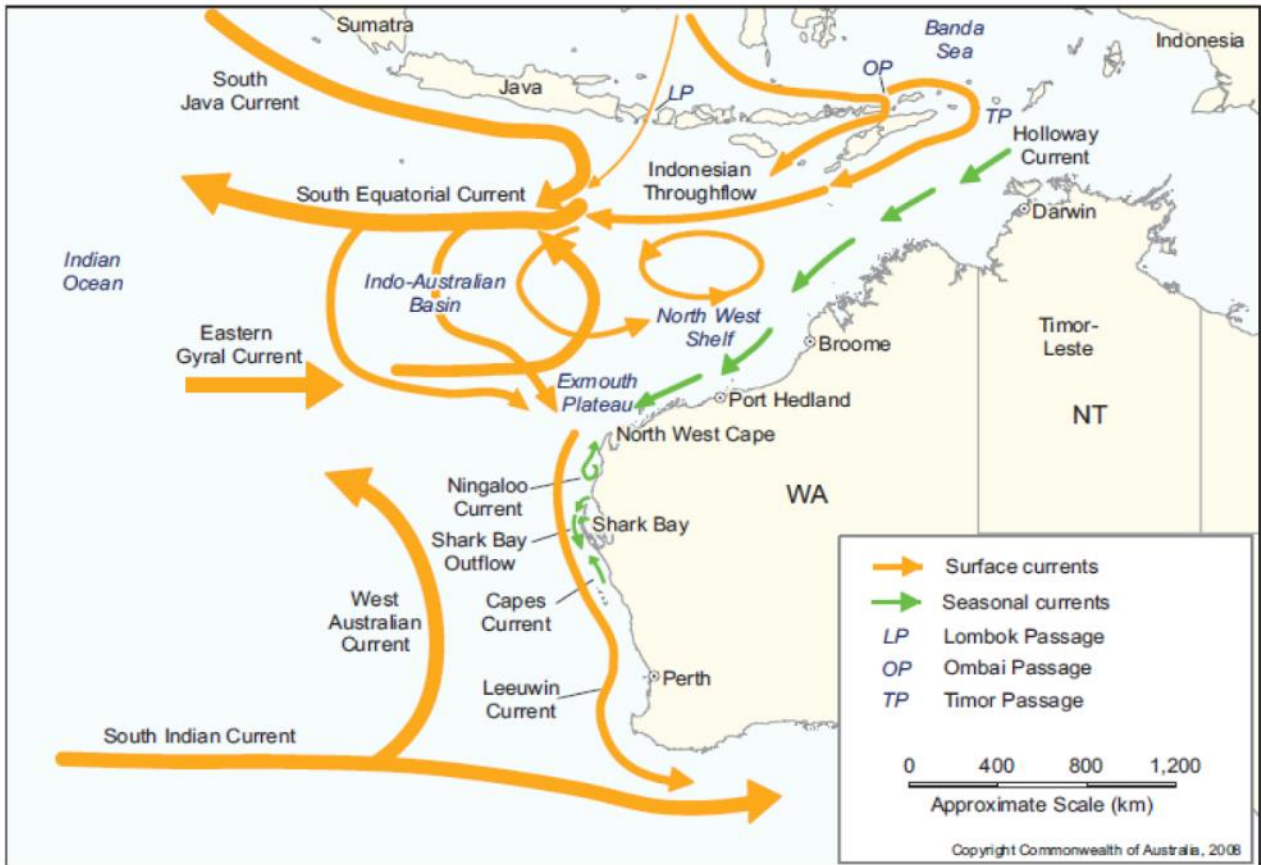


Figure 4-6: Major ocean currents influencing Western Australia (DEWHA, 2008a)

Table 4-4: Predicted average and maximum surface current speeds at the closest station to the operational area

Month	Average Current Speed (m/s)	Maximum Current Speed (m/s)	General Direction (towards)
January	0.31	1.08	West-southwest
February	0.30	1.13	West
March	0.35	1.14	West-southwest
April	0.23	0.51	West-southwest
May	0.26	0.66	West-southwest
June	0.27	0.63	West-southwest
July	0.21	0.51	West-southwest
August	0.19	0.49	West-southwest
September	0.20	0.50	West-southwest
October	0.21	0.52	West
November	0.24	0.73	West
December	0.23	0.81	West
Minimum	0.19	0.49	
Maximum	0.35	1.14	
Annual Average	0.25	0.73	

Waves

North-West Marine Region

The wave regimes in the NWMR are caused by the combination of sea waves and swells. Sea waves occur predominantly from the south-west throughout the year, with more easterly waves experienced in Winter, while the largest swells generally occur from June to October (Woodside, 2002; Pearce *et al.*, 2003). Therefore, the largest total waves (sea waves combined with swell) occur from June to September, with April and May the calmest months, noting only 10% of significant wave heights off Dampier exceed 1.2 m, with average wave height being 0.7 m (Pearce *et al.*, 2003). However tropical cyclones can generate extreme swells, generally from the north-east.

South-West Marine Region

In the SWMR, swell and storm waves from the Southern and Indian Oceans are dominant on the Rottneest Shelf. Swell waves up to 2 m high come from the west and south-west throughout the year. Storm waves up to 10 m high generate significant seas on the southern Rottneest Shelf in winter and spring (Richardson *et al.*, 2005). High modal, deep water waves and long period swell waves from the south-west are predominant in the South West Province. Wave heights have been recorded at over 2.5 m around Cape Leeuwin, where the coast is most exposed to the south-west swell (Richardson *et al.*, 2005).

Water Temperature and Salinity

North-West Marine Region

The average sea surface temperature within the NWMR ranges from 20°C to 24°C during winter and 24°C to 28°C during summer (BOM, 2012b). There is likely to be a distinct thermocline in deep offshore waters, associated with the warming influence of the Leeuwin current, which overlays colder, more saline, deeper

ocean waters that vary seasonally (DEWHA, 2008a). Salinity is relatively uniform at 35 parts per thousand (ppt).

South-West Marine Region

On the northern Rottneest Shelf of the SWMR, sea surface temperatures range from 18°C in winter to 26°C in summer (Richardson *et al.*, 2005). Temperatures fall below 20°C for up to 20% of the year (Richardson *et al.*, 2005). On the southern Rottneest Shelf, sea water temperature ranges from 15–20°C, with very little variation in temperature with depth.

The Leeuwin current is known to bring relatively warm, low-salinity, nutrient-poor water from the tropics into the SWMR (Richardson *et al.*, 2005). The Leeuwin current hinders upwelling, resulting in low productivity.

Bathymetry and Geomorphology

North-West Marine Region

The seafloor of the NWMR consists of four general feature types: continental shelf; continental slope; continental rise; and abyssal plain (or deep ocean floor). The majority of the region consists of either continental slope or continental shelf. Seabed sediments are expected to comprise of bio-clastic, calcareous and organogenic sediments that were deposited by relatively slow and uniform sedimentation rates. The region is made up of a tropical carbonate shelf dominated by sand and gravel to 15° latitude, while the outer shelf/slope zone is dominated by mud (Baker *et al.*, 2008). It has a relatively homogenous rise and abyssal plain/deep ocean floor that is dominated by non-carbonate mud because it occurs below the carbonate compensation depth (Baker *et al.*, 2008).

Major contributors to sediment mobilisation in the NWMR include storm events, including tropical cyclones; internal tides; and ocean currents, including the Leeuwin current (Baker *et al.*, 2008). Sediments of the middle shelf region are predominantly influenced by tidal processes, including internal tides (Baker *et al.*, 2008).

The two main elements of the continental shelf in this region are the Dirk Hartog Shelf to the west of North West Cape and Rowley Shelf to the northeast. The Dirk Hartog Shelf varies in width from 40 km wide to the south of North West Cape, to only 9 to 15 km wide on a direct line between the Pyrenees area and the cape. It is relatively gently sloping and underlain by Pleistocene limestone or mudstone, occasionally exposed but mostly covered by a veneer of sediments of varying thickness. Where the sediment forms a thin layer over the base, the sediment veneer typically consists of coarser sands. Medium and fine sands interspersed with patches of coarser sands usually characterise the deeper sediments.

Approaching the coastline, the Dirk Hartog Shelf rises abruptly to the outer barrier reef, which consists of limestone and coral. The Ningaloo Reef comprises a partially dissected basement of Pleistocene marine or Aeolian sediments, or Tertiary limestone covered by dead or living coral. The reef flat is on average several hundred metres wide (CALM/MRPA, 2005a) and separated from the coastline by a lagoonal area. Sediments in the lagoon are generally coarse calcareous sand with finer calcareous sand or silt in deeper basins and gutters (CALM/MRPA, 2005a). These longshore drainage channels skirt the shoreward edge of the reef and may be up to 12 m deep (CALM/MRPA, 2005a). The underlying limestone may occasionally be exposed as bare pavement where the sand veneer has been swept away.

Continuing on from North West Cape, the Muiron Islands are low dome-shaped, limestone islands separated by a deep navigable channel. The continental shelf is much broader to the northeast of the Cape, sloping away from the Muiron Islands to the shelf break some 30 km seaward. The western shores of the islands are characterised by limestone cliffs fronted by sandy beaches, reef flats and inter-tidal limestone pavements and rubble deposits. The eastern shores of the islands comprise sandy beaches backed by low dunes. They have gently sloping subtidal sand with patch reefs and coral bommies, eventually levelling out to muddy, soft substrata.

Detailed bathymetry, side-scan sonar and high-resolution seismic surveys were undertaken in February 2005 to accurately map water depth and to detect seabed geophysical and geotechnical sediment characteristics at the nearby Pyrenees Facility. Seabed cores were also obtained to assist in interpretation of data. The western portion of the seabed in the area (190 to 260 m depth) is characterised by gravely fine to coarse carbonate

sands, while the seabed sediments in the eastern part of the area (190 to 200 m depth) are soft, fine sediments, mainly carbonate silts and clays.

South-West Marine Region

The SWMR can be divided into four major physiographic provinces: Rottneest, South-West, Great Australian Bight and Spencer and St. Vincent Gulfs. These divisions are based on major geomorphic and sedimentary provinces in the region. The EMBA overlaps with the Rottneest and South-West physiographic provinces (Richardson *et al.*, 2005).

The Rottneest province is characterised by narrow, incipiently-rimmed shelf with submerged ridges and tropical carbonate platforms, an extensive continental slope dissected by numerous submarine canyons, a well-developed continental rise and an extensive area of deep abyssal plain. The Perth Canyon, which is the largest canyon on the Australian margin and a major biogeographical boundary is part of this province (Richardson *et al.*, 2005). Seabed sediments of the Rottneest province of the SWMR are predominantly cool-water carbonates, with shelf-parallel cool-water carbonate facies on the shelf and warm-water tropical carbonate facies on reef platforms (Richardson *et al.*, 2005)

The South-West province is characterised by a narrow continental shelf with nearshore reefs and islands, a slope incised by numerous well-developed submarine canyons, mid-slope terraces, an extensive continental rise and the deepest marginal plateau on the Australian margin, the Naturaliste Plateau. This plateau forms a biogeographical 'island' separate from the shelf and slope. The South-West province has the largest abyssal plain in the region, and a broad area of unique and complex topography comprising abyssal hills, ridges and troughs. Shelf sediments are typical cool water bryozoans, molluscs and coralline algae components and generally occur as thick discontinuous sheets over rocky or algal substrates. On the platforms, zooxanthellate coral fragments reflect warm-water sediment types (Richardson *et al.*, 2005).

4.4 Biological Environment

4.4.1 Deep Water Benthic Habitats

The continental slope and shelf are, for the most part, ecosystems built on a soft sediment habitat with gradational variation in species composition due to depth, water temperature, light penetration, and sediment composition/structure. It consists of generally sparse populations of sessile sponges, soft corals, and algae (at shallower depths), with a mobile population of burrowing crustaceans, echinoderms, and molluscs.

Seabed communities in the operational area are relatively sparse, with diversity and abundance tending to decrease with increasing depth, except where occasional areas of exposed or outcropping rock occur, resulting in localised increases of abundance and diversity. Soft sediment communities are dominated by invertebrate infauna, including polychaetes, crustaceans, molluscs, echinoderms and sponges. Exposed or outcropping rocky areas are dominated by sponges, soft corals and gorgonians, with various finfish, ascidians, crustaceans, echinoderms (urchins and brittle stars), polychaetes and molluscs also occurring. Video footage from a sled towed across parts of the adjacent Pyrenees Facility area showed rippled sediment, with rocky nodules and sparse but reasonably even distribution of sponges and soft corals. Typically, soft corals or sponges were seen attached to these small patches of hard substrate, with fish and other invertebrates gathered around (AIMS, 2002).

4.4.2 Shallow Water Benthic Habitat

The distribution of shallow water and coastal benthic habitats of the Ningaloo Reef and Muiron Islands is well understood. Perhaps the most comprehensive study of habitats of Ningaloo Reef and Muiron Islands is the recent work conducted by the Ningaloo Collaboration Cluster (Kobryn *et al.*, 2011), and funded in part by BHP, to provide a highly resolved classification of benthic habitats associated with the reef and coastal shallow waters. In summary, analysis of the habitat characterisation showed that the majority (54%) of the benthic cover is composed of macroalgal and turfing algae communities, while hard and soft coral cover represents only 7% of the mapped area (762 km²).

Coral Reefs

Corals are both primary producers and filter feeders and thus play a role in the provision of food to marine fauna and in nutrient recycling to support ecosystem functioning (CALM, 2005a). Corals create settlement substrate and shelter for marine flora and fauna. Studies have shown that declines in the abundance, or even marked changes in species composition of corals, has a marked impact on the biodiversity and productivity of coral reef habitats (Pratchett *et al.*, 2008).

As part of the reef building process, scleractinian corals are also important for protection of coastlines through accumulation and cementation of sediments and dissipation of wave energy (CALM, 2005a).

The waters in the NWMR contain extensive coral communities. Coral reefs within the region can be categorised into three general groups: fringing reefs, large platform reefs, and intertidal reefs. The distribution of corals in area is governed by the availability of hard substrate for attachment and light availability.

Coral reefs are dynamic environments that regularly undergo cycles of disturbance and recovery. Depending on how frequent and severe the disturbances are, recovery can take a few years or more than a decade. Disturbances can include sedimentation, cyclones and disease outbreaks (Haapkylä *et al.*, 2013). Coral susceptibility to bleaching and their ability to recover is an important consideration in the context of potential anthropogenic impacts.

In Western Australia, 318 species of scleractinian corals from 70 genera have been recorded. Of these, 53 genera and over 250 different species of coral have been recorded so far on Ningaloo Reef, including representatives from all 15 families of corals (Veron and Marsh, 1988) dominated by Acroporidae and Faviidae.

Reef building corals are the most visible and identifiable component of coral reef ecosystems. Smaller coral communities tend to form in the region wherever a hard substratum is available. Reef building corals are generally restricted to the upper photic zone due to the dependence of their unicellular endosymbionts (commonly known as zooxanthellae) on light. This in turn drives photosynthesis, providing reef-building corals with the majority of their energy requirements (Muscatine, 1990). Consequently, the majority of coral habitat is present in shallow water, in particular on subtidal platforms that border most of the mainland and islands.

Each year, most of the corals on the reef undergo one or two mass synchronous spawning events. These spawning events usually happen over three or four nights in March and/or April, during the evening neap tide seven to ten days after the full moon (Simpson *et al.*, 1993). There may also be smaller synchronous spawning events during other times of the year. Coincident with these events, large swarms of krill have been detected in the shallow coastal waters offshore from Ningaloo Reef from March to June. No aggregations of larger zooplankton (such as krill) were found during an AIMS field study of offshore waters in the vicinity of the Pyrenees Facility in May 2001 and April 2002 (McKinnon *et al.*, 2002). However, many aggregations were found in the shallow near-shore waters of Ningaloo Reef.

The hyperspectral data collected via Kobryn *et al.* (2011) (125 spectral bands between 450 to 2,500 nm and an average spectral resolution of 15 nm) was acquired in 2006 at 3.5 m ground resolution. The total area of the survey covered 3,400 km², encompassing Ningaloo Reef to a depth of approximately 20 m, as well as the coastal strip adjacent to the NMP. There were 5,854 hectares (ha) of coral mosaics mapped along the Ningaloo Reef. The single largest coral mosaic type was continuous tabulate coral (2,155 ha or 37% of all corals). The majority of the coral classes (66%) were a mix of dense to continuous tabulate coral, sparse digitate coral, soft coral and sparse sub-massive and massive corals. Continuous to patchy digitate and tabulate coral made up approximately 10% of the coral cover, while the branching coral species *Acropora* was approximately 8.5%. The majority of the hard coral occurred as either very dense (continuous >90%) cover or as patchy distribution (20 to 45%). Approximately 15,200 ha (21%) of the mapped habitats were in close proximity to the shore (0 to 500 m).

This dataset represents an unprecedented baseline dataset with a spatial extent that spans about 300 km from Bundegi in the north to Red Bluff in the south and includes the Muiron Islands.

Ningaloo Reef and the reefs around the Muiron Islands support a number of habitats, including:

- The outer reef slope is relatively short and steep, extending from sea level to about 10 m depth. It may be undercut or extend seaward into a series of spurs and grooves, often supporting a rich coral growth. The fore reef community is highly diverse with live coral cover over the sloping spur and groove reef.
- The reef crest or outer reef rim is the highest part of the reef and thus most frequently exposed on low tides. It occurs as a narrow band only a few metres in width and distinguishable because of its height. There are occasional reef passes (deep channels), which allow the exchange of seawater and provide access to the lagoon for larger fauna on low tides. Reef crests, which have variable coral cover, are dominated by digitate *Acropora* and massive forms of *Goniastrea* and *Platygyra*.
- The reef flat is the extensive shallow area located on the shoreward side of the crest. At Ningaloo, it may be several hundred metres in width. Live corals occur throughout this area but do not frequently form a total cover due to frequent storm damage and other natural perturbations. The living coral overlies recently dead corals superimposed on Pleistocene aeolian and marine limestone/sandstone deposits. Reef flats have varying cover of rubble deposits and live coral, and sand can be a dominant feature of this area (e.g. as evidenced by the extensive sand areas in the northern section of the Yardie Creek region and adjacent to Point Cloates).
- There is an extensive lagoon system inside the Ningaloo Reef front along the western side of North West Cape. Different habitats in the lagoons include coral bommies, exposed rocky and sandy seabeds and deep holes and channels. The more stable sandy bottoms provide habitat for seagrasses and macroalgae (e.g. the area to the north of Coral Bay).

Corals may be present in all bioregions overlapping the EMBA, with the exception of the Northwest Province and Central Western Transition, which lie entirely in deep waters below the photic zone, and the Southwest Transition and Southwest Shelf Province, which occur in waters too cold to support tropical coral reef species.

Macroalgae Beds

Macroalgae are large, visible plants such as kelp, typically attached to hard substrata such as intertidal and subtidal rock platforms, limestone reefs, rock/rubble areas and dead or partially dead corals, typically in water depths less than 10 m but can occur in up to about 50 m (LeProvost Dames & Moore, 2000). Macroalgae are divided into three groups: Phaeophyceae (brown algae), Rhodophyta (red algae), and Chlorophyta (green algae). Macroalgal communities occur predominantly in the intertidal and subtidal waters of the region (up to depths of about 50 m), including limestone pavements, reefs and platforms, coral rubble and dead or partially dead corals (LeProvost Dames & Moore, 2000). *Ecklonia radiata* and *Sargassum sp.* are typically common in deeper areas.

The principal physical factors affecting the presence and growth of macroalgae include temperature, nutrients, water motion, light, salinity, substratum, sedimentation and pollution (Sanderson, 1997). They occur in moderate to high cover on exposed hard substrates, but typically have lower cover on hard substrates that are covered with a veneer of sediment (SKM, 2009). Macroalgae exhibit very high seasonal and inter-annual variation in biomass (Heyward et al., 2006), distribution, abundance and biodiversity (BHPBIO, 2011). The distribution of hard substrates therefore indicates areas that may support macroalgal communities, although abundance and diversity may fluctuate annually.

Macroalgae are susceptible to disturbance from factors such as sedimentation, scouring and turbidity but the marked seasonality in biomass, abundance, diversity and distribution suggests macroalgae are likely to be resilient to acute, short-term disturbance acting at local scales. Macroalgae may be more susceptible to impacts acting over longer time scales (years) and at certain times of the year, where recruitment at a regional scale could be affected. Indirect impacts affecting the numbers, distribution and community structure of herbivorous fish can also be expected to have impacts (either positive or negative) on macroalgal habitats (Vergès et al., 2011).

Brown algae (Phaeophyte) and red algae species such as *Sargassum* and *Dictyotales* tend to dominate the macroalgal communities in terms of biomass and abundance. Macroalgal communities are ecologically important, being highly productive and providing complex habitat for invertebrates, cryptic fish and juvenile fish of various species, and a direct food source for many species such as green turtles.

Beds of macroalgae, along with seagrass (refer to Section on Seagrasses) provide a major source of benthic production in coastal waters, and support a benthic invertebrate faunal community of high diversity and

abundance. Macroalgal beds also provide a complex habitat for cryptic fish and juvenile fish of various species, and a direct food source for many species such as green turtles. Large beds of macroalgae are known to occur around the Muiron Islands and on the eastern side of Exmouth Gulf (McCook *et al.*, 1995). Well-developed macroalgal communities also occur extensively along the Ningaloo Reef tract.

Benthic macroalgae are present in all regions overlapping the EMBA, with the exception of the Northwest Province and Central Western Transition, which lie entirely in deep waters below the photic zone.

Seagrass

Seagrasses are highly productive habitats that occur on intertidal flats and in shallow coastal waters worldwide from Arctic to tropical climates. Seagrass generally grows in soft sediments within intertidal and shallow subtidal waters where there is sufficient light and are common in sheltered coastal areas such as bays, lees of islands and fringing coastal reefs (McClatchie *et al.*, 2006; McLeay *et al.*, 2003). Water temperature, light penetration, sediment type, salinity, and wave or current energy control seagrass distribution.

Twenty-five species of seagrass have been recorded in WA, the highest diversity in the world (Masini *et al.*, 2009). Waters extending from Busselton to the Northern Territory (NT) border support predominantly tropical species although temperate species are also found, particularly between Busselton and Exmouth (Walker *et al.*, 1987). One species, *Cymodocea angustata*, is endemic to WA.

Areas occupied by seagrass exhibit marked seasonal and inter-annual variability and it is not clear why some areas of suitable substrate will support seagrass in one year but not the next. It appears that recruitment to what may otherwise be suitable substrate is haphazard, lending weight to the descriptions of these seagrass communities as ephemeral (CALM, 2005a).

Most of the known occurrences of seagrasses in the NWMR are from shallow waters less than 5 m in depth, although one species, *Halophila spinulosa*, has been observed in deeper water (10 to 20 m). Available information suggests that seagrasses in the region on the western side of Exmouth Gulf tend to form small meadows, which are sparse (rarely greater than 5 to 10% density) with a patchy distribution (McCook *et al.*, 1995). Seven different species have been recorded in the region of which *Halophila ovalis* is the most common of the seagrasses found on the western side of Exmouth Gulf. It is a tropical species and although widespread throughout the Ningaloo Reef and Rowley Shelf region, it is usually restricted to sparse and patchy occurrences. Seagrasses, including *Halophila*, are eaten by dugongs and also provide a complex habitat for juvenile fish and invertebrates of various species, and are therefore ecologically important.

Seagrass beds also occur in the shallow waters around the Muiron Islands.

Seagrass are present in all bioregions overlapping the EMBA, with the exception of the Northwest Province and Central Western Transition, which lie entirely in deep waters below the photic zone.

Other Benthic Invertebrates

The offshore marine environment from Busselton to the NT border is dominated by soft sediment seabeds; sandy and muddy substrates, occasionally interspersed with hard substrates covered with sand veneers; and rarely, exposed hard substrate. In shallow waters, non-coral benthic invertebrates may form part of the mosaic of benthic organisms found on hard substrates, alongside macrophytes and coral colonies. As light reduces with water depth, non-coral benthic invertebrates are the dominant community, albeit at low densities.

Benthic invertebrates comprise several types of feeding groups including deposit feeders, filter feeders, grazers and predators. The abundance, diversity, biomass and species composition of benthic invertebrates can be used as indicators of changing environmental conditions. The distribution and abundance of benthic invertebrate species may be influenced by a wide variety of physical parameters (e.g. substrate composition, water temperature, depth, dissolved oxygen concentrations, pH, salinity, sediment C/N ratios and hydrography). Spatial and temporal differences in benthic species composition may also be influenced by a range of biological factors (e.g. primary productivity, competition and acclimatisation). Natural seasonal and inter-annual changes in these variables can also modify recruitment success and mortalities of individual species, and consequently the community structure of the benthos (OzCoasts, 2020).

Other benthic invertebrates (non-corals) are expected to be present in all bioregions overlapping the EMBA.

4.4.3 Shoreline Habitats

Mangroves & Saltmarshes

Mangroves and saltmarshes are intertidal communities of plants that grow on the foreshores of coastal lakes and estuaries. These plants are adapted to salty conditions which most other vegetation cannot tolerate.

Mangroves are woody plants growing in the intertidal zone, running parallel to the shoreline or tidal creek systems, usually at the mean high water level. Mangroves exist in a constantly changing environment. Periodically the sea inundates the communities with salty water while, at low tide, especially during periods of high rainfall, they may be exposed to fresh water flows. Mangroves grow in intertidal mud and sand and are found wherever suitable conditions are present including wave dominated settings of deltas, beach/dune coasts, limestone barrier islands and ria-archipelago shores (Semeniuk, 1993). Mangrove plants have specially adapted aerial roots (pneumatophores) that provide for gas exchange during low tide (McClatchie *et al.*, 2006) and have evolved to adapt to fluctuating salinity, tidal inundation and fine, anaerobic, hydrogen sulfide rich sediment (Duke *et al.*, 1998).

They are an important source of primary production and are an important ecological component to the marine and coastal environment as they are a food resource for a range of species. Mangroves provide habitat and shelter for various birds and marine species, including juvenile reef fish species, rock lobster and prawns, increasing the importance of the protection of the discrete stands within the region. Their root system acts as a breeding ground and nursery for crustaceans and fish species, by providing protection from predation. Their extensive root system also reduces water velocity and energy, causing entrapment and deposition of suspended sediments. This provides stability and protection of coastlines by acting as a buffer zone and attenuating wave energy and current flow, reducing erosion and storm surge damage in coastal areas.

Six different species of mangroves are reported to occur within the region, with three species identified within the Ningaloo Marine Park. The dominant species is the white mangrove (*Avicennia marina*), with the spotted-leaved red mangrove (*Rhizophora stylosa*) and the ribbed-fruit orange mangrove (*Bruguiera exaristata*) existing in limited numbers (CALM/MRPA, 2005a).

Well-developed white mangrove communities occur along the eastern and southern sides of Exmouth Gulf, with a small fringing mangal occurring on the western shore of the Gulf to the south of Bundegi Reef. The largest mangrove community within the Marine Park is found within Mangrove Bay. The mangal is characterised by established trees to 5 m in height. Established mangrove stands can also be found associated with the Park's tidal creek systems, including a well-developed mangal within Yardie Creek. While the area of mangal is less than 0.1% of the Marine Park, the mangroves are considered to represent a unique community within the Ningaloo Reef system. There are no reported mangrove communities on the Muiron Islands or any of the offshore islands in the region (DEWHA, 2008a). Saltmarshes occupy the high tide zone and include plants such as sedges, rushes, reeds, grasses, succulent herbs and shrubs that can tolerate high soil salinity and occasional inundation with salt water (halophytic). Saltmarsh areas have low vegetation, often interspersed with bare patches or salt pans. They are typically dominated by dense stands of halophytic plants such as herbs, grasses and low shrubs. The diversity of saltmarsh plant species increases with increasing latitude (in contrast to mangroves). The vegetation in these environments is essential to the stability of the saltmarsh, as they trap and bind sediments. The sediments are generally sandy silts and clays, and can often have high organic material content. Saltmarshes provide a habitat for a wide range of both marine and terrestrial fauna, including infauna and epifaunal invertebrates, fish and birds. Relevant saltmarsh Threatened Ecological Communities (TEC) within the EMBA are further discussed in Section 4.5.7.

During 2009, shoreline ecological aerial and ground surveys were conducted from Darwin in the NT to Broome in WA in response to the Montara oil spill (Duke *et al.*, 2010). Approximately 5,100 km of shoreline was surveyed, analysed and mapped to quantitatively characterise coastal ecological features. Mangroves were found to grow along 63% of the surveyed shoreline and salt marshes occurred over 24% of the shoreline.

Mangroves are expected to be present in sheltered tropical and sub-tropical latitudes of the NWMR bioregions overlapping the EMBA, while saltmarshes may occur in all bioregions within the EMBA.

Sandy Beaches and Intertidal Sediments

Sandy beaches are those areas within the intertidal zone where unconsolidated sediment has been deposited (and eroded) by wave and tidal action. Sandy beaches can vary from low to high energy zones; the energy experienced influences the beach profile due to varying rates of erosion and accretion. Sandy beaches within the EMBA are expected to vary in length, width and gradient, and to be interspersed among areas of hard substrate (for example, sandstone) that form intertidal platforms and rocky outcrops. There is a wide range of variation in sediment type, composition, and grain size along the EMBA.

Sandy beaches provide habitat to a variety of burrowing invertebrates and subsequently provide foraging grounds for shorebirds (Garnet and Crowley, 2000). The number of species and densities of benthic macroinvertebrates that occur in the sand are typically inversely correlated with sediment grain-size and exposure to wave action, and positively correlated with sedimentary organic content and the amount of detached and attached macrophytes (Wildsmith *et al.*, 2005). However, the distributions of these fauna among habitats will also reflect differences in the suite of environmental variables that characterise those habitats (Wildsmith *et al.*, 2005).

Within the NWMR sandy beaches and intertidal sediments occur extensively along the Ningaloo coast, the western side of Exmouth Gulf and on the Northwest mainland (Onslow region). They are also found on many of the Northwest offshore islands, including but not limited to the Muiron Islands, the Barrow-Lowendal-Montebello island group and Thevenard Island. They represent an important habitat that supports burrowing crabs, mainly Ghost Crabs, and burrowing bivalve molluscs, as well as a diverse community of benthic infauna comprising polychaetes, crustaceans and gastropods. In addition, the beaches provide seasonally important habitat for turtle nesting and migratory seabirds and shore birds. Further details on coastline sensitivities can be found in the Joint Carnarvon Operations North West Shelf Sensitivity Mapping Report Part A (June 2012).

Some of the offshore islands with sandy beaches and intertidal sediments are also biologically important for breeding seabirds and migratory wading birds, for example Caspian Terns, Little Tern, Wedge-tailed Shearwaters and Ospreys breed on Serrurier Island and Airlie Island; and Wedge-tailed Shearwater breed on Bessieres Island. The intertidal beaches of some of the offshore islands such as the Muiron Islands and Serrurier and Thevenard Island are also important nesting areas for turtles.

Rocky Shores and Limestone Platforms

Rocky shorelines are found across the EMBA and are often indicative of high energy areas (wave action) where sand deposition is limited or restricted (perhaps seasonally or during a cyclone).

Rocky shore habitats are common along the Ningaloo coastline, offshore islands and western side of the Exmouth Gulf. They range in physical structure from relatively planar limestone/sandstone pavement to dissected low cliffs that provide a range of habitat niches. This habitat is also widespread heading south towards Perth. Rocky shores can include pebble/cobble, boulders, and rocky limestone cliffs (often at the landward edge of reef platforms).

Rocky shorelines are an important foraging area for seabirds and habitat for invertebrates found in the intertidal splash zone (Morton and Britton cited in Jones, 2004). The diversity of fauna increases with the increasing complexity of the substrate and is dominated by sedentary fauna of rock oysters, barnacles and burrowing bivalves, and a mobile fauna comprised largely of crabs, chitons and gastropod molluscs. Further details on coastline sensitivities can be found in the Joint Carnarvon Operations North West Shelf Sensitivity Mapping Report Part A (June, 2012).

Wetlands

Wetlands are areas of land where water covers the soil – all year or just at certain times of the year. Wetlands may be natural or artificial and the water within a wetland may be static or flowing, fresh, brackish, saline or underground.

Wetlands play a critical role in protecting our shores from wave action, reduce the impacts of floods, absorb pollutants and improve water quality. They provide habitat for animals and plants and many contain a wide diversity of life, supporting plants and animals that are found nowhere else. Wetlands provide an important range of environmental, social and economic services. Many wetlands are areas of great natural beauty and many are important to Aboriginal and Torres Strait Islander people (DAWE, 2020g). Wetlands also provide

important benefits for industry. For example, they form nurseries for fish and other freshwater and marine life, and are critical to Australia's commercial and recreational fishing industries (DAWE, 2020g).

The EMBA overlaps ten wetlands of international importance (Ramsar wetlands), and 44 wetlands of national importance (see Section 4.5.5 for further description of these wetlands).

4.4.4 Plankton

Plankton consists of microscopic organisms typically divided into phytoplankton (algae) and zooplankton (fauna including larvae). Plankton play a major role in the trophic system with phytoplankton being a primary producer and zooplankton a primary consumer. They are both in turn consumed by other fauna species.

Phytoplankton are autotrophic planktonic organisms living within the photic zone and spend either part or all of their lifecycle drifting with the ocean currents. Phytoplankton are dependent on oceanographic processes (e.g. currents and vertical mixing), that supply nutrients needed for photosynthesis. Thus, phytoplankton biomass is typically variable (spatially and temporally) (Evans *et al.*, 2016), but greatest in areas of upwelling, or in shallow waters where nutrient levels are high. Peak primary productivity, however, varies on a local and regional scale.

The trophic system in the pelagic zone of the NWMR is based on phytoplankton (DEWHA, 2008a). The distribution of plankton is often associated with localised and seasonal productivity that results in sporadic bursts of phytoplankton and zooplankton communities (DEWHA, 2008a). However, in general, the mixing of warm surface waters with deeper, more nutrient-rich waters generates phytoplankton production and zooplankton blooms.

According to the Australia State of the Environment 2016 Report (Jackson *et al.*, 2016), warming ocean temperatures has extended the distribution of tropical phytoplankton species (which have a lower productivity), further south resulting in a decline in primary productivity in oceanic waters north of 35°, especially the North West Shelf (NWS) (Evans *et al.*, 2016). However, trends in primary productivity across Australia are variable with the south-west of Australia experiencing an increase in productivity and northern Australia experiencing no change between 2002-2016 (Evans *et al.*, 2016).

Cyclones can influence the distribution and abundance of plankton. Observations of Cyclone Tiffany, which affected the NWS in January 1988, noted that communities of phytoplankton rapidly recovered as a result of changed nutrient conditions while zooplankton species were transported into areas beyond their normal range due to changes in current, wind and wave patterns (DEHWA, 2008a).

4.5 Matters of National Environmental Significance

Conservation values and sensitivities listed and protected under the EPBC Act include Matters of Environmental Significance (MNES) and Other Protected Matters. Other internationally significant conservation values have been identified via the World Database on Protected Areas (WDPA) and UNESCO data sources.

Terrestrial or (solely) freshwater species that occur in the EPBC Protected Matters searches of the EMBA have been excluded as they are not relevant to the consideration of potential effects from marine hydrocarbons exposure. Descriptions of species that may occur on shorelines include shorebirds, but terrestrial mammals, reptiles (such as pythons) and bird species that do not have habitats along shorelines have also been excluded. Refer to Appendix D for complete EPBC Protected Matters search results.

4.5.1 Commonwealth and International Marine Areas

The operational area and wider EMBA are within the Australia's exclusive economic zone (EEZ) and Territorial Sea which is a Commonwealth Marine Area, and the wider EMBA also includes the extended continental shelf to Indonesian EEZ. The Commonwealth marine area is any part of the sea, including the waters, seabed, and airspace, within Australia's EEZ and/or over the continental shelf of Australia, that is not State or Northern Territory waters. The Australian Commonwealth marine area stretches from 3 to 200 nmi from the coast. Similarly Indonesian territorial waters extend 12 nmi from coastline.

4.5.2 World Heritage Properties

World Heritage Properties represent the best examples of the world's cultural and natural heritage. There are no World Heritage Properties within the operational area. The wider EMBA intercepts the boundary of three World Heritage Properties, the Ningaloo Coast and Shark Bay within Australia and Komodo Island National Park, Indonesia (Table 4-5).

Note: heritage properties that are terrestrial and not linked to the shoreline EMBA, have been excluded as they are not relevant to consideration of potential affects from marine hydrocarbon spills.

Table 4-5: Summary of Listed World Heritage Sites

Name	EMBA Presence		
	Operational area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
The Ningaloo Coast, Australia	x	✓	✓
Shark Bay, Australia	x	✓	✓
Komodo National Park, Indonesia	x	✓	✓

Ningaloo Coast

The Ningaloo Coast was included on the World Heritage List in June 2011 under the UNESCO Outstanding Universal Values criteria (vii) and (x), for its natural beauty, aesthetic importance and significant habitats of biological diversity containing threatened species. Located on Western Australia’s remote coast along the East Indian Ocean, it covers an area of 6,045 km² and includes one of the longest nearshore reefs in the world (UNESCO, 2020). The Ningaloo Coast World Heritage Area is comprised of the Ningaloo Marine Park (State waters and the adjoining Commonwealth waters section), the Muiron Islands Marine Management Area and Nature Reserve, the Bundegi and Jurabi coastal parks and the Cape Range National Park, in addition to Crown leasehold and freehold land. The following values are recognised by the World Heritage listing:

- Landscapes and seascapes of the property are comprised of mostly intact and large-scale marine and terrestrial environments.
- The lush and colourful underwater scenery provides a stark and spectacular contrast with the arid and rugged land.
- Whale Shark aggregations following the mass coral spawning and seasonal upwelling each autumn at Ningaloo Reef, one of the few places in the world where this species congregates.
- Forms part of the annual migration route for the Humpback Whale and other whales and turtles.
- The Ningaloo Coast hosts an unusual diversity of marine turtle species with an estimated 10,000 nests deposited along the coast annually.
- Marine turtle density is exceptionally high with Green Turtles being most abundant.
- The Ningaloo Coast is on the migratory route of many trans-equatorial wader bird species and provides feeding grounds for many migratory seabirds.
- Over 300 documented coral species and 155 species of sponges.
- Over 700 species of reef fish and over 650 species of mollusc (shellfish, sea snails, octopus and cuttlefish).
- 600 species of crustacean.
- A high diversity of echinoderms (sea stars, sea urchins, sea cucumbers) including 25 new species.

Shark Bay

Shark Bay was included on the World Heritage List in 1991 under the UNESCO Outstanding Universal Values criteria (vii), (viii), (ix) and (x), primarily based on three natural features: vast seagrass beds, which are the largest (4,800 km²) and the most species-rich in the world; dugong population (estimated at 11,000); and its stromatolites (colonies of algae that form hard, dome-shaped deposits), which are amongst the oldest forms of life on earth (UNESCO, 2020). Located on the most western point of the coast of Australia, it covers an area of 23,000 km² and is renowned for its marine fauna. Key features supporting the World Heritage listing include:

- 12 species of seagrass in the bay make it one of the most diverse seagrass assemblages in the world.
- Seagrass beds cover an area of 4,800 km² with the Wooramel Seagrass Bank (1,030 km²) being the largest structure of its type in the world.
- Hamelin Pool in Shark Bay is a hypersaline pool that contains the most diverse and abundant examples of stromatolite forms in the world, representative of life-forms which lived some 3,500 million years ago.
- Humpback and southern right whales use the bay as a migratory staging post.
- Bottlenose dolphins occur in the bay, and green and loggerhead turtles nest on the beaches.
- Large numbers of sharks including bay whaler, tiger shark and hammerhead are frequently observed and there is an abundant population of rays, including the manta ray.
- The estimated population of about 11,000 dugongs is one of the largest populations in the world.

Komodo National Park

Komodo National Park was included on the World Heritage List in 1991 based on its global conservation value. It is comprised of unparalleled terrestrial and marine ecosystems and covers a total area of 219,322 ha. Komodo National Park, located in the center of the Indonesian archipelago, between the islands of Sumbawa and Flores, is composed of three major islands (Rinca, Komodo, and Padar) and numerous smaller ones, all of them of volcanic origin. Located at the juncture of two continental plates, this national park constitutes the “shatter belt” within the Wallacea Biogeographical Region, between the Australian and Sunda ecosystems. The dry climate has triggered specific evolutionary adaptation within the terrestrial flora that range from open grass-woodland savanna to tropical deciduous (monsoon) forest and quasi cloud forest. The rugged hillsides and dry vegetation contrast highly with the sandy beaches and the blue coral-rich waters. Key features supporting the World Heritage listing include:

- Contains the majority of the world’s areas in which there are wild populations of the IUCN Vulnerable listed Komodo dragon lizard (*Varanus komodoensis*)
- Exceptional landscape beauty with contrasts between starkly rugged hillsides of dry savanna, pockets of thorny green vegetation, brilliant white sandy beaches and blue waters surging over coral; unquestionably one of the most dramatic landscapes in all of Indonesia
- Coral reefs and marine biodiversity, with very high species richness, notable marine mammals include blue whale (*Balaenoptera musculus*) and sperm whale (*Physeter catodon*) as well as 10 species of dolphin, dugong (*Dugong dugon*) and five species of sea turtles.

4.5.3 National Heritage Properties

National Heritage Properties are natural, historic and Indigenous places of outstanding significance to the nation. No National Heritage Properties are located in the operational area. Seven National Heritages Properties have boundaries that lie within the moderate EMBA (Table 4-6).

Table 4-6: Summary of Listed National Heritage Sites

Name	EMBA Presence		
	Operational area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
Natural			
Shark Bay, Western Australia	x	✓	✓
The Ningaloo Coast	x	✓	✓
The West Kimberley	x	✓	✓
Indigenous			
Dampier Archipelago (including Burrup Peninsula)	x	✓	✓
Historic			
Batavia Shipwreck Site and Survivor Camps Area 1629 – Houtman Abrolhos	x	✓	✓
Dirk Hartog Landing Site 1616 - Cape Inscription Area	x	✓	✓
HMAS Sydney II and HSK Kormoran Shipwreck Sites	x	✓	✓

The Ningaloo Coast

The Ningaloo Coast was included on the National Heritage List in May 2007. Refer to previous Section 4.5.2 for a description of the heritage values.

Shark Bay

Shark Bay was included on the National Heritage List in May 2007. Refer to previous Section 4.5.2 for a description of the heritage values.

The West Kimberley

Included in the National Heritage List in August 2011, the West Kimberley is one of Australia's very special places. It is a vast area of dramatic and relatively undisturbed landscapes that has great biological richness and provides important geological and fossil evidence of Australia's evolutionary history. The West Kimberley National Heritage values for:

- Demonstrating the pattern of Australia's natural and cultural history.
- Possessing uncommon aspects of Australia's natural or cultural history.

- Yielding information contributing to the understanding of Australia's natural and cultural history.
- Demonstrating the principal characteristics of a class of Australia's natural or cultural environments.
- Exhibiting particular aesthetic characteristics valued by a community or cultural group.
- Demonstrating a high degree of creative or technical achievement at a particular period.
- Having a strong or special association with a particular community or cultural group.
- Having special associations with the life or works of a person or group of importance in Australia's history.
- Their importance in Indigenous tradition.

Dampier Archipelago

Included on the National Heritage List in July 2007. Made up of islands, reefs, shoals, channels and straits, and covering a land area of around 400 square kilometres, the Burrup Peninsula is 27 kilometres long and four kilometres wide. Many important native plants, animals and habitats are found in the area. The Archipelago was formed 6-8000 years ago when rising sea levels flooded what were once coastal plains. The underlying rocks are amongst the oldest on earth, formed in the Archaean period more than 2400 million years ago.

This is a sacred place, home to Indigenous Australians for tens of thousands of years. Ngarda-Ngarlie people say ancestral beings created the land during the Dreamtime, and the spirits of Ngkurr, Bardi and Gardi continue to live in the area. They have left their mark in features like the Marntawarrura, or 'black hills,' said to be stained from the blood of the creative beings. Sites types include quarries, middens, fish traps, rock shelters, ceremonial sites, artefact scatters, grinding patches, stone arrangements and engravings. Engravings are the most numerous type of site, with images potentially numbering in the millions. Large concentrations are found on inland plateaus, steep valley inclines bordering waterways and on rock platforms next to the ocean. There is also a high density of stone sites in the area, including standing stones, complex stone arrangements, fish traps, stone pits, hunting hides and stone cairns. Some of the standing stones are thought to have been built to mark important resources, such as waterholes, soaks and camping areas. (DAWE, 2021).

Batavia Shipwreck Site

Included on the National Heritage List in April 2006, the *Batavia* is the oldest of the known Verenigde Oost-Indische Compagnie (VOC) wrecks on the WA coast and has a unique place in Australian shipwrecks associated with the discovery and delineation of the WA coastline. The *Batavia* wreck site is located about 800 m east from the south-west corner of the Morning Reef in the Wallabi group of the Houtman Albrolhos, a series of low reefs and islands lying between latitudes 28 degrees 14'S and 29 degrees 00'S and longitudes 113 degrees 35'E and 114 degrees 04'E about 65 km off the Western Australian coast (DAWE, 2020a). The shipwreck is protected under the *Underwater Cultural Heritage Act 2018*. Recovered sections of the hull have been reconstructed in the Western Australian Maritime Museum and provides information on the 17th Century Dutch ship building techniques (DAWE, 2020a).

Dirk Hartog Landing Site – Cape Inscription Area, Dirk Hartog Island

Included on the National Heritage List in April 2006, Cape Inscription is the site of the oldest known landings of Europeans on the western coast of the Australian continent, and is associated with a series of landings and surveys by notable explorers over a 250 year period (DAWE, 2020a). The first known European landing on the west coast of Australia was by Dirk Hartog of the Dutch East India Company's ship the *Eendracht* at Cape Inscription on 25 October 1616 (DAWE, 2020a).

HMAS Sydney II and HSK Kormoran Shipwreck Sites, Carnarvon

Included on the National Heritage List in March 2011, the shipwreck sites of *HMAS Sydney II* and *HSK Kormoran* have outstanding heritage value to the nation because of their importance in a defining event in Australia's cultural history, their contribution to a greater understanding of Australia's history of World War II and for their part in the development of the process of the defence of Australia (DAWE, 2020a). The battle occurred between *HMAS Sydney II* and the German raider *HSK Kormoran* of the WA coast on the 19 November 1941.

The two areas that make up the heritage listing are located approximately 290 km west south-west of Carnarvon and 211 km of the coast of WA. The heritage place includes the surface of the seabed and includes both the water column above the seabed and airspace above the sea (DAWE, 2020a).

4.5.4 Commonwealth Heritage Places

The Commonwealth Heritage list is a list of the historic, cultural and natural heritage places on Commonwealth land, in Commonwealth waters, or owned or managed by the Commonwealth Government. These include places connected to defence, maritime safety, communications, customs and other government activities that also reflect Australia’s development as a nation. No Commonwealth heritage places exist within the operational area. Six relevant Commonwealth heritage places with potential ocean connectivity exist within the wider EMBA including an historic shipwreck (Table 4-7).

Heritage places that are terrestrial and not linked to the shoreline, but occur in the EPBC Protected Matters search of the EMBA, have been excluded as they are not relevant to consideration of potential affects from marine hydrocarbon spills. Refer to Appendix D for complete EPBC Protected Matters searches results.

Table 4-7: Summary of Listed Commonwealth Heritage Places

Name	Presence		
	Operational area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
Natural			
Ashmore Reef National Nature Reserve	x	x	✓
Christmas Island Natural Areas	x	✓	✓
Mermaid Reef - Rowley Shoals	x	✓	✓
Ningaloo Marine Area - Commonwealth Waters	x	✓	✓
Scott Reef and Surrounds - Commonwealth Area	x	✓	✓
Historic			
HMAS Sydney II and HSK Kormoran Shipwreck Sites	x	✓	✓

Christmas Island Natural Areas

Included in the Commonwealth Heritage List in June 2004 (DAWE, 2021), Christmas Island Natural Areas listing covers most of Christmas Island, including the National Park, and protects its natural (environmental) heritage values. Key heritage values include: the island’s geological formations which illustrate tectonic and volcanic action, the high number and level of diversity of plants and animals that are only found on the island, and the importance of island ecosystems in the development of evolutionary theory.

Mermaid Reef - Rowley Shoals

Included in the Commonwealth Heritage List in June 2004 (DAWE, 2021), Mermaid Reef is characterised by environmental conditions which are rare for shelf edge reefs and are known only from the Rowley Shoals in Western Australia and include deep, clear oceanic water and large tidal ranges. Species of conservation

significance recorded at the location include the nationally vulnerable Green Turtle. The Rowley Shoals provides habitat for species which have not previously been recorded in WA including: 216 species of fish; 39 species of molluscs; and seven species of echinoderms. It is regionally important for the diversity of its fauna which includes: corals; molluscs; echinoderms and fish. Mermaid Reef, together with Clerke and Imperieuse Reefs, has biogeographical significance due to the presence of species which are at, or close to, the limits of their geographic ranges. Mermaid Reef is particularly significant as a stepping stone in the spread of genetic material from the Indonesian archipelago to the reefs to the south. Rowley Shoals is important for benchmark studies as one of the few places off the north-west coast of Western Australia which have been the site of major biological collection trips by the Western Australian Museum.

Rowley Shoals comprises one of the best morphological examples of shelf edge reefs in Australian waters and is important in demonstrating their principal structural and developmental characteristics. . The Rowley Shoals reefs are considered to be representative of the progressive stages in platform reef formation, with Mermaid Reef representative of the early stage of shelf reef development (DAWE, 2020d). The major marine habitats of Mermaid Reef have been mapped and classified as sand cay, lagoon, submerged sand, deep reef flat, and emergent areas (DAWE, 2020d). A shipwreck off the western edge of Mermaid Reef is believed to be that of the British whaling vessel, the Lively, which was lost in the early 1800s.

Ningaloo Marine Area - Commonwealth Waters

The Ningaloo Marine Area was included in the Commonwealth Heritage List in June 2004 (DAWE, 2021). Refer to Section 4.5.2 for a description of conservation values.

Scott Reef and Surrounds - Commonwealth Area

Included in the Commonwealth Heritage List in June 2004 (DAWE, 2021), Scott Reef is a significant component of a disjunct chain of shelf edge reefs separated from Indonesia by the Timor Trough. The place is regionally significant both because of its high representation of species not found in coastal waters off Western Australia and for the unusual nature of its fauna which has affinities with the oceanic reef habitats of the Indo-West Pacific as well as the reefs of the Indonesian region. Scott Reef is important for its contribution to understanding long term geomorphological and reef formation processes and past environments as a result of its sedimentary sequence that extends back to include Triassic sediments.

Scott Reef is important for scientific research and benchmark studies due to its great age, the exceptional documentation of its geophysical and physical environmental characteristics and its use as a site of major biological collection trips and surveys.

HMAS Sydney II and HSK Kormoran Shipwreck Sites

These sites were included in the Commonwealth Heritage List in March 2011(DAWE, 2021). Refer to Section 4.5.3 for a description of conservation values.

4.5.5 Wetlands of International Importance

There are twelve Wetlands of International Importance under the Convention on Wetlands of International Importance (the Ramsar Convention) in Western Australia. Ten Ramsar Wetlands are located within the EMBA but only five have connectivity with the marine environment. The nearest Ramsar wetland to the operational area is Eighty-mile Beach, located near Port Hedland. This wetland is potentially exposed to low hydrocarbon threshold, while two wetland areas; Hosnies Spring and the Dales is exposed to moderate hydrocarbon thresholds. Ramsar Wetlands with connectivity to the ocean and located within the wider EMBA are summarised in Table 4-8. Refer to Appendix D for complete EPBC Protected Matters searches results.

Table 4-8: Summary of Listed Wetlands of International Importance

Name	Presence		
	Operational area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
Ashmore Reef National Nature Reserve	x	x	✓
Eighty-mile Beach	x	x	✓
Hosnies Spring	x	✓	✓
Roebuck Bay	x	x	✓
The Dales	x	✓	✓

Ashmore Reef National Nature Reserve

See Section 4.5.6 below

Eighty Mile Beach

See Section 4.5.6 below

Hosnies Spring

Hosnies Spring was listed as a Ramsar site on 11 December 1990 and covers an area of approximately 202 ha (DAWE, 2020a). Hosnies Spring Ramsar site is an example of a highly unusual wetland that is unique to Christmas Island.

The mangrove forest present at the site is unique within the bioregion and possibly worldwide. The stand comprises two mangrove species both of which usually occur in intertidal zones, but here grows at a height of 24-37 metres above sea level. The Ramsar site includes surrounding terrestrial areas with rainforest grading to coastal scrub, and includes an area of shoreline and coral reef (DAWE, 2020a).

Roebuck Bay

See Section 4.5.6 below

The Dales

The Dales was listed as a Ramsar site on 21 October 2002 and covers an area of approximately 583 ha (DAWE, 2020a). It is located in the Christmas Island IMCRA bioregion, and is made up of many wetland types in a near-pristine state, including surface and subterranean karst systems. This system of wetlands, particular the karst wetlands, is unique to the bioregion (DAWE, 2020a).

The Dales provide essential habitat for two wetland-dependent nationally threatened species, the Abbott's booby and the Christmas Island frigatebird (DAWE, 2020a). It is also a significant migratory route for red crabs, blue crabs and robber crabs. The freshwater streams provide critical habitat for the blue crabs as the larvae emerge from the ocean and return inland. In addition the site provides important habitat for land crab spawning, with all 20 species which occur in the site, migrating to the ocean to spawn with their larval stages being marine (DAWE, 2020a).

The mass spawning and development of the larvae of red crabs corresponds to the arrival and aggregation of juvenile whale sharks offshore of Christmas Island to feed on the immature stages of red crabs. The offshore

waters of The Dales are believed to provide an important habitat and feeding area for the whale sharks (DAWE, 2020a).

4.5.6 Wetlands of National Importance

Wetlands of national importance are wetlands that are a good example in a particular area, an important habitat for native species, or that have outstanding heritage or cultural significance. The EMBA overlaps with 44 wetlands of national importance but only 25 have connectivity with the marine environment. Table 4-9 summarises Ramsar Wetlands with connectivity to the ocean and located within the wider EMBA.

Wetlands that are not linked to the shoreline, but occur in the EPBC Protected Matters search of the EMBA, have been excluded as they are not relevant to consideration of potential affects from marine hydrocarbon spills. Refer to Appendix D for complete EPBC Protected Matters searches results.

Table 4-9: Summary of Listed Nationally Important Wetland

Name	Approx. closest distance to operational area	Presence		
		Operational area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
Ashmore Reef	1,394 km	x	✓	✓
Cape Leeuwin System	1,402 km	x	✓	✓
Cape Range Subterranean Waterways	17 km	x	✓	✓
De Grey River	552 km	x	✓	✓
Eighty Mile Beach System	582 km	x	✓	✓
Exmouth Gulf East	68 km	x	✓	✓
Hutt Lagoon System	716 km	x	✓	✓
Learmonth Air Weapons Range – Saline Coastal Flats	99 km	x	✓	✓
Leslie (Port Hedland) Saltfields System	494 km	x	✓	✓
Mermaid Reef	749 km	x	✓	✓
Murchison River (Lower Reaches)	669 km	x	✓	✓
Roebuck Bay	912 km	x	✓	✓
Shark Bay East	447 km	x	✓	✓
Willie Creek Wetlands	941 km	x	✓	✓

Ashmore Reef

Ashmore Reef is one of only three emergent oceanic reefs in the north eastern Indian Ocean, and the only one having vegetated islands. The Ashmore Reef reserve consists of three islets surrounded by intertidal reef and sand flats and deeper subtidal reef and sand flats (DAWE, 2020d). Some 95 species of bird have been recorded from the reef and its adjacent waters. 43 of these species are listed on the Japan-Australia and China-Australia Migratory Birds Agreements. The islets are an important staging point for wading birds migrating between Australia and the northern hemisphere. The total area of Ashmore Reef National Nature Reserve is 58,300 ha and it sits 0 to 3 m above sea level.

Cape Leeuwin System

The Cape Leeuwin System site is a small coastal valley in the Augusta-Margaret River area. Seepage from a series of freshwater springs feeds an elongate swamp on the floor of the valley and moistens areas of the limestone and granite coastline to the west (DAWE, 2020d). Except during late summer and autumn, there is minor discharge westward from the swamp along a flume to a wooden waterwheel. The Indian Ocean lies 100 m to the west and the Southern Ocean lies 150 m to the south. The site represents habitat for the largest known population of the rare aquatic gastropod mollusc, the Cape Leeuwin Freshwater Snail *Austroassiminea lethra* (Sr). The cliffs at Quarry Bay (alongside the waterwheel) are the location of some of the most spectacular and rare tufa formations in Western Australia. The total area is 20 ha and it sits 1 to 15 m above sea level.

Cape Range Subterranean Waterways

The Cape Range Subterranean Waterways site is the subterranean waterways, sinkholes, general groundwater and artificial wells (notably Billy, Five Mile, Javis, Kubara, Kudumurra, Milyering, Mowbowra, Pilgramunna, Tantabiddi and Tulki wells, Tantabiddi and Wobiri rockholes, Bundera Sinkhole, and connecting caves) of the coastal plain and foothills of Cape Range north of a line between Norwegian Bay, at the foot of the peninsula on the west coast, and the Bay of Rest in Exmouth Gulf (DAWE, 2020d). The site represents a good example of a subterranean karst wetland system and the only one (apart from Barrow Island) in arid north-western Australia. Identified as meeting two Ramsar Criteria for listing as a Wetland of International Importance and recommended as a World Heritage site. The total area is 175,000 ha and sits 0 to 2 m above sea level.

De Grey River

The site exists within Port Hedland and East Pilbara area and incorporates the De Grey River (excluding tributaries and distributaries), from the confluence of the Oakover and Nullagine Rivers to the Indian Ocean near Poissonier Point (DAWE, 2020d). Above the tidal zone, the site includes more than 30 named river pools including the Coolenar-Triangle Pools at the Great Northern Highway, Coogeenariner Pool, Mulyie Pool, Coolcoolinnarriner Pool and Ngumberamuring Pool. Below the junction with the Strelley River, the De Grey River splits in two around Ripon Island and the tidal lower reaches (including Salt Pool) open into a small estuary (Breaker Inlet) with associated mudflats and coastal flats. The site is a good example of a major river system in the bioregion, and includes the longest permanent river pools and largest shallow estuary in north-western Australia.

Eighty Mile Beach System

This site comprises Eighty Mile Beach between Cape Missiessy and Cape Keraudren and adjoining tidal mudflats; also the coastal plain with distinct swamps, immediately inland of the beach, mainly near Anna Plains Homestead (DAWE, 2020d).

This site is one of the most important migration stop-over areas for shorebirds in East Asia-Australasia, supporting more than 300,000 birds. It is one of the most important sites in the world for migration of the Great Knot and it supports at least 1% of the national population of 21 shorebird species (DAWE, 2020d). It is an outstanding example of a major beach with associated inter-tidal flats and coastal floodplain, located in the arid tropics (DAWE, 2020d).

Exmouth Gulf

The site occurs within the Carnarvon bioregion and comprises wetlands in the eastern part of Exmouth Gulf, from Giralalia Bay to Urala Creek Locker Point. It includes marine waters less than 6 m deep at low tide, tidal mudflats, and saline coastal flats 5-15 km wide (DAWE, 2020d). Several islands subject to complete inundation are included. The wetland provides an outstanding example of tidal wetland systems of low coast of north-west Australia, with well-developed tidal creeks, extensive mangrove swamps and broad saline coastal flats. The Exmouth Gulf wetland total area is 120 000 ha and includes coastal plain covering 80 000 ha.

Hutt Lagoon System

The site comprises Hutt Lagoon and lakes and marshes immediately north-west and south-east of the Lagoon, notably Utcha Swamp. It represents a good example of a coastal brine lake and exists at near sea-level (DAWE, 2020d).

Learmonth Air Weapons Range – Saline Coastal Flats

Very little is known about this site, except that it represents typical saline coastal flats subject to inundation and ponding. This vegetation type typically has low species richness, but its floristic composition and structure is highly distinctive and supports habitat specific fauna. The wetland extends for some 300 ha and is likely to possess a relatively diverse community, with several species present (DAWE, 2020d).

Leslie (Port Hedland) Saltfield System

This site comprises a large saltfield, fringing coastal flats, and tidal creeks (Ridley River, Catfish Creek and Rock Cod Hole Creeks), with mudflats between the saltfields and the Indian Ocean (DAWE, 2020d). It is a good example of coastal flats and associated tidal coast in north-western Australia (DAWE, 2020d).

This system is a major migration stop-over area for shorebirds in the East Asia-Australasia Flyway; possibly the most important stop-over site in the Flyway for the Broad-Billed Sandpiper and an important site for Oriental Plover. It is recorded as the most important site in Australia for Asian Dowitcher and Red-Necked Phalarope (DAWE, 2020d).

Mermaid Reef

Refer to Section 4.5.4 for a description of conservation values.

Murchison River (Lower Reaches)

The site exists within the Geraldton Sandplains bioregion and extends from the Kalbarri river mouth, upstream to 42 km east south-east of Kalbarri. The site comprises the estuary of the Murchison River and pools (for example, Bully Pool and Woonana Pool) in the lower reaches and within the Murchison Gorge, with the upstream limit at the south-east boundary of Kalbarri National Park. The site represents a good example of permanent river pools set in a long, narrow, steep-sided gorge.

Roebuck Bay

The site is Roebuck Bay, an embayment in the Indian Ocean, to the usual high water (tide) mark. The limits are Entrance Point in the north-west and Cape Villaret in the south-west and waters more than 6 m deep at low tide are excluded. The site includes intertidal mudflats near Fall Point, Bush Point and Sandy Points (up to 13 km wide off Bush Point, elsewhere less than 2 km wide); also Dampier Creek, Crab Creek, Yardoogarra Creek and associated coastal flats up to 4 km, but mostly less than 1 km, inland. Roebuck Bay is an outstanding example of a tropical marine embayment with sand beaches and extensive intertidal mudflats; the mudflats are among the widest in WA. Roebuck is also listed as a Wetland of International Importance under the Ramsar Convention.

Shark Bay East

Shark Bay East comprises tidal wetlands, and marine waters (up to 10 km from shore) less than 6 m deep at low tide, in the east arm of Shark Bay, from the mouth of the Gascoyne River (Carnarvon) south to latitude 26° S (DAWE, 2020d).

Shark Bay east is an outstanding example of a very large, shallow marine embayment, with particularly extensive occurrence of seagrass beds and substantial areas of intertidal mud/sand-flats and mangrove swamp (DAWE, 2020d). The site supports what is probably the world's largest discrete population of dugong; it is also a major nursery and/or feeding area for turtles, rays, sharks, other fishes, prawns and other marine fauna; and is a major migration stop-over area for shorebirds (DAWE, 2020d).

Willie Creek Wetlands

The site consists of two spring-fed and tidally inundated wetlands, Nimalaica Swamp and an unnamed crescent-shaped lake 2 km to the north. They are on the tidal flats of Willie Creek estuary. Nimalaica is a unique, permanent freshwater swamp surrounded by a combination of dense spike-rush beds and dense inundated cadjeput forest. The crescent-shaped lake is an important wader habitat with unusual vegetation in its vicinity.

4.5.7 Threatened Ecological Communities

Listing threatened ecological communities (TECs) is a form of landscape or systems level protection. These communities provide vital wildlife corridors and habitat refuges for many plant and animal species, including threatened species and other Australian plants and animals that are in decline.

Protection through the EPBC Act complements other conservation measures, and is particularly vital for species and ecological communities that occur outside conservation reserves. In Australia, the three categories for listing TECs under the EPBC Act are critically endangered, endangered and vulnerable.

There are no marine threatened ecological communities under the EPBC Act within the operational area and five coastal communities within the wider EMBA. However, only a single TEC has direct coastal connectivity.

Note: TECs which are not linked to the shoreline, but occur in the EPBC Protected Matters search of the EMBA, have been excluded as they are not relevant to consideration of potential affects from marine hydrocarbon spills. Refer to Appendix D for complete EPBC Protected Matters searches results.

Table 4-10: Summary of Listed Threatened Ecological Communities

Name	EPBC Act Status	EMBA Presence		
		Operational area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	x	✓	✓

Subtropical and Temperate Coastal Saltmarsh

The Subtropical and Temperate Coastal Saltmarsh community is listed as vulnerable under the EPBC Act (DAWE, 2021c). This community occurs within the subtropical and temperate climatic zones and is present in coastal areas under regular or intermittent tidal influences and occurs over six State jurisdictions (South-western Queensland, New South Wales, Victoria, Tasmania and South-western WA) (DSEWPaC, 2013). In WA it occurs from the south coast up to the southern part of Shark Bay. The community is made up of mainly salt tolerant vegetation which include halophytes as well as a number of non-vascular plant species. The community is listed as vulnerable under the EPBC Act (DAWE, 2021c).

4.5.8 Threatened and Migratory Species

A search of the EPBC Act Protected Matters Search Tool was used to identify listed threatened and migratory species that may occur within the operational area, the moderate conservative ecological impact threshold area, and the low contact threshold area (collectively described as the EMBA) (Table 4-11). A total of 19 threatened marine species (16 of which are also listed as migratory) and a further 18 migratory species may potentially occur, or have habitat, within the operational area.

A total of 54 marine or coastal threatened species (36 of which are also listed as migratory) potentially occur within the wider EMBA. Descriptions of the threatened and migratory species are provided below. A further 219 marine or coastal listed species potentially occur within the wider EMBA. The full list of marine species and coastal species from the protected matters search is provided in Appendix D. Subsequent to undertaking the protected matters search, the Australian Government removed the humpback whale from the threatened species list in February 2022, however Appendix D has not been amended. Note that threatened terrestrial species (such as terrestrial mammals, reptiles and bird species) that appear in the protected matters search of the EMBA and do not have habitats along shorelines are not relevant to the identified impacts and risks of a marine hydrocarbon spill and therefore have been excluded from Table 4-11.

Table 4-11: EPBC Act threatened and migratory species potentially occurring within the EMBA

Value/ Sensitivity				EMBA Presence		
Common Name	Species Name	EPBC Act Status		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
Marine Mammals						
Antarctic Minke Whale	<i>Balaenoptera bonaerensis</i>	-	Migratory	x	✓	✓
Sei Whale	<i>Balaenoptera borealis</i>	Vulnerable	Migratory	✓	✓	✓
Bryde's Whale	<i>Balaenoptera edeni</i>	-	Migratory	✓	✓	✓
Southern Right Whale	<i>Balaena glacialis australis</i> (<i>Eubalaena australis</i>)	Endangered*	Migratory	✓	✓	✓
Blue Whale	<i>Balaenoptera musculus</i>	Endangered	Migratory	✓	✓	✓
Fin Whale	<i>Balaenoptera physalus</i>	Vulnerable	Migratory	✓	✓	✓
Pygmy Right Whale	<i>Caperea marginata</i>	-	Migratory	x	✓	✓
Dugong	<i>Dugong dugon</i>	-	Migratory	x	✓	✓
Dusky Dolphin	<i>Lagenorhynchus obscurus</i>	-	Migratory	x	✓	✓
Humpback Whale	<i>Megaptera novaeangliae</i>	-	Migratory	✓	✓	✓
Australian Sea Lion	<i>Neophoca cinerea</i>	Endangered	-	x	✓	✓
Australian Snubfin Dolphin	<i>Orcaella heinsohni</i>	-	Migratory	x	✓	✓
Orca	<i>Orcinus orca</i>	-	Migratory	✓	✓	✓

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Value/ Sensitivity				EMBA Presence		
Common Name	Species Name	EPBC Act Status		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
Sperm Whale	<i>Physeter macrocephalus</i>	-	Migratory	✓	✓	✓
Indo-Pacific Humpback Dolphin	<i>Sousa chinensis</i>	-	Migratory	x	✓	✓
Spotted Bottlenose (Arafura/Timor Sea populations)	<i>Tursiops aduncus</i>	-	Migratory	✓	✓	✓
Marine Reptiles						
Short-Nosed Seasnake	<i>Aipysurus apraefrontalis</i>	Critically Endangered	-	x	✓	✓
Leaf-Scaled Seasnake	<i>Aipysurus foliosquama</i>	Critically Endangered	-	x	x	✓
Loggerhead Turtle	<i>Caretta caretta</i>	Endangered	Migratory	✓	✓	✓
Green Turtle	<i>Chelonia mydas</i>	Vulnerable	Migratory	✓	✓	✓
Saltwater Crocodile	<i>Crocodylus porosus</i>	-	Migratory	x	✓	✓
Leatherback Turtle	<i>Dermochelys coriacea</i>	Endangered	Migratory	✓	✓	✓
Hawksbill Turtle	<i>Eretmochelys imbricata</i>	Vulnerable	Migratory	✓	✓	✓
Olive Ridley Turtle	<i>Lepidochelys olivacea</i>	Endangered	Migratory	x	✓	✓
Flatback Turtle	<i>Natator depressus</i>	Vulnerable	Migratory	✓	✓	✓
Fish, Sharks and Rays						
Narrow Sawfish	<i>Anoxypristis cuspidata</i>	-	Migratory	✓	✓	✓
Grey Nurse Shark (west coast population)	<i>Carcharias taurus</i>	Vulnerable	-	✓	✓	✓
Oceanic Whitetip Shark	<i>Carcharhinus longimanus</i>	-	Migratory	x	✓	✓
White Shark	<i>Carcharodon carcharias</i>	Vulnerable	Migratory	✓	✓	✓
Northern River Shark	<i>Glyphis garricki</i>	Endangered	-	x	✓	✓
Shortfin Mako	<i>Isurus oxyrinchus</i>	-	Migratory	✓	✓	✓
Longfin Mako	<i>Isurus paucus</i>	-	Migratory	✓	✓	✓
Porbeagle	<i>Lamna nasus</i>	-	Migratory	x	✓	✓

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Value/ Sensitivity				EMBA Presence		
Common Name	Species Name	EPBC Act Status		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
Dwarf Sawfish	<i>Pristis clavata</i>	Vulnerable	Migratory	✓	✓	✓
Freshwater Sawfish	<i>Pristis pristis</i>	Vulnerable	Migratory	x	✓	✓
Green Sawfish	<i>Pristis zijsron</i>	Vulnerable	Migratory	✓	✓	✓
Whale Shark	<i>Rhincodon typus</i>	Vulnerable	Migratory	✓	✓	✓
Reef Manta Ray	<i>Manta alfredi</i>	-	Migratory	✓	✓	✓
Giant Manta Ray	<i>Manta birostris</i>	-	Migratory	✓	✓	✓
Birds						
Common Sandpiper	<i>Actitis hypoleucos</i>	-	Migratory	✓	✓	✓
Oriental Reed-Warbler	<i>Acrocephalus orientalis</i>	-	Migratory	x	x	✓
Common Noddy	<i>Anous stolidus</i>	-	Migratory	✓	✓	✓
Australian Lesser Noddy	<i>Anous tenuirostris melanops</i>	Vulnerable	-	x	✓	✓
Flesh-Footed Shearwater	<i>Ardenna carneipes</i>	-	Migratory	✓	✓	✓
Ruddy Turnstone	<i>Arenaria interpres</i>	-	Migratory	x	✓	✓
Fork-Tailed Swift	<i>Apus pacificus</i>	-	Migratory	x	✓	✓
Sooty Shearwater	<i>Ardenna grisea</i>	-	Migratory	x	✓	✓
Wedge-Tailed Shearwater	<i>Ardenna pacifica</i>	-	Migratory	x	✓	✓
Short-Tailed Shearwater	<i>Ardenna tenuirostris</i>	-	Migratory	x	x	✓
Australasian Bittern	<i>Botaurus poiciloptilus</i>	Endangered	-	x	✓	✓
Sharp-Tailed Sandpiper	<i>Calidris acuminata</i>	-	Migratory	✓	✓	✓
Sanderling	<i>Calidris alba</i>	-	Migratory	x	✓	✓
Red Knot	<i>Calidris canutus</i>	Endangered	-	✓	✓	✓
Curlew Sandpiper	<i>Calidris ferruginea</i>	Critically endangered	Migratory	✓	✓	✓
Pectoral Sandpiper	<i>Calidris melanotos</i>	-	Migratory	✓	✓	✓
Long-Toed Stint	<i>Calidris subminuta</i>	-	Migratory	x	x	✓

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Value/ Sensitivity				EMBA Presence		
Common Name	Species Name	EPBC Act Status		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
Great Knot	<i>Calidris tenuirostris</i>	Critically endangered	Migratory	x	✓	✓
Red-Necked Stint	<i>Calidris ruficollis</i>	-	Migratory	x	✓	✓
Streaked Shearwater	<i>Calonectris leucomelas</i>	-	Migratory	✓	✓	✓
Cape Barren Goose (South-Western)	<i>Cereopsis novaehollandiae grisea</i>	Vulnerable	-	x	x	✓
Double-Banded Plover	<i>Charadrius bicinctus</i>	-	Migratory	x	x	✓
Little Ringed Plover	<i>Charadrius dubius</i>		Migratory	x	x	✓
Lesser Sand Plover	<i>Charadrius mongolus</i>	Endangered	Migratory	x	x	✓
Oriental Plover	<i>Charadrius veredus</i>	-	Migratory	x	✓	✓
Greater Sand Plover	<i>Charadrius leschenaultii</i>	Vulnerable	Migratory	x	✓	✓
Amsterdam Albatross	<i>Diomedea amsterdamensis</i>	Endangered	Migratory	x	✓	✓
Antipodean Albatross	<i>Diomedea antipodensis</i>	Vulnerable	Migratory	x	x	✓
Tristan Albatross	<i>Diomedea dabbenena</i>	Endangered	Migratory	x	✓	✓
Southern Royal Albatross	<i>Diomedea epomophora</i>	Vulnerable	Migratory	x	✓	✓
Wandering Albatross	<i>Diomedea exulans</i>	Vulnerable	Migratory	x	✓	✓
Northern Royal Albatross	<i>Diomedea sanfordi</i>	Endangered	Migratory	x	✓	✓
Christmas Island Frigatebird	<i>Fregata andrewsi</i>	Endangered	Migratory	x	✓	✓
Lesser Frigatebird	<i>Fregata ariel</i>	-	Migratory	✓	✓	✓
Great Frigatebird	<i>Fregata minor</i>	-	Migratory	x	✓	✓
Swinhoe's Snipe	<i>Gallinago megala</i>	-	Migratory	x	x	✓
Pin-Tailed Snipe	<i>Gallinago stenura</i>		Migratory	x	x	✓
Oriental Pratincole	<i>Glareola maldivarum</i>	-	Migratory	x	✓	✓

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Value/ Sensitivity				EMBA Presence		
Common Name	Species Name	EPBC Act Status		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
Blue Petrel	<i>Halobaena caerulea</i>	Vulnerable	-	x	✓	✓
Caspian Tern	<i>Hydroprogne caspia</i>	-	Migratory	x	✓	✓
Broad-Billed Sandpiper	<i>Limicola falcinellus</i>	-	Migratory	x	x	✓
Asian Dowitcher	<i>Limnodromus semipalmatus</i>	-	Migratory	x	x	✓
Bar-Tailed Godwit	<i>Limosa lapponica</i>	-	Migratory	x	✓	✓
Northern Siberian Bar-Tailed Godwit	<i>Limosa lapponica menzbieri</i>	Critically endangered	-	x	✓	✓
Black-Tailed Godwit	<i>Limosa limosa</i>	-	Migratory	x	✓	✓
Southern Giant Petrel	<i>Macronectes giganteus</i>	Endangered	Migratory	✓	✓	✓
Northern Giant Petrel	<i>Macronectes halli</i>	Vulnerable	Migratory	x	✓	✓
Eastern Curlew	<i>Numenius madagascariensis</i>	Critically endangered	Migratory	✓	✓	✓
Little Curlew	<i>Numenius minutus</i>	-	Migratory	x	x	✓
Whimbrel	<i>Numenius phaeopus</i>	-	Migratory	x	✓	✓
Bridled Tern	<i>Onychoprion anaethetus</i>	-	Migratory	x	✓	✓
Fairy Prion (southern)	<i>Pachyptila turtur subantarctica</i>	Vulnerable	-	x	✓	✓
Osprey	<i>Pandion haliaetus</i>	-	Migratory	✓	✓	✓
Abbott's Booby	<i>Papasula abbottii</i>	Endangered	-	x	✓	✓
White-Tailed Tropic Bird	<i>Phaethon lepturus</i>	-	Migratory	x	✓	✓
Christmas Island White-Tailed Tropicbird	<i>Phaethon lepturus fulvus</i>	Endangered	-	x	✓	✓
Red-Tailed Tropicbird	<i>Phaethon rubricauda</i>	-	Migratory	x	✓	✓
Red-Necked Phalarope	<i>Phalaropus lobatus</i>	-	Migratory	x	x	✓
Ruff (reeve)	<i>Philomachus pugnax</i>	-	Migratory	x	x	✓
Sooty Albatross	<i>Phoebastria fusca</i>	Vulnerable	Migratory	x	✓	✓

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

Value/ Sensitivity				EMBA Presence		
Common Name	Species Name	EPBC Act Status		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
Pacific Golden Plover	<i>Pluvialis fulva</i>	-	Migratory	x	✓	✓
Grey Plover	<i>Pluvialis squatarola</i>	-	Migratory	x	✓	✓
Round Island Petrel	<i>Pterodroma arminjoniana</i>	Critically Endangered	-	x	x	✓
Soft-Plumaged Petrel	<i>Pterodroma mollis</i>	Vulnerable	-	x	✓	✓
Australian Painted Snipe	<i>Rostratula benghalensis (Rostratula australis)</i>	Endangered*	-	x	✓	✓
Roseate Tern	<i>Sterna dougallii</i>	-	Migratory	x	✓	✓
Australian Fairy Tern	<i>Sternula nereis nereis</i>	Vulnerable	-	✓	✓	✓
Masked Booby	<i>Sula dactylatra</i>	-	Migratory	x	✓	✓
Brown Booby	<i>Sula leucogaster</i>	-	Migratory	x	✓	✓
Red-Footed Booby	<i>Sula sula</i>	-	Migratory	x	✓	✓
Greater Crested Tern	<i>Thalasseus bergii</i>	-	Migratory*	x	✓	✓
Indian Yellow-Nosed Albatross	<i>Thalassarche carteri</i>	Vulnerable	Migratory	x	✓	✓
Shy Albatross	<i>Thalassarche cauta</i>	Endangered	Migratory	x	✓	✓
Grey-Headed Albatross	<i>Thalassarche chrysostoma</i>	Endangered	Migratory	x	x	✓
Campbell Albatross	<i>Thalassarche impavida</i>	Vulnerable	Migratory	x	✓	✓
Black-browed Albatross	<i>Thalassarche melanophris</i>	Vulnerable	Migratory	x	✓	✓
White-Capped Albatross	<i>Thalassarche steadi</i>	Vulnerable	Migratory	x	✓	✓
Grey-Tailed Tattler	<i>Tringa brevipes</i>	-	Migratory	x	✓	✓
Wood Sandpiper	<i>Tringa glareola</i>	-	Migratory	x	✓	✓
Common Greenshank	<i>Tringa nebularia</i>	-	Migratory	x	✓	✓
Marsh Sandpiper	<i>Tringa stagnatilis</i>	-	Migratory	x	x	✓
Common Redshank	<i>Tringa totanus</i>	-	Migratory	x	x	✓

Value/ Sensitivity				EMBA Presence		
Common Name	Species Name	EPBC Act Status		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
Terek Sandpiper	<i>Xenus cinereus</i>	-	Migratory	x	✓	✓

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Listed Species Recovery Plans, Conservation Advice and Threat Abatement Plans

BHP considered recent updates to Recovery Plans, Conservation Management Plans, Threat Abatement Plans or approved Conservation Advice in place for EPBC Act-listed threatened species that may potentially occur or utilise habitat within the EMBA (Table 4-12).

Recovery Plans set out the research and management actions necessary to stop the decline of, and support the recovery of listed threatened species. In addition, Threat Abatement Plans provide for the research, management, and any other actions necessary to reduce the impact of a listed key threatening process on native species and ecological communities. The Minister decides whether a threat abatement plan is required for key threatening processes listed under Section 183 of the EPBC Act. Table 4-12 provides information on the specific requirements of the relevant conservation advice, species recovery plans and threat abatement plans that is applicable to the petroleum activity, and demonstrates how current management requirements have been taken into account during the preparation of the EP. Through the implementation of relevant control measures, performance outcomes and performance standards, potential risks and impacts of the petroleum activity are managed to ALARP and acceptable levels.

Table 4-12: Summary of relevant species recovery plans, approved conservation plans and threat abatement plans

Species or Group	Relevant Plan/Conservation Advice	Threats and or Management Strategies Relevant to the Activity	Addressed in EP Section
All Vertebrate Fauna			
All vertebrate fauna	Threat Abatement Plan for the impacts of marine debris on vertebrate wildlife of Australia’s coasts and oceans (DoEE, 2018)	Ship-sourced marine debris as a risk to vertebrate marine life through entanglement or ingestion	Section 8.7
Marine Mammals			
Sei Whale	Conservation Advice for the Sei Whale (Threatened Species Scientific Committee, 2015a)	Noise interference	Section 7.6
		Habitat degradation including pollution	Section 8.3 & 8.5
		Vessel strike	Section 8.8
Blue Whale	Conservation Management Plan for the Blue Whale 2015-2025 (DoE, 2015a) and associated Guidance on key terms within the Blue Whale Conservation Management Plan (DAWE, 2021)	Noise interference	Section 7.6
		Habitat modification	Section 8.3 & 8.5
		Vessel disturbance	Section 8.8
Fin Whale	Approved Conservation Advice for the Fin Whale (Threatened Species Scientific Committee, 2015b)	Noise interference	Section 7.6
		Habitat degradation including pollution	Section 8.3 & 8.5
		Vessel strike	Section 8.8
Southern Right Whale	Conservation Management Plan for the Southern Right Whale 2011-2021 (DSEWPaC, 2012a)	Noise interference	Section 7.6
		Habitat modification	Section 8.3 & 8.5
		Marine debris	Section 8.7
		Vessel disturbance/ strike	Section 8.8
Australian Sea Lion	Recovery Plan for the Australian Sea Lion (DSEWPaC, 2013a)	Habitat degradation including pollution and oil spills	Section 8.3
Marine Reptiles			
EPBC Act listed marine turtles in the EMBA: • Loggerhead Turtle	National Light Pollution Guidelines for Wildlife, including marine turtles, seabirds and migratory shorebirds (DoEE, 2020). Recovery Plan for Marine Turtles (DoEE, 2017).	Light pollution	Section 7.5
		Noise interference	Section 7.6

Species or Group	Relevant Plan/Conservation Advice	Threats and or Management Strategies Relevant to the Activity	Addressed in EP Section
<ul style="list-style-type: none"> Green Turtle Hawksbill Turtle Flatback Turtle Leatherback Turtle Olive Ridley Turtle 	Approved Conservation Advice for Leatherback Turtle (DEWHA, 2008).	Marine debris	Section 8.7
		Vessel disturbance/ strike	Section 8.8
		Habitat loss/ modification. Chemical discharge/ deteriorating water quality	Section 8.3 & 8.5
Short-Nosed Seasnake	Approved Conservation Advice for <i>Aipysurus apraefrontalis</i> (Short-nosed Sea Snake) (TSSC, 2011a)	Habitat degradation Chemical discharge/ deteriorating water quality	Section 8.3 & 8.5
Fish, Sharks and Rays			
Dwarf Sawfish	Approved Conservation Advice for <i>Pristis clavata</i> (Dwarf Sawfish) (DEWHA, 2009) Sawfish and River Sharks Multispecies Recovery Plan (DoE, 2015b)	Habitat degradation and modification	Section 8.3 & 8.5
Green Sawfish	Approved Conservation Advice for the Green Sawfish (<i>Pristis zijsron</i>) (Threatened Species Scientific Committee, 2008) Sawfish and River Sharks Multispecies Recovery Plan (DoE, 2015b)	Habitat degradation and modification	Section 8.3 & 8.5
Grey Nurse Shark	Recovery Plan for the Grey Nurse Shark (<i>Carcharias taurus</i>) (DoE, 2014b)	Habitat modification	Section 8.3 & 8.5
Northern River Shark	Sawfish and River Sharks Multispecies Recovery Plan (DoE, 2015b)	Habitat degradation and modification	Section 8.3 & 8.5
Whale Shark	Approved Conservation Advice for the Whale Shark (<i>Rhincodon typus</i>) (TSSC, 2015d)	Marine debris	Section 8.7
		Habitat disruption	Section 8.3 & 8.5
		Boat strike	Section 8.8
White Shark	National Recovery Plan for the White Shark (<i>Carcharodon carcharias</i>) (DSEWPac, 2013b)	Habitat modification	Section 8.3 & 8.5
Birds (general)			

Species or Group	Relevant Plan/Conservation Advice	Threats and or Management Strategies Relevant to the Activity	Addressed in EP Section
Seabirds and migratory shorebirds	National Light Pollution Guidelines for Wildlife, including marine turtles, seabirds and migratory shorebirds (DoEE, 2020)	Light pollution	Section 7.5
	Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans	Marine debris	Section 8.7
Shorebirds			
Australasian Bittern	Approved Conservation Advice for <i>Botaurus poiciloptilus</i> (Australasian bittern) (TSSC, 2019)	Habitat loss disturbance and modifications	Section 8.3 & 8.5
Australian Lesser Noddy	Approved Conservation Advice for the Australian lesser noddy (<i>Anous tenuirostris melanops</i>) (TSSC, 2015f)	Pollution and oil spills	Section 8.3 & 8.5
Australian Painted Snipe	Approved Conservation Advice for Australian painted snipe (<i>Rostratula australis</i>) (DSEWPac, 2013c)	None listed relevant to the Activity	N/A
Bar-Tailed Godwit (baueri)	Approved Conservation Advice for the bar-tailed godwit (western Alaskan) (<i>Limosa lapponica baueri</i>) (TSSC, 2016d)	Habitat loss and degradation from pollution	Section 8.3 & 8.5
Curlew Sandpiper	Approved Conservation Advice for the curlew sandpiper (<i>Calidris ferruginea</i>) (TSSC, 2015g)	Habitat loss and degradation from pollution	Section 8.3 & 8.5
Eastern Curlew	Approved Conservation Advice for eastern curlew (<i>Numenius madagascariensis</i>) (TSSC, 2015i)	Habitat loss and degradation from pollution	Section 8.3 & 8.5
Great Knot	Approved Conservation Advice for the great knot (<i>Calidris tenuirostris</i>) (TSSC, 2016b)	Habitat loss and degradation from pollution	Section 8.3 & 8.5
Greater Sand Plover	Approved Conservation Advice for the greater sand plover (<i>Charadrius leschenaultii</i>) (TSSC, 2016c)	Habitat loss and degradation from pollution	Section 8.3 & 8.5

Species or Group	Relevant Plan/Conservation Advice	Threats and or Management Strategies Relevant to the Activity	Addressed in EP Section
Lesser Sand Plover	Approved Conservation Advice <i>Charadrius mongolus</i> (Lesser sand plover) (TSSC, 2016f)	Habitat loss and degradation from pollution	Section 8.3 & 8.5
Red Knot	Approved Conservation Advice for the red knot (<i>Calidris canutus</i>) (TSSC, 2016a)	Habitat loss and degradation Pollution/ contamination impacts	Section 8.3 & 8.5
Northern Siberian Bar-Tailed Godwit	Approved Conservation Advice for the bar-tailed godwit (northern Siberian) (<i>Limosa lapponica menzbieri</i>) (TSSC, 2016e)	Habitat loss and degradation from pollution	Section 8.3 & 8.5
Birds – Seabirds			
Relevant EPBC Act-listed seabirds: <ul style="list-style-type: none"> • Amsterdam Albatross • Black-Browed Albatross • Campbell Albatross • Indian Yellow-Nosed Albatross • Northern Giant Petrel • Northern Royal Albatross • Soft-Plumaged Petrel • Southern Giant Petrel • Shy Albatross • Sooty Albatross • Southern Royal Albatross • Tristan Albatross • Wandering Albatross • White-Capped Albatross 	Background Paper, Population Status and Threats to Albatrosses and Giant Petrels Listed as Threatened under the EPBC Act 1999 (DSEWPaC, 2011b) National recovery plan for threatened albatrosses and giant petrels 2011-2016 (DSEWPaC, 2011c)	Marine pollution	Section 8.3 & 8.5
		Marine debris	Section 8.7
Abbott’s Booby	Approved Conservation Advice for Abbott’s booby (<i>Papasula abbotti</i>) (TSSC, 2015k)	Marine pollution	Section 8.3
Australian Fairy Tern	Approved Conservation Advice for Australian fairy tern (<i>Sternula nereis nereis</i>) (TSSC, 2011)	Oil spills	Section 8.3 & 8.5
Blue Petrel	Approved Conservation Advice for the blue petrel (<i>Halobaena caerulea</i>) (TSSC, 2015h)	None listed relevant to the activity	N/A
Christmas Island Frigatebird	Approved Conservation Advice <i>Fregata andrewsi</i> (Christmas Island Frigatebird (TSSC, 2020a); and	Habitat loss disturbance and modifications	Section 8.3 & 8.5

Species or Group	Relevant Plan/Conservation Advice	Threats and or Management Strategies Relevant to the Activity	Addressed in EP Section
	National recovery plan for the Christmas Island Frigatebird (<i>Fregata andrewsi</i>) (Hill and Dunn, 2004)		
Christmas Island White-Tailed Tropicbird	Approved Conservation Advice for <i>Phaethon lepturus fulvus</i> white-tailed tropicbird (Christmas Island) (DoE, 2014a)	Oil spills	Section 8.3 & 8.5
Fairy Prion (southern)	Approved Conservation Advice for fairy prion (southern) (<i>Pachyptila turtur subantarctica</i>) (TSSC, 2015j)	None listed relevant to the Activity	N/A
Grey-Headed Albatross	Approved Conservation Advice for <i>Thalassarche chrysostoma</i> (Grey-headed Albatross) (DEWHA, 2009)	Marine debris, Oil spills	Section 8.3 & 8.5
Shy Albatross	Approved Conservation Advice for <i>Thalassarche cauta</i> (Shy Albatross) (TSSC, 2020b)	Marine debris	Section 8.7
Soft-Plumaged Petrel	Approved Conservation Advice for the soft-plumaged petrel (<i>Pterodroma mollis</i>) (TSSC, 2015e)	None listed relevant to the Activity	N/A

Biologically Important Areas and Habitat Critical to the Survival of a Species

The Conservation Values Atlas¹ identifies biologically important areas (BIAs) for some of the region’s protected species. These are areas that are considered to be particularly important for the conservation of protected species and where aggregations of individuals display biologically important behaviour such as breeding, foraging, resting or migration. BIAs are not protected matters and should not be confused with ‘critical habitat’ as defined in the EPBC Act.

A review of the Conservation Values Atlas identified BIAs for five protected species that intersect with the operational area. The identified protected species and the relevant BIAs are:

- Humpback whales – migratory corridor (North and South) and waters to about 50 km offshore (Figure 4-7);
- Pygmy blue whale – distribution (Exmouth, North West Cape area) (Figure 4-7);
- Flatback turtle – inter-nesting (North West Cape area, Exmouth Gulf) (Figure 4-8);
- Whale shark – foraging (Ningaloo Marine Park and adjacent Commonwealth waters) (Figure 4-12); and
- Wedge-tailed shearwater – breeding and foraging (North West Cape area) (Figure 4-15).

In addition, a number of BIAs occur within the wider EMBA (Table 4-13). Refer to the specific species descriptions for further information.

Table 4-13: BIAs within the wider EMBA

Species	BIA Type	Closest approx. distance to operational area (km)
Marine Mammals		
Humpback whale (refer to Figure 4-7)	Nursing (Kimberley/Coastal North Lacepede Island, Camden Sound)	982 km
Blue whale and pygmy blue whale (refer to Figure 4-7)	Foraging (on migration) (outer continental shelf from south of Jurien Bay to Cape Naturaliste)	1,015 km
Indo-Pacific bottlenose dolphin (refer to Figure 4-7)	Calving (Roebuck Bay)	907 km
Indo-Pacific humpback dolphin (refer to Figure 4-7)	Calving (Roebuck Bay)	907 km
Pygmy blue whale (refer to Figure 4-7)	Migration (Exmouth, North West Cape)	10 km
	Foraging (Ningaloo)	40 km
Australian snubfin dolphin (refer to Figure 4-7)	Calving (Roebuck Bay)	907 km
Sperm whale (refer to Figure 4-7)	Foraging (Western end of Perth canyon and Albany Canyons)	1,113 km
Southern right whale (refer to Figure 4-7)	Calving buffer (Perth to Kangaroo Island)	1,093 km
Dugong (refer to Figure 4-13)	Breeding, Nursing/calving (Ningaloo coast ¹ , Exmouth Gulf) Foraging (Kimberley coast, Dampier Peninsula, Dirk Hartog Island, Shark Bay)	22 km

Species	BIA Type	Closest approx. distance to operational area (km)
Australian sea lion (refer to Figure 4-14)	Breeding, foraging, haul-out sites (Houtman Abrolhos Islands, Mid west coast, includes Beagle Island, Fisherman Island, Jurien Bay, Cervantes and Buller Colonies, South coast from Recherche Archipelago to Doubtful Islands [key colonies, Kimberly island, Glenny and Wickam Island].	720 km
Marine Reptiles		
Flatback turtle (refer to Figure 4-8)	Foraging (Barrow Island)	141 km
	Nesting (Thevenard Island ¹ , Barrow Island, Montebello Islands, Dampier Archipelago, including Delambre Island and Hauy Island, Mundabullangana Beach, Cemetery Beach, Eighty mile beach, Eco Beach)	90 km
	Inter-nesting (North West Cape ¹ , Muiron Islands, Thevenard Island, Barrow Island, Montebello Islands)	55 km
Green turtle (refer to Figure 4-9)	Foraging (Barrow Island)	141 km
	Nesting (North West Cape ¹ , Muiron Islands, Barrow Island, Montebello Islands, Adele Island, Lacepede Islands)	27 km
	Inter-nesting (Exmouth Gulf and Ningaloo coast, North West Cape ¹ , Muiron Islands, Barrow Island, Montebello Islands, Dampier Archipelago)	2 km
Hawksbill turtle (refer to Figure 4-10)	Nesting (Ningaloo coast and Jurabi coast ¹ , Thevenard Island, Barrow Island, Lowendal Islands)	25 km
	Inter-nesting (Ningaloo coast and Jurabi coast ¹ , Thevenard Island, Barrow Island, Lowendal Islands, Montebello Islands, Dampier Archipelago, including Delambre Island and Rosemary Island, Cape Preston to mouth of Exmouth Gulf)	25 km
Loggerhead turtle (refer to Figure 4-11)	Nesting (Ningaloo and Jurabi coast ¹ , Muiron Islands, Montebello Islands, Dirk Hartog Island, Gnaraloo Bay)	26 km
	Inter-nesting (Ningaloo ¹ , Muiron Islands, Montebello Islands, Dirk Hartog Island, Shark Bay)	2 km
Fish/ Sharks		
Whale shark (refer to Figure 4-12)	Foraging (Ningaloo Marine Park and adjacent Commonwealth waters)	overlapping
White shark (refer to Figure 4-12)	Foraging (Houtman Abrolhos Islands, coastal waters from Dongara to Wedge Island, waters off pinniped colonies in South-west Marine region)	730 km
Dwarf sawfish (refer to Figure 4-12)	Foraging (80 mile beach) Pupping (80 mile beach) Nursing (80 mile beach)	605 km
Green sawfish (refer to Figure 4-12)	Pupping (80 mile beach, Roebuck Bay, Willie Creek, Cape Keraudren) Foraging (Roebuck Bay, Cape Keraudren) Nursing (80 mile beach, Cape Keraudren)	605 km
Freshwater sawfish (refer to Figure 4-12)	Pupping (80 mile beach, Roebuck Bay) Foraging (80 mile beach, Roebuck Bay)	605 km
Birds		

Species	BIA Type	Closest approx. distance to operational area (km)
Australian lesser noddy (refer to Figure 4-15)	Foraging (Houtman Abrolhos Islands)	730 km
Bridled tern (refer to Figure 4-15)	Foraging (south from north of Abrolhos Islands)	680 km
Brown booby (refer to Figure 4-15)	Breeding (Kimberley and northern Pilbara coasts and islands also Ashmore Reef)	614 km
Caspian tern (refer to Figure 4-15)	Foraging (south from north of Abrolhos Islands)	680 km
Common noddy (refer to Figure 4-15)	Foraging (Houtman Abrolhos Islands, Lancelin Island)	730 km
Flesh-footed shearwater (refer to Figure 4-15)	Aggregation (Rottnest Island to Bunbury) Foraging (Cape Naturaliste to Eyre)	1,177 km
Fairy tern (refer to Figure 4-15)	Breeding (North West Cape ¹ , Thevenard Island, Barrow Island, Montebello islands, Shark Bay, Pilbara and Gascoyne coasts and islands) Foraging (south west coast to Peel Inlet) and south coast (from Flinders Bay east to Israelite Bay), including islands (as far offshore as Trimouille I. and Houtman Abrolhos)	30 km
Greater frigatebird (refer to Figure 4-15)	Breeding (Kimberley and Ashmore Reef) Foraging (Kimberley and Ashmore Reef)	1052 km
Great-winged petrel (refer to Figure 4-15)	Foraging (south-west corner of WA and east past Kangaroo Island)	1,546 km
Indian yellow-nosed Albatross (refer to Figure 4-15)	Foraging (south-west marine region)	1,420 km
Lesser crested tern ² (refer to Figure 4-15)	Breeding (Thevenard Island ¹ , Lowendal Islands, island off Dirk Hartog Island)	65 km
Lesser frigatebird (refer to Figure 4-15)	Breeding (Kimberley and Pilbara coasts and islands also Ashmore Reef)	455 km
Little penguin (refer to Figure 4-15)	Foraging (Perth to Bunbury, Augusta to Twilight Cove)	1,159 km
Little shearwater ² (refer to Figure 4-15)	Foraging (coastal and offshore waters south from Kalbarri)	640 km
Little tern (refer to Figure 4-15)	Resting (Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef, Roebuck Bay Ramsar site) Breeding (Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef)	636 km
Pacific gull (refer to Figure 4-15)	Foraging (Houtman Abrolhos Islands, West coast and islands from Point Quobba south to Wedge, south west to Cape Leeuwin. Common around Albany and Esperance)	730 km
Red-footed booby (refer to Figure 4-15)	Breeding (North west Kimberley and Ashmore reef) Foraging (North west Kimberley and Ashmore reef)	1052 km
Roseate tern (refer to Figure 4-15)	Aggregation (Eighty Mile Beach)	90 km

Species	BIA Type	Closest approx. distance to operational area (km)
	Breeding (Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef, Ningaloo ¹ , Thevenard Island, Barrow Island, Shark Bay) Foraging (mid west, south to Mandurah)	
Short-tailed shearwater (refer to Figure 4-15)	Foraging (in high numbers) (archipelago of the Recherche, west to the lower west coast north to 33°40'S)	1515 km
Soft-plumaged petrel (refer to Figure 4-15)	Foraging (offshore waters south of Geraldton)	835 km
Sooty tern (refer to Figure 4-15)	Foraging (offshore waters west of Shark Bay)	490 km
Wedge-tailed shearwater (refer to Figure 4-15)	Breeding (Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef, Exmouth, islands off Onslow, Barrow Island, Shark Bay) Foraging (Shark Bay, south to Dunsborough)	38 km
White-tailed tropicbird (refer to Figure 4-15)	Breeding (Ashmore reef)	556 km

¹ Where multiple BIAs overlap with the wider EMBA, the distance shown is the distance of the closest BIA to the operational area.
² The little shearwater, lesser crested tern, Pacific gull and sooty tern are not listed as threatened or migratory under the EPBC Act.

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

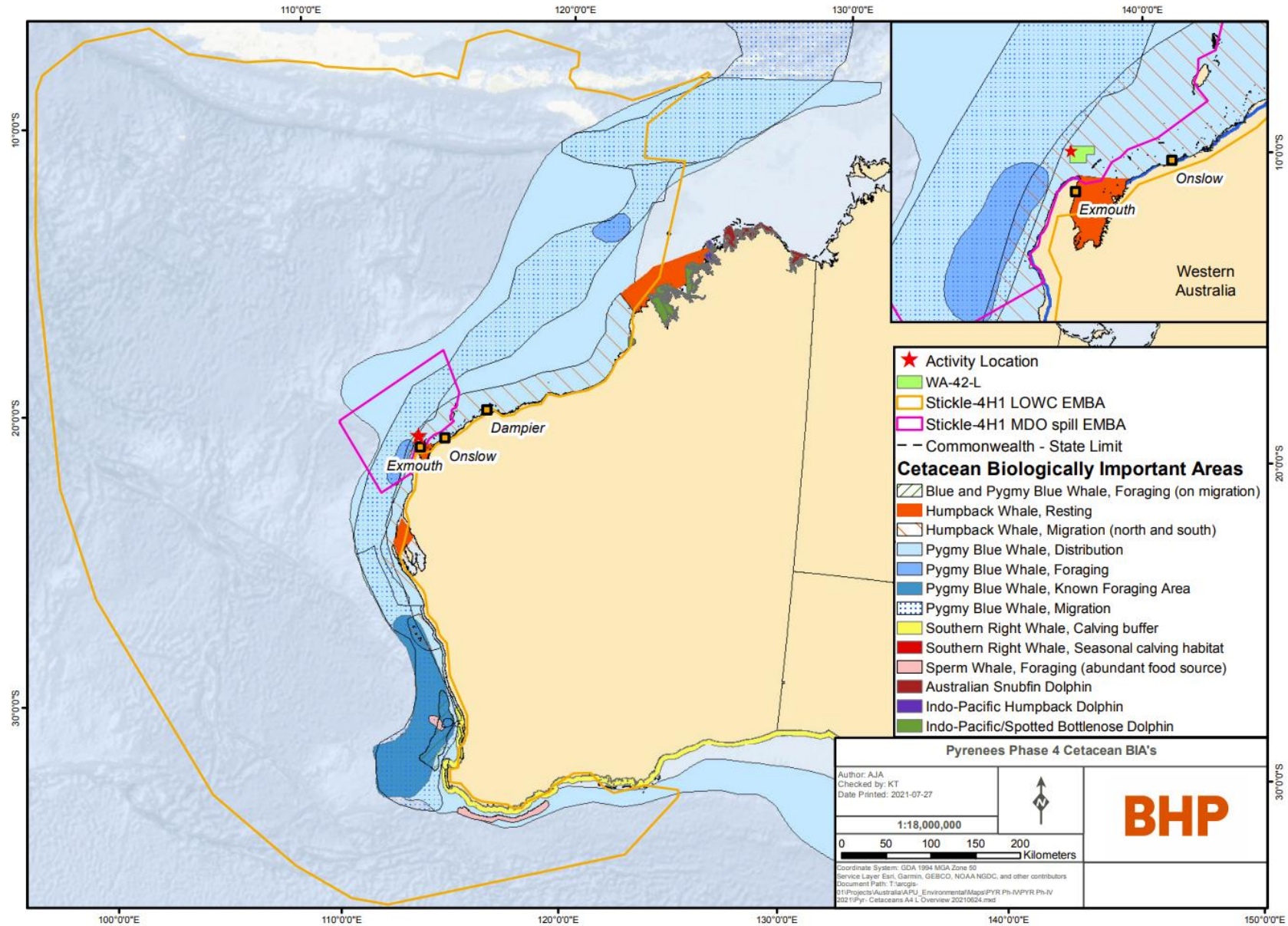


Figure 4-7: Biologically important areas for cetaceans

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

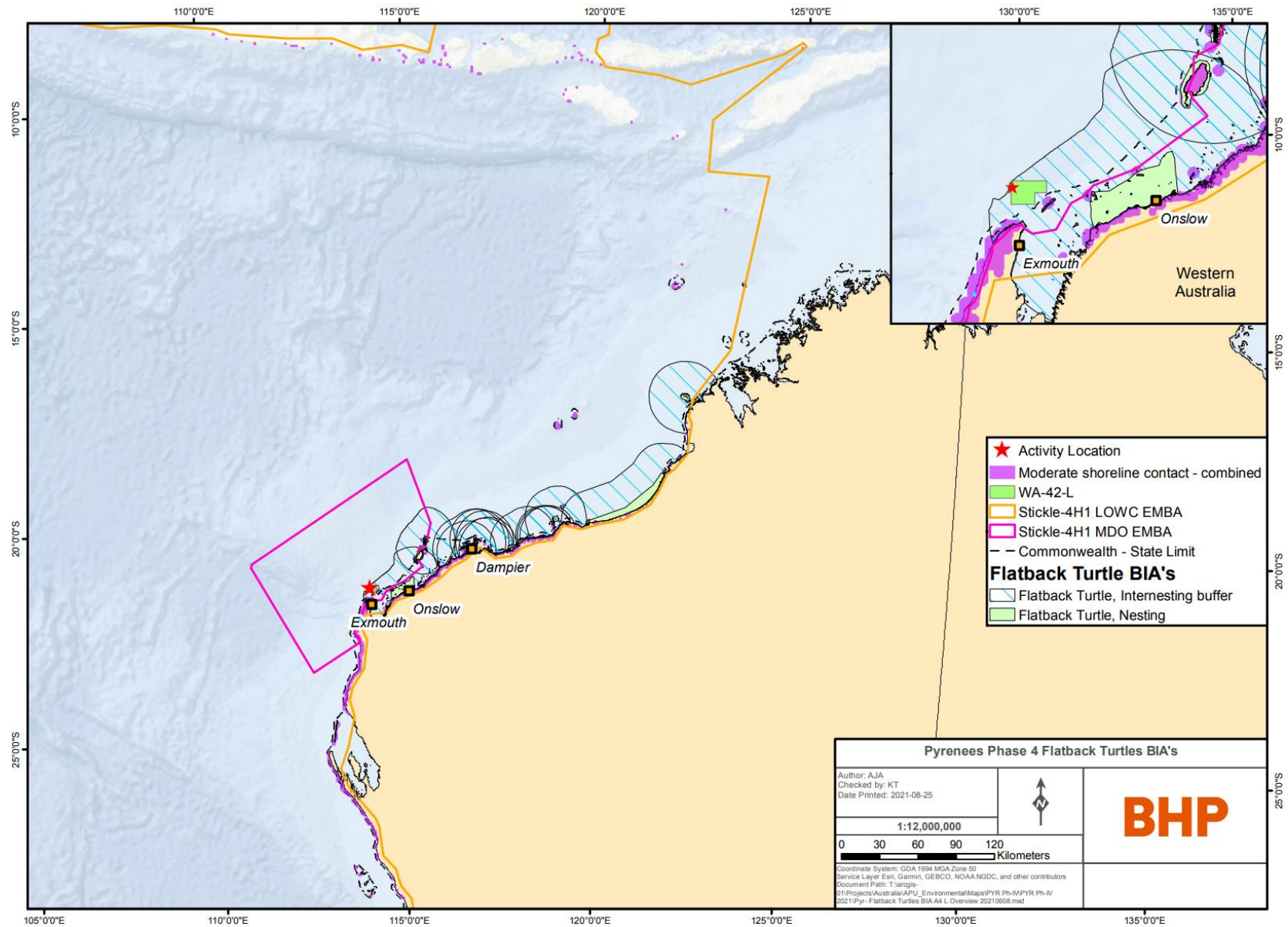


Figure 4-8: Biologically important areas for flatback turtles

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

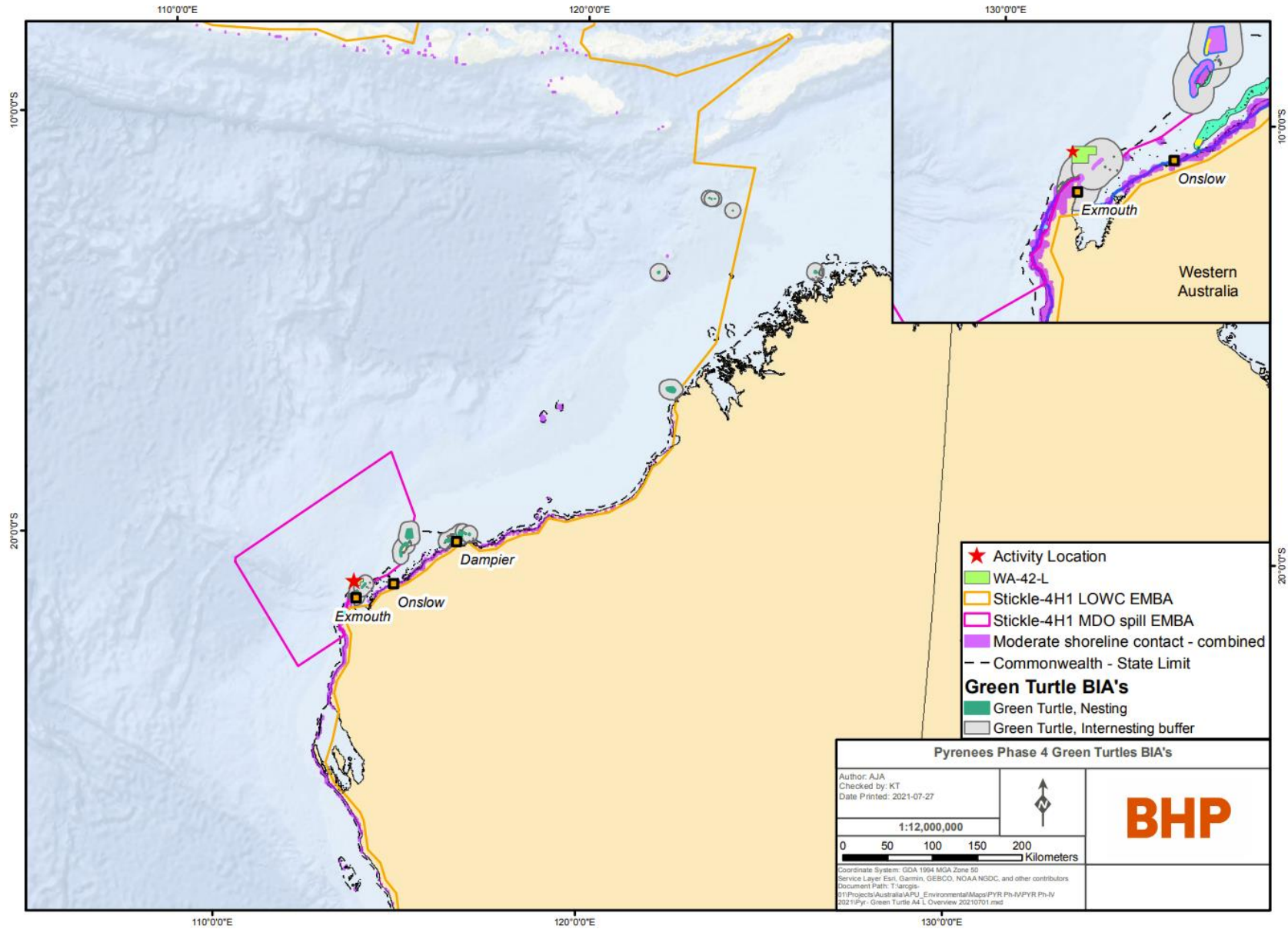


Figure 4-9: Biologically important areas for green turtles

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

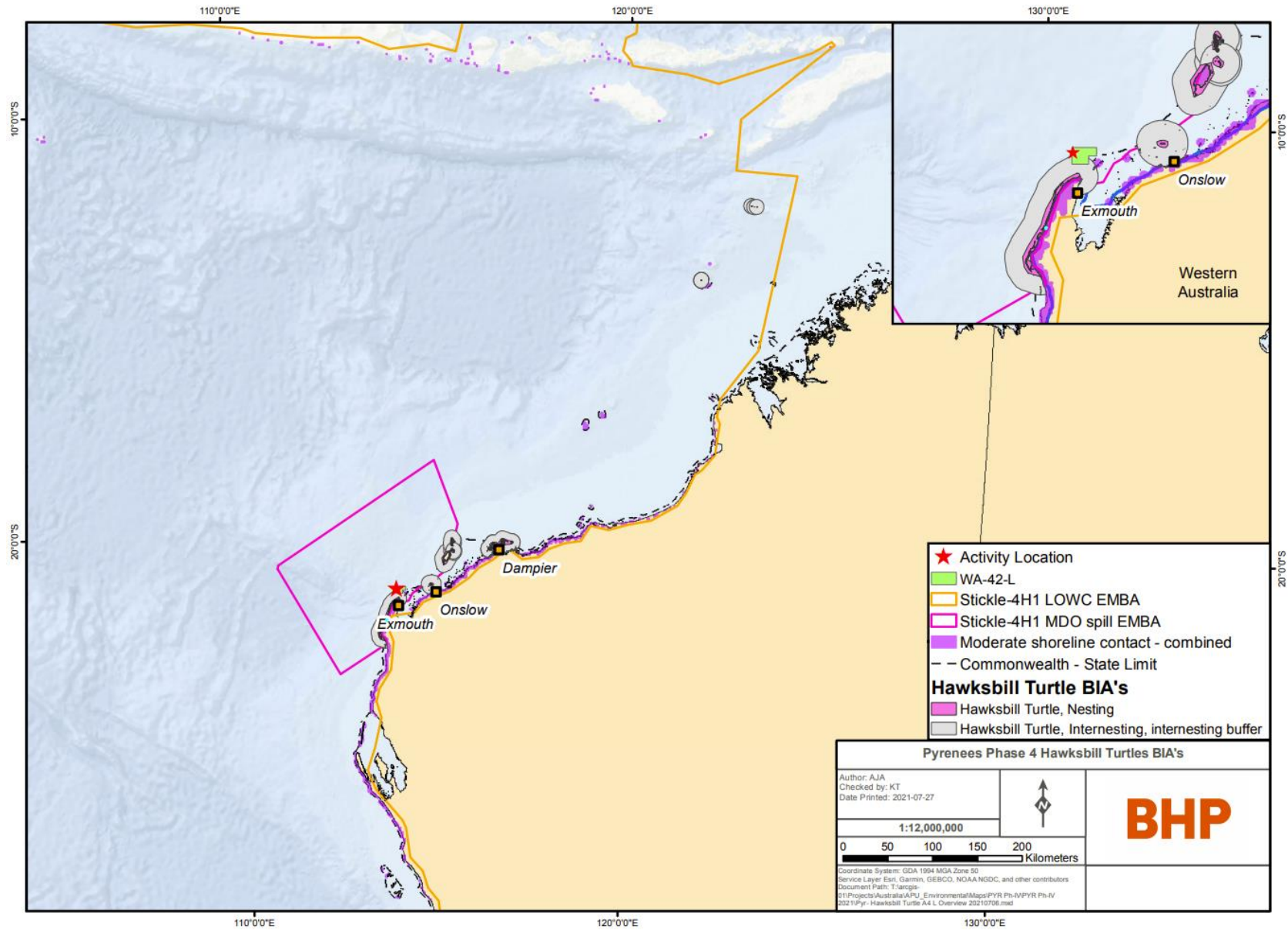


Figure 4-10: Biologically important areas for hawksbill turtles

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

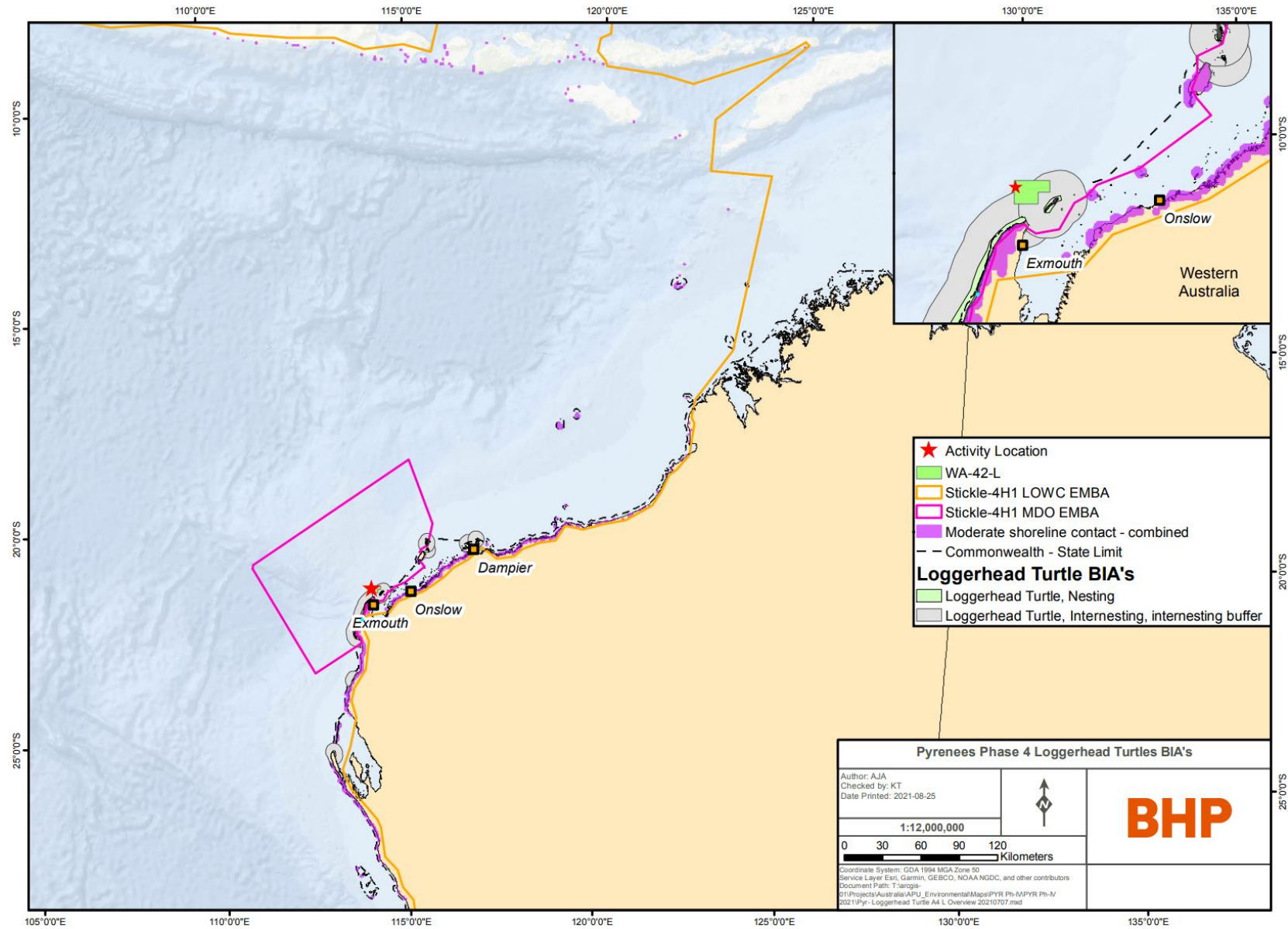


Figure 4-11: Biologically important areas for loggerhead turtles

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

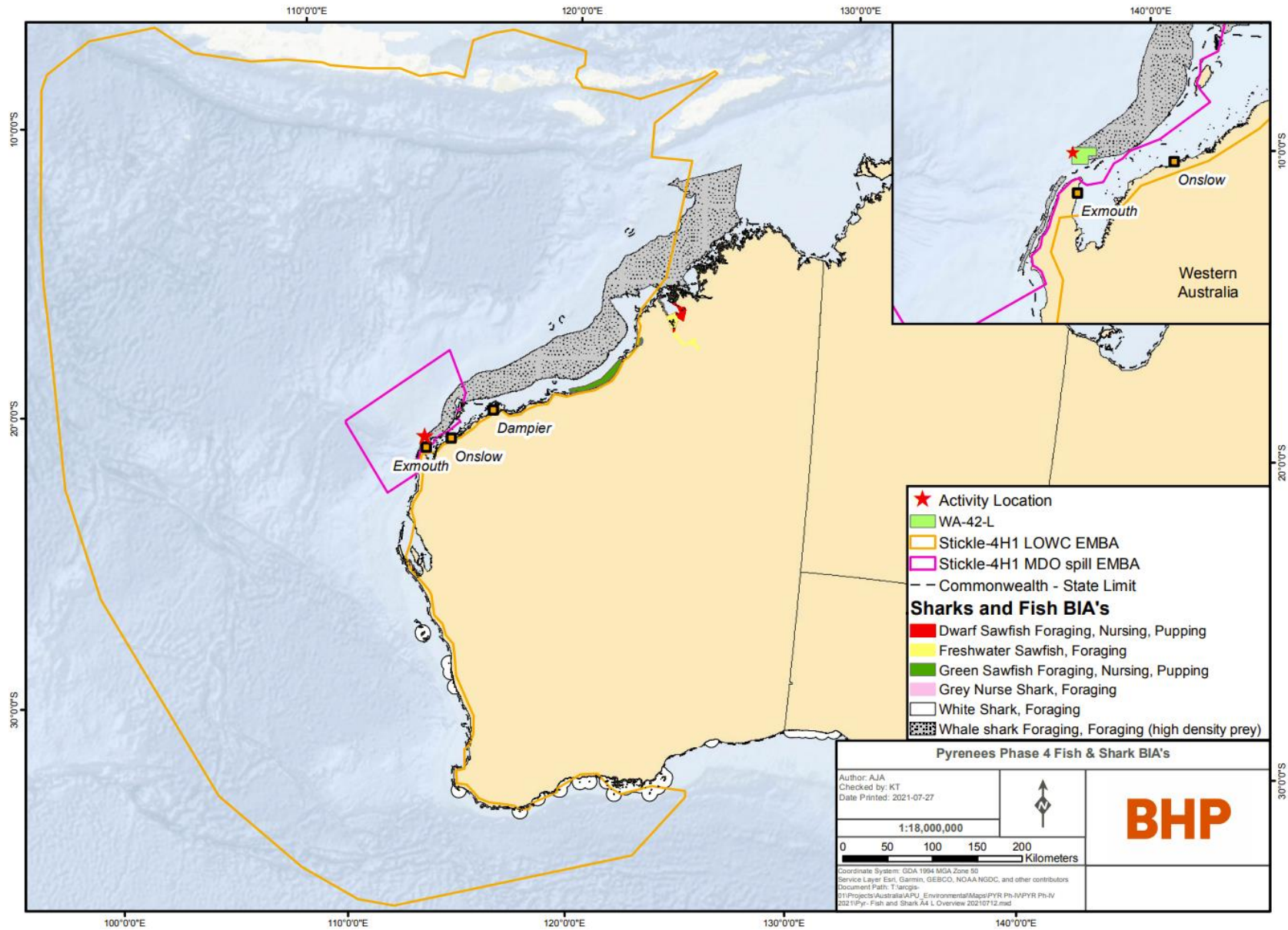


Figure 4-12: Biologically important areas for fish and sharks

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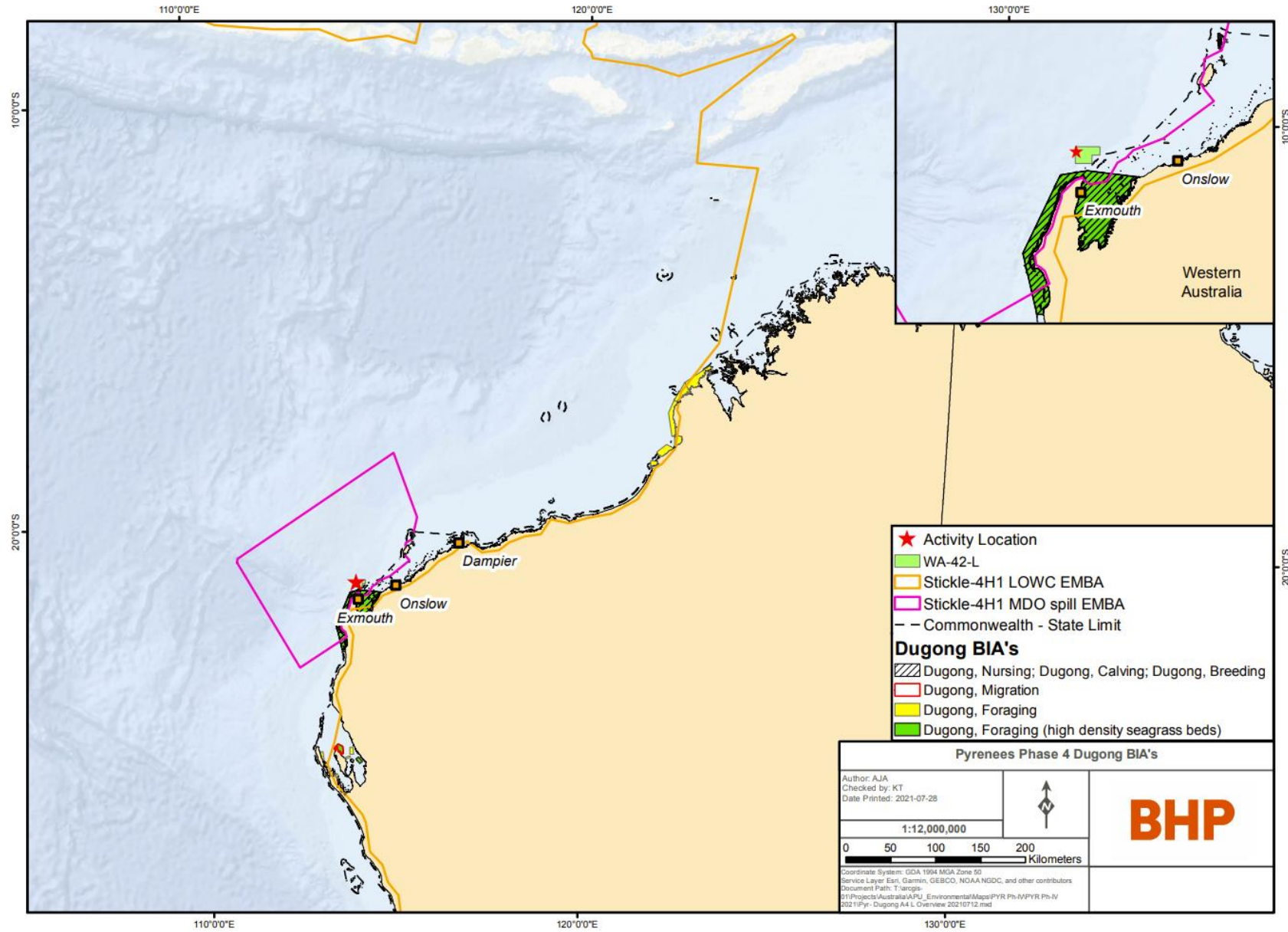


Figure 4-13: Biologically important areas for dugongs

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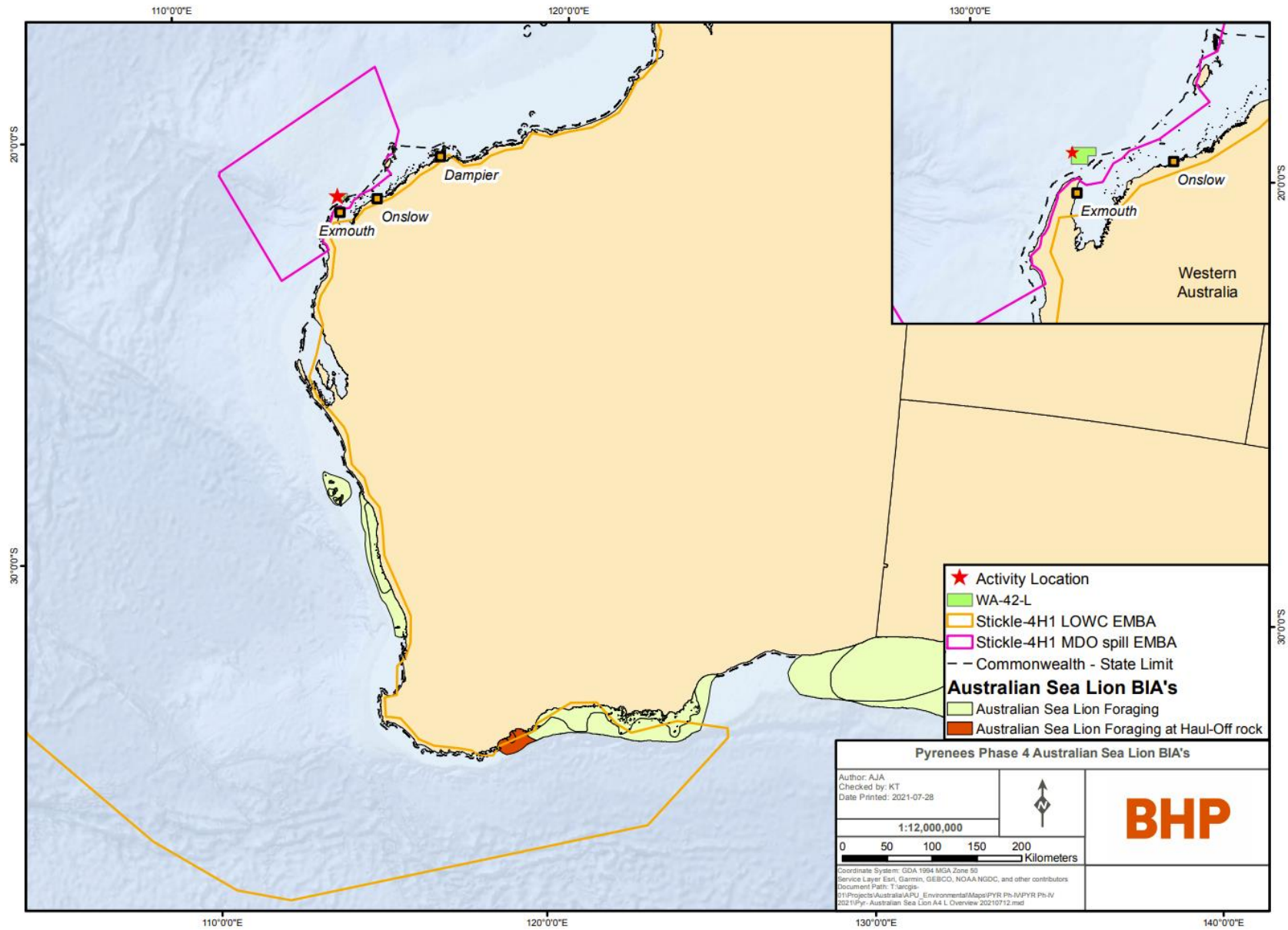


Figure 4-14: Biologically important areas for Australian sea lion

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

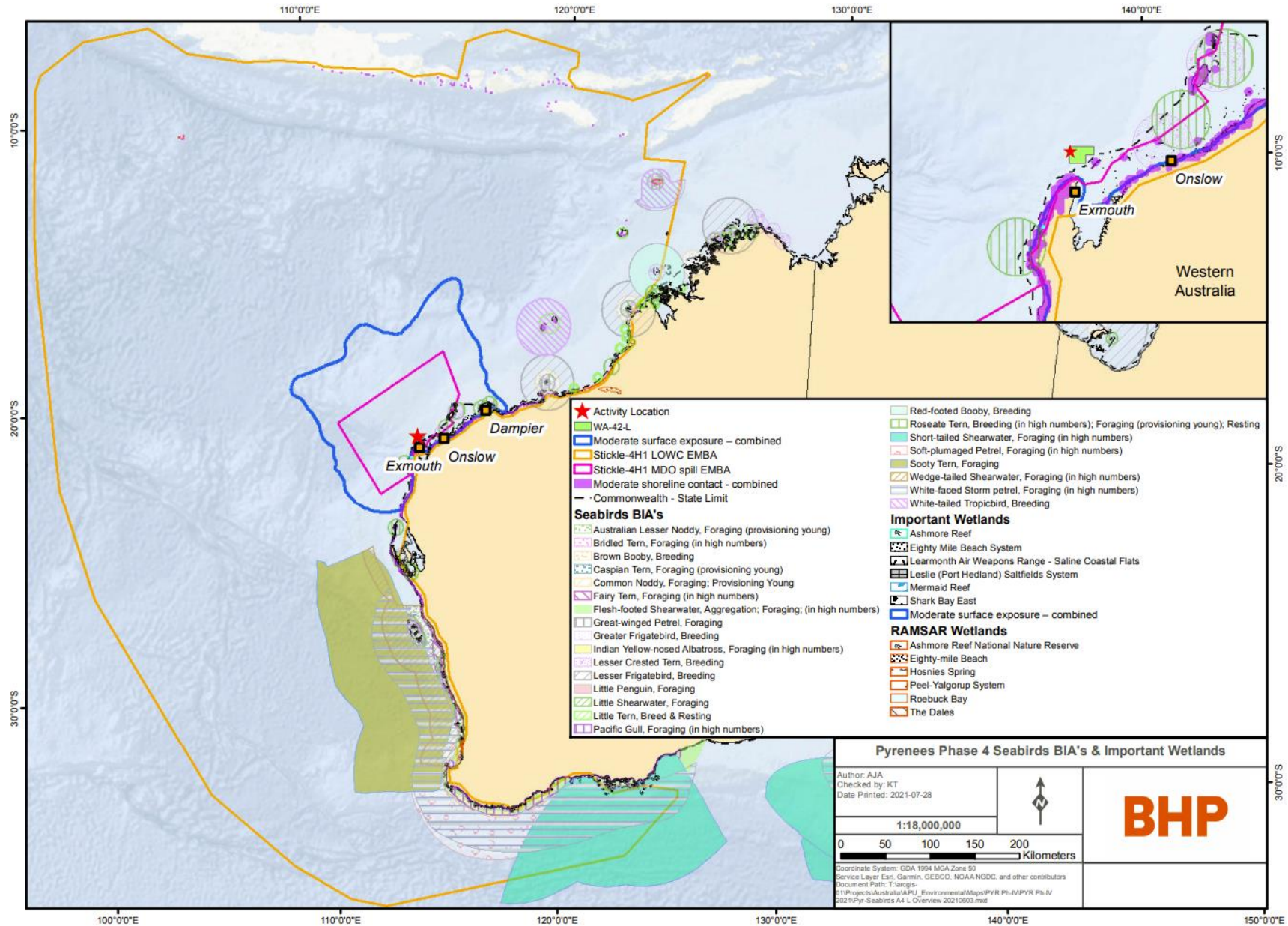


Figure 4-15: Seabird BIA's and Important Wetlands

Habitat Critical to the Survival of a Species

‘Habitat critical to the survival of a species’ is defined within the EPBC Act Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (DoE, 2013) as areas that are necessary:

- For activities such as foraging, breeding, roosting, or dispersal;
- For the long-term maintenance of the species (including the maintenance of species essential to the survival of the species);
- To maintain genetic diversity and long-term evolutionary development; or
- For the reintroduction of populations or recovery of the species.

The Recovery Plan for Marine Turtles in Australia (DoEE, 2017) provides details of habitat critical to the survival of several species of marine turtle genetic stock (summarised in Table 4-14). The EMBA intercepts the following:

- Inter-nesting habitat critical to the survival of flatback turtles (intercepts the operational area); and
- Inter-nesting habitat critical to the survival of flatback, green, loggerhead, hawksbill and Olive Ridley turtles (intercepts the moderate and low threshold EMBA).

Figure 4-16 shows the habitat critical to the survival of relevant marine turtles that intercept the EMBA.

Table 4-14: Nesting and inter-nesting areas identified as ‘habitat critical to the survival of marine turtles’ within the EMBA

Turtle Species	Nesting Location / Inter-nesting Buffer	Nesting Period	EMBA		
			Operational area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
Flatback turtle (Pilbara stock)	60 km radius of nesting locations: Muiron Islands, Pilbara coast, coastal islands from Cape Preston to Locker Island, Montebello Islands	Oct-Mar	✓	✓	✓
Green turtle (NWS genetic stock)	20 km radius of nesting locations: Serrurier Island, Northwest Cape, Exmouth Gulf, Barrow Island, Montebello Islands, Thevenard Island, Shark Bay to Ningaloo coast	Nov-Mar	x	✓	✓
Hawksbill turtle (WA stock)	20 km radius of nesting locations: Muiron Islands, and mainland beaches from Cape Range to Ningaloo and Gnaraloo to Red Buff, Cape Preston to	Oct-Feb	x	✓	✓

Turtle Species	Nesting Location / Inter-nesting Buffer	Nesting Period	EMBA		
			Operational area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
	mouth of Exmouth Gulf, Montebello Islands				
Loggerhead turtle (WA stock)	20 km radius of nesting locations: North West Cape, Ningaloo coast, Muiron Islands, Gnoraloo Bay, Dirk Hartog Island	Nov-May	x	✓	✓

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

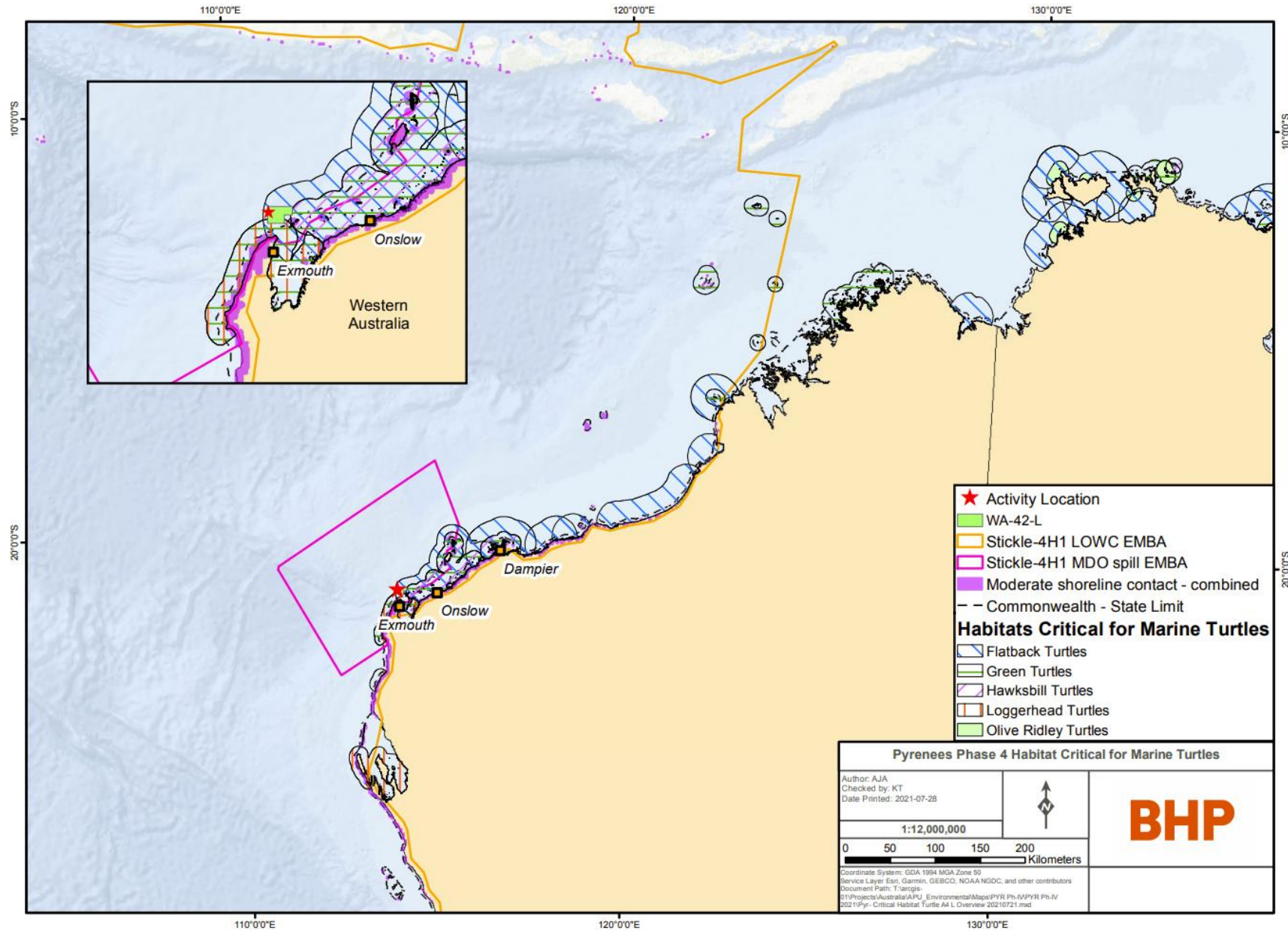


Figure 4-16: Habitat critical to the survival of marine turtles within the EMBA

Summary of Windows of Ecological Sensitivity

Table 4-15 provides a summary of the windows of ecological sensitivity for values identified within and around the operational area and the wider EMBA. These receptors are considered throughout the EP in terms of the identified potential risk.

Table 4-15: Key environmental sensitivities and timing of biologically important activity

Category	Environmental Sensitivity	Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Habitats/ Communities	Phytoplankton abundance												
	Zooplankton abundance												
	Coral spawning												
	Seagrass												
	Macroalgae												
Marine Fauna (threatened/ migratory species)	Green turtle nesting												
	Loggerhead turtle nesting												
	Hawksbill turtle nesting												
	Flatback turtle nesting												
	Olive Ridley turtle nesting												
	Humpback whale migration												
	Humpback whale calving												
	Blue whale migration												
	Whale shark (Ningaloo)												
	Dugong aggregation												
	Inshore dolphin calving (Roebuck Bay)												
	Migratory shorebird staging (Roebuck Bay and Eighty-mile Beach)												
	Seabird nesting												
	Australian sea lion (Houtman Abrolhos Is.) breeding												
	Legend		Peak occurrence/ activity (reliable and predictable)										

Category	Environmental Sensitivity	Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		Low level of occurrence/ activity (may vary from year to year)											
		Activity can occur throughout the year											
		No occurrence											

4.6 Marine Mammals

A search of the EPBC Protected Matters database identified 48 EPBC listed marine mammal species with potential to occur or have habitat within the wider low and moderate EMBA. Of these, a total of six were listed as threatened and 15 were listed as migratory marine mammal species. Within the operational area a total of eight EPBC listed marine mammals (five threatened species and eight migratory listed) were identified.

4.6.1 Threatened and Migratory Species

Sei Whale

Sei whales (*Balaenoptera borealis*) are listed as vulnerable and migratory under the EPBC Act. Sei whales are not commonly recorded in Australian waters and their similarity to Bryde's whales has resulted in confusion about their distributional limits and the accuracy of recorded observations (DoE, 2020). There are no known mating or calving areas in Australian waters. The species migrates between Australian waters and Antarctic feeding areas but their movements are unpredictable and not well documented. They have been sighted inshore (in the proximity of the Bonney upwelling in Victoria) as well as in deeper offshore waters and have only been sighted in summer and autumn (DAWE, 2020).

Sei whales were identified as likely to occur within the operational area and likely to be foraging within wider moderate and low EMBA; however due to infrequent sightings in Australia, their occurrence is considered unlikely.

Southern Right Whale

The Southern right whale (*Eubalaena australis*) is listed as endangered and migratory under the EPBC Act. The species is seasonally present on the Australian coast between May and November and recorded in the coastal waters of all Australian states (Bannister *et al.*, 1996). Major calving areas are located in Western Australia at Doubtful Island Bay, east of Israelite Bay in the south-west; and in South Australia at Head of Bight (Bannister *et al.*, 1996). The distribution of Southern Right Whales in Australian waters other than near the coast is unknown and very little information is known about the migratory patterns, habitats, calving areas or feeding habits; but peak periods for mating are known to be from mid-July through to August (DAWE, 2020).

Isolated individuals have been seen outside the normal season but a summer sighting would be very unusual. Australian Southern Right Whales migrate seasonally between higher and middle latitudes. The general timing of migratory arrivals and departures varies slightly each year. Migratory pathways are not well known (Bannister *et al.*, 1996). A circular, anticlockwise migration pattern south of the Australian continent was proposed by Hart *et al.* (1842), based on the seasonal location of whaling activity. This generalised migratory pattern is further supported by the majority of inter-year coastal movements being in a westerly direction and between-year coastal movements being in an easterly direction (Burnell, 2001).

Southern Right Whales were identified as likely to occur within the operational area and known to undertake breeding within wider low and moderate EMBA. Calving BIAs are present within the EMBA.

Blue Whale

Blue whales (*Balaenoptera musculus*) are listed as endangered and migratory under the EPBC Act. There are two recognised subspecies of blue whale in the southern hemisphere that are both recorded in Australian waters, the southern (or 'true' blue whale (*Balaenoptera musculus intermedia*) and the 'pygmy' blue whale (*Balaenoptera musculus brevicauda*). In general, Southern Blue Whales occur in waters south of 60°S and Pygmy Blue Whales occur in waters north of 55°S (i.e. not in the Antarctic). By this definition, all Blue Whales in waters from Kalbarri to the Northern Territory border are assumed to be Pygmy Blue Whales, and are discussed below.

Pygmy Blue Whales have a southern hemisphere distribution, migrating from tropical water breeding grounds in winter to temperate and polar water feeding grounds in summer (Bannister *et al.*, 1996; Double *et al.*, 2014). Passive acoustic data documented Pygmy Blue Whales migrating along the Western Australian shelf break at depth of 500 to 1,000 m (McCauley & Jenner, 2010) (Figure 4-17).

During the southern migration, Pygmy Blue Whales pass south of the Montebello Islands and Exmouth from October to the end of January, peaking in late November to early December (Double *et al.*, 2012). On the

return journey, tagging surveys have shown Pygmy Blue Whales migrating northward relatively near to the Australian coastline (100 km) until reaching North West Cape after which they travelled offshore (240 km) to Indonesia. Blue Whales have been detected off Exmouth and the Montebello Islands between April and August (Double *et al.*, 2012; McCauley & Jenner, 2010) (Figure 4-17).

Blue whales were identified as likely to occur within the operational area and likely foraging within the wider low and moderate EMBA. Foraging and migration BIA's for the Pygmy Blue Whale intercept the wider EMBA (Figure 4-7). Considering the known usage of the area, it is likely that the Pygmy Blue Whale will be regionally present, particularly over the summer season and may occur in the wider EMBA between April and August (north-bound migration) and October to January (south-bound migration).

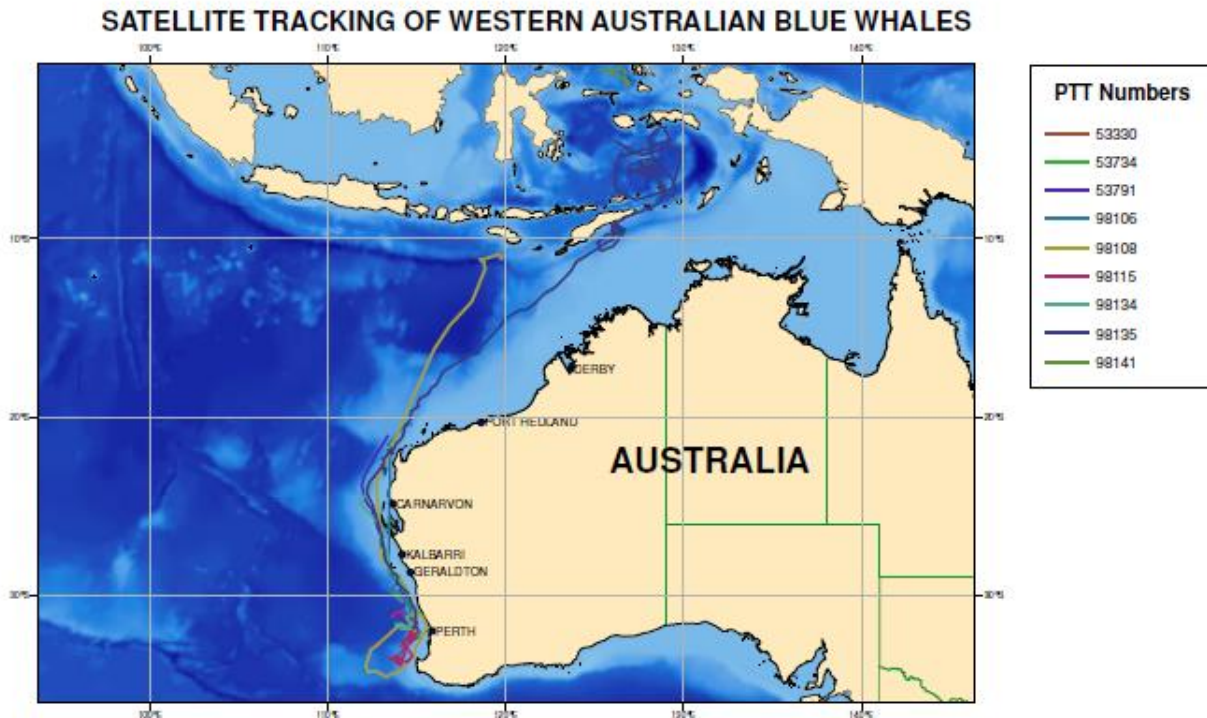


Figure 4-17: Satellite tracking of blue whales in 2010/2011, modified from Double *et al.*, (2012)

Fin Whale

The Fin Whale (*Balaenoptera physalus*) is listed as vulnerable and migratory under the EPBC Act. The Fin Whale is the second-largest whale species after the Blue Whale. Fin Whale distribution in Australian waters is known primarily from stranding events and whaling records. Due to scarcity of sighting records, the distribution cannot be accurately determined although it is thought to be present along the western coast of Australia, southern Australia around to Tasmania. The Australian Antarctic waters are important feeding grounds but there are no known mating or calving areas in Australian waters (Morrice *et al.*, 2004). The migration routes and location of winter breeding grounds are uncertain, but presence in Australian waters has been detected in summer and autumn months (DoEE, 2017).

Fin Whales were identified as likely to occur within the operational area and likely foraging within wider low and moderate EMBA; however due to infrequent sightings in Australia the likelihood of these whales being present is low.

Humpback Whale

The Humpback Whale (*Megaptera novaengliae*) whilst previously listed as vulnerable and migratory under the EPBC Act, has been removed from Australia's threatened species list, but remains protected. Humpback Whales occur throughout Australian waters, their distribution being influenced by their migratory pathways and aggregation areas for resting, breeding and calving. In the southern hemisphere, Humpback Whale populations spend the summer months feeding in the Antarctic polar region before migrating north to tropical breeding/calving grounds in the coastal waters of the Kimberley.

Aerial surveys and noise logger recordings undertaken for Chevron’s Wheatstone Project show that the main distribution of Humpback Whales were sighted at an average distance of 50 km from the mainland during the northern migration and 35 km during the southbound migration (RPS, 2010). The southbound migration moves down the coast between late August and November, although females with calves have been documented leaving the calving areas last, with a later peak in abundance observed from mid-August to mid-September (Jenner *et al.*, 2001). Figure 4-18 illustrates the results of aerial surveys conducted during a single year between the north-west cape and Barrow Island.

Humpback Whales were identified as known to occur within the operational area and known to breed within the wider EMBA (Figure 4-7). The operational area intersects the Humpback Whale migration BIA and waters out to about 50 km offshore as part of the migratory corridor for these whales. The wider EMBA intersects a portion of the Exmouth Gulf resting area. Individuals may be sighted particularly between June and December whilst transiting through to rest areas of the Exmouth Gulf.

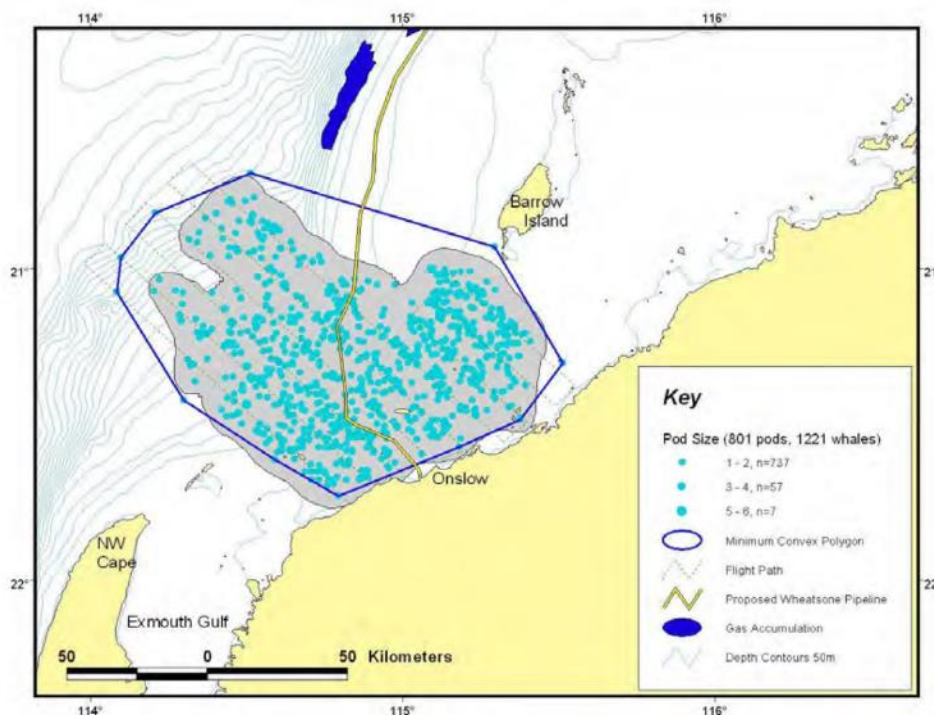


Figure 4-18: Aerial survey sightings of humpback whales from June to December 2009 (taken from Jenner *et al.*, 2010)

Australian Sea Lion

The Australian Sea Lion (*Neophoca cinerea*) is listed as vulnerable under the EPBC Act. The Australian Sea Lion is the only pinniped endemic to Australia. The breeding range extends from Houtman Abrolhos, Western Australia, to The Pages Island, east of Kangaroo Island, South Australia. Breeding colonies occur on islands or remote sections of coastline. Over 66 breeding colonies have been recorded: 28 in WA and 38 in SA (DAWE, 2020). The Australian Sea Lion exhibits high site fidelity and little movement of females between colonies have been observed.

Australian Sea Lions use a wide variety of habitats for breeding sites (called rookeries), and during the non-breeding season, for haul-out sites. Onshore habitats used include exposed islands and reefs, rocky terrain, sandy beaches and vegetate for dunes and swales (DAWE, 2020). They feed on a wide variety of prey, including cephalopods, fish, sharks, rock lobsters and sea birds.

The Australian Sea Lion was identified as known to occur within the wider EMBA, with breeding known to occur at the Houtman Abrolhos Islands and south west Australia. The wider EMBA intersects BIAs (breeding, foraging, haul-out sites) for the species (Figure 4-14).

Antarctic Minke Whale

The Antarctic Minke Whale (*Balaenoptera bonaerensis*) is listed as migratory under the EPBC Act. This large baleen whale swims alone or in pairs; numbers are not well documented. The distribution of this species in WA is unknown, however they are known to occur offshore within cold temperate to Antarctic waters (DAWE, 2020). The species migrates between Antarctic feeding grounds to warmer tropical and subtropical waters and calving occurs in warmer waters during late May and early June after winter migration from Antarctic waters.

The Antarctic Minke Whale was identified as likely to occur within the wider EMBA.

Bryde's Whale

Bryde's Whale (*Balaenoptera edeni*) is listed as migratory under the EPBC Act. Bryde's Whale is considered the least migratory of the whale species in Australian waters and is typically found in tropical waters between 40°S and 40°N year round (Bannister *et al.*, 1996; DAWE, 2020). This is supported by noise logger recordings of Bryde's Whales year round near Scott Reef. The species frequents oceanic waters as well as nearshore areas following zones of upwelling around the continental shelf (Mustoe and Edmunds, 2008).

Bryde's Whales were identified as likely to occur within the operational area and wider EMBA.

Pygmy Right Whale

The Pygmy Right Whale (*Caperea marginata*) is listed as migratory under the EPBC Act. Little is known of this small and elusive baleen whale with few sightings recorded. In Australia, they have been recorded between 32°S and 47°S, but are not uniformly spread around the coast, with the northern distribution on the west coast may be limited by the Leeuwin current.

The Pygmy Right Whale was identified as likely to forage within wider EMBA, in particular the southernmost extent.

Dugong

Dugongs (*Dugong dugon*) are protected under the *Biodiversity Conservation Act 2016* WA and under the EPBC Act, which lists them as marine and migratory species. They are large herbivorous marine mammals that feed on seagrass and mostly inhabit shallow (up to 5 m) waters fringing coasts and offshore islands occurring in close conjunction with the seagrass and algae beds on which they feed. There is little data on the presence of Dugongs in deeper offshore waters, although the absence of food would suggest this is unlikely.

The distribution of Dugongs in Australia ranges from Shark Bay in WA extending around the Northern Territory coastline to Moreton Bay in Queensland. Dugongs are long-lived and slow breeding. Breeding occurs from September through to April.

Dugongs were identified to have known breeding within the wider EMBA and a known BIA (foraging and breeding) which intersects with the wider EMBA in the Exmouth Gulf, Ningaloo Coast and Shark Bay (Figure 4-13).

Dusky Dolphin

The Dusky Dolphin (*Lagenorhynchus obscurus*) is listed as migratory under the EPBC Act and occurs mostly in temperate and sub-Antarctic zones. In Australia, the Dusky Dolphin has been sighted in southern Australia from WA to Tasmania. The area of occupancy is unknown, but it is considered to primarily inhabit inshore waters, but may also move offshore to seek out colder waters in summer months (DAWE, 2020).

Dusky Dolphins have been identified as likely to occur within wider EMBA, in particular the southernmost extent of the wider EMBA.

Australian Snubfin Dolphin

Australian Snubfin Dolphin (*Orcaella heinsohni*) is listed as migratory under the EPBC Act. Stranding and museum specimen records indicate that Australian Snubfin Dolphins occur only in waters off the northern half of Australia, from approximately Broome (17° 57' S) on the west coast to the Brisbane River (27° 32' S) on the east coast (Parra *et al.* 2002; DAWE, 2021). Aerial and boat-based surveys indicate that Australian Snubfin Dolphins occur mostly in protected shallow waters close to the coast, and close to river and creek mouths (Parra, 2006; Parra & Corkeron 2001; Parra *et al.*, 2002; DAWE, 2021b).

The large area of shallow water on the northern Sahul Shelf, plus records of Australian Snubfin Dolphins out to 23 km offshore, suggests that even though the known distribution is limited, its occurrence probably exceeds 20 000 km² (Peddemors & Harcourt 2006, pers. comm.: DAWE, 2021).

All available data on the distribution and habitat preferences of Australian Snubfin Dolphins indicate that they mainly occur in one location: shallow coastal and estuarine waters of Queensland, Northern Territory and north Western Australia (Beasley *et al.* 2002: DAWE, 2021)

Australian Snubfin Dolphins have been identified as known to occur within the wider EMBA.

Orca

Orca (*Orcinus orca*) is listed as migratory under the EPBC Act and is the largest member of the dolphin family. Orca are found in both tropical and temperate waters in oceanic, pelagic and neritic waters (DAWE, 2020). Orca usually travel in groups of 10-30 individuals and make seasonal migrations, and may follow regular migratory pathways; however this has not been proven. No specific information on migratory pathways along the WA coast is documented. Orca have been recorded relocating to Antarctic waters during summer months and back to warmer waters during winter. This suggests that during the winter months would be the highest likelihood of occurrence of Orca on the NWS.

The Orca has been identified as may occur within the operational area and wider EMBA.

Sperm Whale

The Sperm Whale (*Physeter macrocephalus*) is listed as migratory under the EPBC Act. They have a wide distribution extending from the polar regions to the equator although they are usually found in deeper oceanic waters near continental breaks and canyons (DAWE, 2020). Females and young males tend to remain in warmer waters, whereas adult males venture further away from the equator to colder waters. Limited information exists on Sperm Whale distribution in Australian waters.

Sperm whales were identified as may occur within the operational area and known to forage within the wider EMBA.

Spotted Bottlenose Dolphin

The Spotted Bottlenose Dolphin (Arafura/Timor Sea population) (*Tursiops aduncus*) is listed as migratory under the EPBC Act. Occurring Australia wide, this species resembles the common bottlenose dolphin. This species prefers shallower inshore bays and estuaries and travels in groups consisting on average of between five and 16 individuals (DAWE, 2020). Migratory movements in Australia are variable, and are likely to be triggered by baitfish movements. This species can spend all year in one location, but can also make long-range movements.

The Spotted Bottlenose Dolphin was identified as may occur within the operational area and wider EMBA.

Indo-Pacific Humpback Dolphin

The Indo-Pacific Humpback Dolphin (*Sousa chinensis*) is listed as migratory under the EPBC Act. The species is known to occur along the Exmouth Gulf around the North West Cape round to the Queensland/NSW border. The total population size of the Indo-Pacific Humpback Dolphin in Australian waters is not known. The dolphin inhabits shallow coastal, estuarine and occasionally riverine habitats and usually in waters less than 20 m, but have occasionally been seen as far offshore as 55 km in relatively shallow water (Corkeron *et al.*, 1997). The Indo-Pacific Humpback Dolphin's migratory patterns in the NWS region are not well documented.

The Indo-Pacific Humpback Dolphin was identified as to having known breeding within the wider EMBA.

4.7 Marine Reptiles

A search of the EPBC Protected Matters database identified 28 and 30 EPBC listed marine reptile species, with potential to occur or have habitat within the wider low and moderate EMBA, respectively. Of these, a total of eight were listed as threatened and seven as migratory marine reptile species. Within the operational area a total of five EPBC listed marine reptiles (five threatened species and five migratory listed) were identified.

4.7.1 Threatened and Migratory Species

Short-nosed Seasnake

The Short-nosed Seasnake (*Aipysurus apraefrontalis*) is listed as critically endangered under the EPBC Act. It is a fully aquatic, small snake and is endemic to WA. It has been recorded from Exmouth Gulf, WA to the reefs of the Sahul Shelf, in the eastern Indian Ocean. This species is believed to show strong site fidelity to shallow coral reef habitats in less than 10 m of water, with most specimens having been collected from Ashmore and Hibernia reefs (Minton & Heatwole, 1975; Guinea & Whiting, 2005).

The species prefers the reef flats or shallow waters along the outer reef edge in water depths to 10 m (McCosker, 1975; Cogger, 2000). The species has been observed during daylight hours, resting beneath small coral overhangs or coral heads in 1–2 m of water (McCosker, 1975). Guinea and Whiting (2005) reported that very few short-nosed seasnakes moved even as far as 50 m away from the reef flat and are therefore unlikely to be expected in high numbers in offshore, deeper waters.

The Short-nosed Seasnake was identified as known to occur within the wider EMBA.

Leaf-scaled Seasnake

The Leaf-scaled Seasnake (*Aipysurus foliosquama*) is listed as critically endangered under the EPBC Act.

The Leaf-scaled Seasnake is a small, slender snake with a small head and pointed snout. The dorsal surface is dark (reddish brown or purplish) with paler cross-bands. The head scales are large and usually symmetrical. Body scales are imbricate (strongly overlapping), or leaf-like, and are in 19–21 rows at the mid-body. Ventral scales are deeply notched, and number 135–155. The anal scale is divided. Subcaudal scales vary between 20–30. The Leaf-scaled Seasnake grows to about 60 cm in total length (Cogger, 2000; Smith, 1926; Storr *et al.*, 2002) but specimens up to 90 cm have been reported (Guinea, 1995). Sexual dimorphism is present in the number of subcaudal scales, with males having 24–27 and females having 20–29 (Greer, 1997).

All seasnakes are air breathing reptiles and must come to the surface to breathe, however they can spend from 30 minutes to two hours diving between breaths. Nostril valves, which prevent water entering the lung while underwater, open inwards and are held shut from behind by erectile tissue engorged with blood (Heatwole 1999). Seasnakes have one elongated cylindrical lung that extends for almost the entire length of their body, which is very efficient for gas exchange. Seasnakes also carry out cutaneous respiration, where oxygen diffuses from sea water across the snake's skin into tiny blood vessels and carbon dioxide diffuses out (Heatwole, 1999).

Seasnakes are able to avoid excess salt accumulation from sea water using a salt excreting gland that sits under the tongue. Seasnakes shed their skin every 2–6 weeks, which is more frequently than land snakes and more often than needed for growth alone. The process involves rubbing their lips against coral, or other hard substrate, to loosen the skin. The seasnake then catches the skin against something to anchor it and moves slowly forward, leaving the skin turned inside out behind it. Skin shedding allows seasnakes to rid themselves of fouling marine organisms such as algae, barnacles and bryozoans (Heatwole 1999).

The Leaf-scaled Seasnake is usually solitary but is sometimes found in groups at particular coral outcrops, together with other species of seasnake such as the Short-nosed Seasnake (*A. apraefrontalis*) and the Dusky Seasnake (*A. fuscus*) (McCosker, 1975). These congregations contain gravid (pregnant) females (Guinea & Whiting 2005).

The Leaf-scaled Seasnake is found only on the reefs of the Sahul Shelf in Western Australia, especially on Ashmore and Hibernia Reefs (Cogger, 2000; Minton & Heatwole, 1975; Storr *et al.*, 2002) in the North-west Bioregion (DEWHA, 2008b).

The current extent of occurrence is estimated to be 750 km² and the area of occupancy is approximately 228 km² (Guinea, 2003).

The Leaf-scaled Seasnake was the most common seasnake encountered on the reef flat at Ashmore Reef (Guinea, 1995; Guinea & Whiting, 2005; Minton & Heatwole, 1975). However, sightings of this species have become rare on both Ashmore Reef and Hibernia Reef (Guinea 2006, 2007) and it has not been reported in surveys since 2001 (Guinea, 2007; Lukoschek *et al.*, 2013). In 2010, a dead specimen was collected from Barrow Island and deposited in the Western Australia Museum, although it is unknown whether the individual was a resident or a waif (displaced from original habitat) (Lukoschek *et al.*, 2013).

The Leaf-scaled Seasnake was identified as known to occur within the wider EMBA.

Loggerhead Turtle

The Loggerhead Turtle (*Caretta caretta*) is listed as endangered and migratory under the EPBC Act. The Loggerhead Turtle has a worldwide distribution, living and breeding in subtropical to tropical locations (Limpus, 2008a). The annual nesting population in WA is thought to be 3,000 females annually (Baldwin et al., 2003), and this is considered to support the third largest population in the world (Limpus, 2008a).

Nesting and breeding occurs from October to March, with a peak in late December/early January (DAWE, 2020). Major nesting beaches include the Dampier Archipelago and the Montebello Islands. Lower density nesting is known from the Lowendal Islands, Barrow Island, the Muiron Islands, and the Ningaloo Coast at Cape Range, and south to Carnarvon.

Foraging areas are widespread for Loggerhead Turtle populations and migrations from nesting to feeding grounds can stretch 1,000s of kilometres, including feeding grounds as far north as the Java Sea of Indonesia for the WA population (Limpus, 2008a). Loggerhead turtles are carnivorous and feed primarily on benthic invertebrates from depths of ranging from approximately 50 m to near shore tidal areas (DAWE, 2020) including areas of rocky and coral reef, muddy bays, sand flats, estuaries and seagrass meadows (Limpus, 2008a).

The Loggerhead Turtle was identified as known to occur within the operational area and breeding known to occur within wider EMBA. No BIAs for the species lie within the operational area. However, the wider EMBA intersects known BIAs (nesting and inter-nesting habitat) (Figure 4-11) and habitat critical to the survival of the species (refer to Table 4-14 and Figure 4-16).

Green Turtle

The Green Turtle (*Chelonia mydas*) is listed as vulnerable and migratory under the EPBC Act. The Green Turtle has a worldwide tropical and subtropical distribution and is widespread and abundant in WA waters, with an estimated 20,000 individuals occurring in WA; arguably the largest population in the Indian Ocean (Limpus, 2008b). The principal rookeries in WA include the Lacepede Islands, Barrow Island, Montebello Islands (all with sandy beaches), Muiron Islands, Browse Island, Northwest Cape, and Ningaloo coast north. Nesting occurs between November and March, with the peak period between January and March.

Green turtles are omnivores, mainly feeding in shallow benthic habitats on seagrass and/or algae, but are also known to feed on sponges, jellyfish and mangroves (Limpus, 2008b). Green turtles are unlikely to forage or dwell within deeper offshore waters due to the water depths; however, they may occasionally migrate through it.

The Green Turtle was identified as known to occur within the operational area and breeding known to occur within wider EMBA. No BIAs for the species lie within the operational area. However, the wider EMBA intersects known BIAs (foraging, nesting and inter-nesting habitat) (Figure 4-9) and habitat critical to the survival of the species (refer to Table 4-14 and Figure 4-16).

Leatherback Turtle

The Leatherback Turtle (*Dermochelys coriacea*) is listed as endangered and migratory under the EPBC Act. The Leatherback Turtle has the widest distribution of any marine turtle, and can be found from tropical to temperate waters throughout the world (Márquez, 1990). There are no major centres of nesting activity that have been recorded in Australia, although scattered isolated nesting (one to three nests per annum) occurs in southern Queensland and the Northern Territory (Limpus & McLachlin, 1994). There have been several records of Leatherback Turtles off the coast of WA, but no confirmed nesting sites (Limpus, 2009).

The Leatherback Turtle was identified as known to occur within the operational area and known foraging within wider EMBA; however, no BIAs or habitat critical to the survival of the species lie within the operational area or wider EMBA.

Hawksbill Turtle

The Hawksbill Turtle (*Eretmochelys imbricata*) is listed as vulnerable and migratory under the EPBC Act. Hawksbill Turtles have a global distribution throughout tropical and sub-tropical marine waters. The WA stock is concentrated on the NWS, one of the largest hawksbill populations in the world. The most significant breeding areas are around the sandy beaches of the Dampier Archipelago and the Montebello Islands.

Hawksbill turtles also nest at North West Cape/ Ningaloo coast, Muiron Islands, Varanus Island, the Lowendal Islands, and Rosemary Island. Nesting occurs throughout the year in WA, peaking between October and January.

Adults tend to forage in tropical tidal and subtidal coral and rocky reef habitat where they feed on an omnivorous diet of sponges, algae, jellyfish and cephalopods (DAWE, 2020).

The Hawksbill Turtle was identified as known to occur within the operational area and breeding known to occur within wider EMBA. No BIAs for the species lie within the operational area. However, the wider EMBA intersects a known BIA (nesting and inter-nesting habitat) (Figure 4-10) and habitat critical to the survival of the species (refer to **Table 4-14** and **Figure 4-16**). As Hawksbill Turtle rookeries and foraging areas are known to occur within the area, individuals are likely to be encountered in the EMBA.

Olive Ridley Turtle

The Olive Ridley Turtle (*Lepidochelys olivacea*) is listed as endangered under the EPBC Act. It has a worldwide tropical and sub-tropical distribution and is known to occur in both WA and the NT (DSEWPaC, 2012b). Whilst nesting has been recorded in WA, it is far more common in the NT (DSEWPaC, 2012b). Although Olive Ridley Turtles nest all year round, nesting activity peaks around April to November, with the majority of nesting occurring from the Arnhem Land coast (including Bathurst Island, a BIA) to the north western coast of Cape York Peninsula (DSEWPaC, 2012c). After nesting, Olive Ridley Turtles are known to migrate up to 1,050 km to various foraging areas (DAWE, 2020b). Adult turtles forage for crabs, shrimp, tunicates, jellyfish, salps and algae in depths ranging from several metres to over 100 m (DAWE, 2020a).

The Olive Ridley Turtle was identified as known aggregation area within wider EMBA. However, no BIAs and habitat critical to the survival of Olive Ridley Turtles overlap with the EMBA.

Flatback Turtle

The Flatback Turtle (*Natator depressus*) is listed as vulnerable and migratory under the EPBC Act. The Flatback Turtle has an Australasian distribution, with all recorded nesting beaches occurring within tropical to sub-tropical Australian waters (Limpus, 2007). They are known to feed on mid-water plankton and benthic organisms, and can forage in mid-shelf water depths (up to about 50 m). Breeding and nesting is restricted to northern WA (Limpus, 2007). The southern WA nesting population of flatback turtles occurs from Exmouth to the Lacepede Islands off the Kimberley coast (DAWE, 2020). Nesting activity within the Ningaloo Reef/ Exmouth Gulf area is low. Counts of nesting conducted by the Ningaloo Turtle program found no nesting activity during the 2010/2011 season in the Ningaloo Reef area. Significant rookeries are centred on Barrow Island especially the east coast beaches (DAWE, 2020). Inter-nesting Flatback Turtles can travel up to 62 km away from their rookery between nesting events (Whitlock *et al.*, 2014).

Unlike other sea turtles, the Flatback Turtle lacks a wide oceanic dispersal phase and adults tend to be found in soft sediment habitats within the continental shelf of northern Australia (DAWE, 2020).

The flatback turtle was identified as occurring within the operational area and wider EMBA. The operational area lies within an inter-nesting BIA (North West Cape area and Exmouth Gulf) for the species; and the wider EMBA intersects known BIAs (foraging, nesting and inter-nesting) (Figure 4-8) and habitat critical to the survival of the species (refer to **Table 4-14** and **Figure 4-16**).

Saltwater Crocodile

The Salt-water Crocodile (*Crocodylus porosus*) is listed as migratory under the EPBC Act. The Salt-water Crocodile is found in Australian coastal waters, estuaries, lakes, inland swamps and marshes (DAWE, 2021). Despite the species' common name, the salt-water crocodile can persist in freshwater bodies. The species' distribution ranges from Rockhampton in Queensland to King Sound (near Broome) in Western Australia (DAWE, 2021).

The Salt-water Crocodile was identified as likely to occur within the wider EMBA.

4.8 Fish, Sharks and Rays

A search of the EPBC Protected Matters database identified a total of 17 and 16 EPBC listed fish species (plus additional 73 syngnathinae species), with potential to occur or have habitat within the wider low and moderate EMBA, respectively. Of these, a total of ten were listed as threatened and 12 were listed as migratory fish species. Within the operational area a total of ten EPBC listed fish (five threatened species and nine migratory listed) were identified. Nineteen syngnathinae species were identified within operational area.

In addition, there are two conservation dependent species that may occur within the operational area and wider EMBA.

Fishes

Some 1,400 species of finfish are known to occur in the region, mostly of a tropical Indo-West Pacific affinity, with a greater proportion occurring in shallow coastal waters (DEWHA, 2008a). In general, most fish in the region are associated with coral reefs. For example, the abundance, species richness and assemblage structure of juvenile fishes was quantified in 2009 to 2011 at 20 locations extending from Bundegi to 3-Mile Camp and covering approximately 280 km of the Ningaloo coastline. Sampling included back reef and lagoonal reef zones as well as sanctuary and recreational management zones. In total, 36,791 juvenile fishes from 120 species were observed over the three recruitment years, providing an average of 53 individuals (± 2.6 standard error) per 30 m² transect. Interestingly, recruitment rates varied significantly among sampling times (i.e. temporal variation). Transect abundance means ranged from 82 ± 6.3 individuals (2009), 19 ± 1.2 individuals (2010) to 77 ± 4.6 individuals (2011) (Depczynski et al., 2011). The authors of this study noted that the 75% drop in abundance in 2010 coincided with a small increase in mean species richness. A number of different pelagic fish occur in the deeper offshore waters of the region. Pelagic fish species are seasonally abundant and may pass through the area during annual migrations. The most notable species of deep water pelagic fishes in the area are the billfish, which include Sailfish, Marlin (both Family Istiophoridae) and Swordfish (*Xiphias gladius*).

The region also supports diverse and abundant shark and ray populations. Whaler sharks (Family Carcharhinidae) are the most numerous and diverse, occurring in a wide range of habitats such as intertidal (Black-tip Reef Shark – *Carcharhinus melanopterus*), offshore reefs (Grey Reef Shark - *C. amblyrhynchos*) and deep ocean areas (Oceanic White-tip Shark - *C. longimanus*).

The Ningaloo Marine Park (State Waters) Management Plan 2005 to 2015 (CALM/MRPA, 2005a) outlines a suite of management strategies to protect marine plants and animals found in the region. The offshore waters of the Ningaloo Reef and Muiron islands have diverse and abundant shark and ray populations. Section 7.1.14 of the Ningaloo Marine Park (State Waters) Management Plan 2005 to 2015 makes reference to several locations in the Ningaloo Marine Park including Pelican Point, Bundegi Sanctuary Zone, Mangrove Bay and Bills Bay, which are suggested aggregation points (nursery areas) for juvenile sharks and ray populations. The best known of these is Bills Bay, where up to 100 sharks have been witnessed in water depths as shallow as 0.5 m. Aggregations recorded in other locations of the reserves have so far represented fewer individuals. Due to stable diversity and abundance of shark and ray numbers, there is at present a low level of threat to these populations. The current major pressure is from commercial and recreational fishing; however, population information is limited.

A number of commercial fisheries operate in the area including wetline fisheries, demersal line fishery, mackerel fishery, the Exmouth Gulf Prawn Managed Fishery (EGPMF), the Shark Bay snapper fishery and the marine aquarium and specimen shell fisheries. Section 7.2.1.1 of the Ningaloo Marine Park (State Waters) Management Plan 2005 to 2015 describes the primary role of management within the reserves in relation to commercial fishing as, in liaison with Department of Fisheries, ensuring that commercial fishing activities are ecologically sustainable and helping maintain the natural values (e.g. high water and sediment quality) of the reserves on which the industry depends. Maintenance of habitat (e.g. nursery grounds, areas of high productivity) is the highest priority, as well as consideration of spawning areas of key fish species adjacent to the operational area (Table 4-16).

The region also supports diverse and abundant shark and ray populations, with 94 species known in the region (DEWHA, 2008a).

Table 4-16: Listed key fish species that may occur in the vicinity of the operational area

Key Fish Species	Spawning/ Aggregation Times
Baldchin Groper (<i>Choerodon rubescens</i>)	Sep – Feb
Spanish Mackerel (<i>Scomberomorus commerson</i>)	Aug – Nov
Rankin Cod (<i>Epinephelus multinotatus</i>)	Aug – Oct
Red Emperor (<i>Lutjanus sebae</i>)	Oct – Mar
Pink Snapper (<i>Pagrus auratus</i>)	May – Jul
Blacktip Shark (<i>Carcharhinus melanopterus</i>)	Nov – Dec
Sandbar Shark (<i>Carcharhinus plumbeus</i>)	Oct – Jan
Crystal (Snow) Crab (<i>Chaceon</i> spp.)	All year
King George Whiting (<i>Sillaginodes punctate</i>)	Jun – Sep
Spangled Emperor (<i>Lethrinus nebulosus</i>)	Sep – Dec

4.8.1 Threatened and Migratory Species

Grey Nurse Shark

The Grey Nurse Shark (*Carcharias taurus*, west coast population) is listed as vulnerable under the EPBC Act. Globally, the species is listed as vulnerable in the IUCN Red List of Threatened Species. Grey Nurse Shark are now restricted to two populations, one on the east coast from southern Queensland to southern NSW and the other around the south-west coast of Western Australia. The Grey Nurse Shark is now considered extinct in Victorian waters. It is believed that the east and west coast populations do not interact. The west coast population has a broad inshore distribution, primarily in sub-tropical to cool temperate waters (Last and Stevens, 2009). The population of grey nurse sharks (west coast population) is predominantly found in the south-west coastal waters of Western Australia (DoE, 2014b) and has been recorded as far north as the North West Shelf (Stevens, 1999; Pogonoski *et al.*, 2002). The greatest threat to Grey Nurse Sharks is considered to be incidental bycatch in commercial fisheries.

Grey Nurse Sharks are frequently observed hovering motionless just above the seabed in or near deep sandy-bottomed gutters or rocky caves, and in the vicinity of inshore rocky reefs and islands (Pollard *et al.*, 1996). Adult Grey Nurse Sharks feed on a wide range of fish, other sharks, squid, crabs and lobsters.

The Grey Nurse Shark was identified as may occur within the operational area and known to occur within the wider EMBA.

White Shark

The White Shark (*Carcharodon carcharias*) is listed as vulnerable and migratory under the EPBC Act. It occurs in almost all coastal and offshore waters of the major oceans that have water temperature between 12 and 24°C with greater concentrations in the United States (Atlantic Northeast and California), South Africa, Japan, Australia/Oceania, Chile, and the Mediterranean. This shark reaches its maturity around 15 years of age and can have a life span of over 30 years. White Sharks are known to prey on marine mammals and a variety of other marine animals, including fish and seabirds and have been frequently recorded in WA particularly during Humpback Whale migrations.

The White Shark was identified as known to occur within the operational area and foraging known to occur within wider EMBA. BIAs for the White Shark fall within the wider EMBA (Figure 4-12).

Northern River Shark

The Northern River Shark (*Glyphis garricki*) is listed as endangered under the EPBC Act. This species has only been found in two places in Australia - the Adelaide River and Alligator River, Northern Territory. This species would occur over a total area of far less than 5000 km². The area occupied by specimens of the species is far less than 500km², especially over the dry season.

It is suspected that the population is severely fragmented. A number of surveys undertaken over northern Australian river systems have not found *Glyphis* species, despite conditions in these rivers being suitable for the species. These sharks are known not to aggregate in schools but are a solitary species. (DAWE, 2021b).

The population is estimated to number less than 250 mature individuals. It is estimated that a maximum of a few hundred (300) individuals would be found at these two locations. There would be less than 250 mature individuals (DAWE, 2021b).

The Northern River Shark may occur within the wider EMBA, particularly the northern boundaries.

Dwarf Sawfish

The Dwarf Sawfish (*Pristis clavata*) is listed as vulnerable and migratory under the EPBC Act. Dwarf Sawfish are rays, somewhat resembling sharks, with elongated and serrated rostrums. The distribution of Dwarf Sawfish is considered to be restricted to northern Australia, ranging from northern Queensland to the Pilbara coastline. Sawfish generally inhabit shallow coastal waters along with estuaries, which are utilised as nurseries for juveniles. Surveys have found most captures of Dwarf Sawfish over soft sediment environments. The diets of Sawfish are primarily made up of small fish, which they stun using their serrated rostrums (DAWE, 2020).

The Dwarf Sawfish was identified as known to occur within the operational area and known breeding within the northern boundaries of wider EMBA, particularly shallower coastal mainland locations. Foraging, pupping and nursing BIAs overlap the EMBA at Eighty Mile Beach as presented in Figure 4-12.

Freshwater Sawfish

The Freshwater Sawfish (*Pristis pristis*) is listed as vulnerable and migratory under the EPBC Act. The Freshwater Sawfish, also known as the large tooth or river sawfish, grow up to 7 m in length (DoE, 2015b). It is a marine/estuarine species spending its first three-four years in freshwater. Juveniles are predominantly found in rivers and estuaries, while mature animals tend to occur more often in coastal and offshore waters up to 25 m in depth. Their preferred habitat is muddy seabeds of river embayments and estuaries. Nursing areas for the species include Eighty Mile Beach, Roebuck Bay and King Sound.

The Freshwater Sawfish may potentially occur in all large rivers of northern Australia from the Fitzroy River, Western Australia, to the western side of Cape York Peninsula, Queensland. It is mainly confined to the main channels of large rivers (DoE, 2015b).

The Freshwater Sawfish was identified as known to breed within the northern boundaries of the wider EMBA. Foraging and pupping BIAs overlap the EMBA at Eighty Mile Beach and Roebuck Bay as presented in Figure 4-12.

Green Sawfish

The Green Sawfish (*Pristis zijsron*) is listed as vulnerable and migratory under the EPBC Act. They have a shark-like body, a flattened head and an elongated snout or rostrum, which is studded with 24–28 pairs of unevenly spaced rostral teeth. This tooth-studded rostrum is commonly described as the 'saw'. The first dorsal fin origin is slightly behind the pelvic fin origin and the lower lobe of the caudal fin is much shorter than half the length of the upper lobe. Green sawfish are greenish brown or olive in colour on their upper surfaces and pale to white on their undersides. Mature adult Green Sawfish can grow to 5 m in length in Australian waters (Last & Stevens, 2009). Little is known about their historical distribution in Western Australia and the Northern Territory (Stevens et al., 2005).

The Green Sawfish was identified as known to occur within the operational area and known to breed within the wider EMBA in some shallower coastal mainland locations. Foraging, pupping and nursing BIAs overlap the EMBA as presented in Figure 4-12.

Whale Shark

The Whale Shark (*Rhincodon typus*) is listed as vulnerable and migratory under the EPBC Act and it is also classified as endangered on the IUCN Red List of Threatened Species. In WA, Whale Sharks are protected under the *Biodiversity Conservation Act 2016*.

The Whale Shark is widely distributed in Australian waters and is known to frequent the region, aggregating each year between March and June, with the largest numbers generally recorded in April (Meekan *et al.*, 2006). The Ningaloo population of whale sharks has been shown to be part of a wider Indian Ocean Whale Shark

stock that is likely to encompass much of the south eastern Indian Ocean and the waters of South East Asia (Meekan *et al.*, 2006).

The Whale Shark was identified as known to forage within the operational area and wider EMBA. A BIA (foraging) intersects with the operational area and wider EMBA, in the waters adjacent to the Ningaloo coastline (known for intensive foraging), and the offshore Commonwealth waters along the North West Shelf (Figure 4-12).

Narrow Sawfish

The Narrow Sawfish (*Anoxypristis cuspidata*), also known as the knifetooth sawfish, is listed as a migratory species under the EPBC Act. The species inhabits estuarine, inshore and offshore waters to at least 40 m depth (Last & Stevens, 2009). Inshore and estuarine waters are important for juveniles and pupping females, whilst adults predominantly occur offshore (Peverell, 2005).

The Narrow Sawfish may occur within the operational area and is known to occur within the wider EMBA.

Oceanic Whitetip Shark

The Oceanic Whitetip Shark is listed as a migratory species under the EPBC Act. The Oceanic Whitetip Shark is a widespread pelagic species that has been subject to overfishing throughout much of its distribution. The Oceanic Whitetip Shark is widespread throughout tropical and subtropical pelagic waters of the world (30°N to 35°S). Within Australian waters, it is found from Cape Leeuwin (Western Australia) through parts of the Northern Territory, down the east coast of Queensland and New South Wales to Sydney (DAWE, 2021b).

The Oceanic Whitetip Shark was identified as may occur within the operational area and likely to occur within the wider EMBA.

Shortfin Mako Shark

The Shortfin Mako Shark (*Isurus oxyrinchus*) is listed as a migratory species under the EPBC Act. It is a coastal, oceanic species occurring from the surface to at least 500 m depth and is widespread in temperate and tropical waters of all oceans from about 50°N (up to 60°N in the northeast Atlantic) to 50°S. It is occasionally found close inshore where the continental shelf is narrow.

The Shortfin Mako Shark may occur within the operational area and the wider EMBA.

Longfin Mako Shark

The Longfin Mako (*Isurus paucus*) is listed as a migratory species under the EPBC Act. It is a widely distributed but rarely encountered oceanic shark. This species is known to be caught as bycatch in tropical pelagic longline fisheries for tuna, swordfish and sharks and in other oceanic fisheries. This species appears to be cosmopolitan in tropical and warm temperate waters. However, at present records are sporadic and the complete distribution remains unclear.

The Longfin Mako Shark is likely to occur within the operational area and the wider EMBA.

Porbeagle

The Porbeagle, also named Mackerel Shark (*Lamna nasus*) is listed as a migratory species under the EPBC Act. The Porbeagle is a wide-ranging, coastal and oceanic shark found in temperate and cold temperate waters worldwide (DAWE, 2020). The migratory movements of the Porbeagle on Australia's NWS are not well documented.

The Porbeagle was identified as likely to occur within the wider EMBA.

Reef Manta Ray

The Reef Manta Ray (*Manta alfredi*) is listed as a migratory species under the EPBC Act. The Reef Manta Ray has a widespread distribution in tropical and subtropical waters worldwide, including WA. Reef Manta Rays are thought to have relatively sedentary behaviour with precise areas for cleaning and feeding still within close proximity of coasts, reefs or islands. The migratory pattern in WA is not well documented.

The Reef Manta Ray was identified as known to occur within the operational area and the wider EMBA.

Giant Manta Ray

The Giant Manta Ray (*Manta birostris*) is listed as a migratory species under the EPBC Act and is the largest of the rays. The species has a tropical and semi-temperate distribution worldwide that includes WA. The Giant Manta Ray appears to be a seasonal visitor to coastal sites and satellite tracking studies have revealed it to be capable of migrations of over 1,000 km in distance. The migratory pattern in WA is not well documented.

The Giant Manta Ray was identified as known to occur within the operational area and the wider EMBA.

4.8.2 Conservation Dependent Species

Orange Roughy

The Orange Roughy (*Hoplostethus atlanticus*) is listed as conservation dependent under the EPBC Act. In Australia, Orange Roughy are found across the southern half of the continent, from central NSW, through to southwestern Australia, including Tasmania (Kailola *et al.*, 1993). They also occur around seamounts and ridges south of Australia and on the South Tasman and Lord Howe rises (DAWE, 2021b).

It is possible orange roughy may be present within the southern reaches of the wider EMBA.

Scalloped Hammerhead Shark

The Scalloped Hammerhead Shark (*Sphyrna lewini*) is classified as endangered on the IUCN Red List of Threatened Species and was listed as a conservation dependent species on 15 March 2018. There is no adopted or made Recovery Plan for this species. The following information is sourced from the Commonwealth Listing Advice (TSSC, 2018).

The Scalloped Hammerhead is a coastal and semi-oceanic shark. Pups are born in shallow intertidal habitats where they remain in shallow inshore habitats for the first few years. Information collected from deeper water fisheries (but still on the continental shelf) suggests that juveniles and some adults, particularly males, remain in coastal waters, while some mature adults may move into deeper pelagic waters.

The principal threat to the species is fishing activity. The species has a circum-global distribution in tropical and sub-tropical waters and the Australian stock is likely to be shared with Indonesia and possibly a broader Indo-Pacific population. Within Australian waters, Scalloped Hammerheads are found across northern and temperate Australian waters extending from New South Wales, around the north of the continent and then south into WA, to approximately Geographe Bay. The distribution of the species in WA is sparse. They have been recorded in WA in the catch of the Pilbara Fish Trawl Fishery.

It is possible Scalloped Hammerheads may be present in the operational area and wider EMBA.

School Shark

The School Shark (*Galeorhinus galeus*) is listed as conservation dependent under the EPBC Act. The School Shark is a slender bronze-grey coloured member of the Family Triakidae (hound sharks). It has a distinguishing large lobe on its tail giving it a 'double-tailed' appearance. In Australia, School Sharks are about 30 cm long at birth and can attain lengths of 175 cm. Elsewhere, the species may reach a larger adult size, commonly reaching lengths of 195 cm in the North Atlantic (Last and Stevens, 1994). In Australian waters, School Sharks are found in offshore temperate waters from Moreton Bay in Queensland to Perth in Western Australia. The main threat operating against School Sharks has been identified as historic and ongoing fishing pressure. (DAWE, 2021).

It is possible school shark may be present within the southern reaches of the wider EMBA.

Southern Bluefin Tuna

The Southern Bluefin Tuna (*Thunnus maccoyii*) is classified as critically endangered on the IUCN Red List of Threatened Species and was listed as a conservation dependent species on 15 December 2010. There is no adopted or made Recovery Plan for this species. The following information is sourced from the Commonwealth Listing Advice (TSSC, 2010).

The Southern Bluefin Tuna is a highly migratory species that occurs globally in waters between 30°S and 50°S, though is mainly found in the eastern Indian Ocean and in the south Western Pacific Ocean. In Australian waters, the Southern Bluefin Tuna ranges from northern WA, around the southern region of the continent, to northern New South Wales. The southernmost portion of the spawning ground lies within Australia's EEZ.

Juvenile Southern Bluefin Tuna are targeted in the Great Australian Bight by Australian purse seine fishing vessels and taken to Port Lincoln where they are transferred to ocean cages where they are fed intensively for 6-8 months before being exported to Japan. More than 95% of Australia's total catch is taken by this method. The main threat to Southern Bluefin Tuna is historic and on-going fishing pressure.

It is possible Southern Bluefin Tuna may be present in the operational area and wider EMBA.

Southern Dogfish

The Southern Dogfish (*Centrophorus zeehaani*) is listed as conservation dependent under the EPBC Act. There is no conservation advice for this species. (DAWE, 2021) A small uniformly light greyish-brown deepwater shark, which may be darker above and paler on the belly. Juveniles have dark posterior margins on the dorsal fins and the tail, which fade in intensity in adults. Southern Dogfish have greenish eyes, and a relatively short and bulky snout compared with other gulper shark species (Bray, D.J. 2019, *Centrophorus zeehaani* in Fishes of Australia).

It is possible southern dogfish may be present within the southern reaches of the wider EMBA.

4.9 Seabirds and Migratory Shorebirds

A search of the EPBC Protected Matters database identified a total of 114 and 93 EPBC listed bird species, with potential to occur or have habitat within the wider low and moderate EMBA, respectively. Of these, a total of 34 were listed as threatened and 72 were listed as migratory bird species. Within the operational area a total of 13 EPBC listed birds (five threatened species and 11 migratory listed) were identified.

4.9.1 Threatened and Migratory Species

Antipodean Albatross

The Antipodean albatross (*Diomedea antipodensis*) is listed as vulnerable and migratory under the EPBC Act.

Antipodean Albatrosses are difficult to distinguish from the Wandering Albatross (*Diomedea exulans*). Adult Wandering Albatrosses are significantly larger, however juvenile Antipodean Albatrosses are very similar to juvenile Wandering Albatrosses. Breeding Antipodean Albatrosses have a mixed white and brownish plumage. Breeding females have chocolate-brown upperparts with white winding, wavy outlines on their back; a white face mask and throat; a white lower breast and belly with brown undertail-coverts; a white underwing with dark tips; and a broad brown breast-band. Breeding males are whiter than females but darker than the Wandering Albatross. Males and females have pink bills. Male Antipodean Albatrosses may be distinguished from other *D. exulans* subspecies by their darker cap and tail, and less white on their humeral flexure (BirdLife International, 2009). The Antipodean Albatross is endemic to New Zealand, however forages widely in open water in the south-west Pacific Ocean, Southern Ocean and the Tasman Sea, notably off the coast of NSW (Elliott & Walker, 2005; Environment Australia, 2001f; Garnett & Crowley, 2000). The Antipodean Albatross is marine, pelagic and aerial. It rarely enters the belt of icebergs region of Antarctica (Hicks 1973), but in late summer, it may approach the edge of pack-ice (Darby 1970). It sleeps and rests on ocean waters when not breeding. The Antipodean Albatross nests in open patchy vegetation, such as among tussock grassland or shrubs on ridges, slopes and plateaus (BirdLife International, 2009; Warham & Bell, 1979). On Antipodes Island, they nest in relatively uniform densities, but avoid areas of tall vegetation on steep coastal slopes, or amongst the tall ferns on poorly drained parts of the peaks near the island's centre (Walker & Elliott 2005). The Antipodean Albatross feeds primarily on cephalopods, fish and crustaceans (BirdLife International, 2009; Gales, 1998) (DAWE, 2021).

The Antipodean albatross was identified as likely to occur in the wider EMBA.

Australian Lesser Noddy

The Australian Lesser Noddy (*Anous tenuirostris melanops*) is listed as vulnerable under the EPBC Act. The Australian lesser noddy is usually found only around its breeding islands in the Houtman Abrolhos Islands in Western Australia (Storr et al., 1986) (Figure 4-15), but there are also some records north of the breeding islands, for example at the Wallabi Group of islands, in the northern Houtman Abrolhos Islands, on Barrow Island, and at Webb Island (Higgins & Davies, 1996). The Australian lesser noddy usually occupies coral-

limestone islands that are densely fringed with white mangrove *Avicennia marina*. It occasionally occurs on shingle or sandy beaches (Higgins & Davies, 1996).

The Australian lesser noddy was identified as known breeding occurring within the wider EMBA. Foraging BIAs for the species occur in the wider EMBA (Figure 4-15).

Australasian Bittern

The Australasian Bittern (*Botaurus poiciloptilus*) is listed as endangered and migratory under the EPBC Act. It is a large, stocky, thin-necked, heron-like bird (TSSC, 2019). In WA, the Australasian bittern has been recorded in the south-west, where it reportedly occurs on the western coastal plain between Lancelin and Busselton, in the southern coastal region from Augusta to the east of Albany and inland to some wetlands in the Jarrah forest belt, with small and isolated populations in swamps from west of Esperance eastward to near Cape Arid (TSSC, 2019). The diet of the Australasian bittern includes aquatic animals such as small fish, frogs, freshwater crayfish, spiders, insects and small reptiles. Breeding occurs from October to February (TSSC, 2019).

The Australasian bittern was identified as known to occur within the wider EMBA.

Red Knot

The red knot (*Calidris canutus*) is listed as endangered and migratory under the EPBC Act. The red knot breeds in Siberia and spends the non-breeding season in Australia and New Zealand. The non-breeding season is spent on tidal mudflats or sandflats where the omnivorous species feeds on intertidal invertebrates, especially shellfish (Garnet et al., 2011). Although the species is found throughout main suitable habitats in Australia, the highest numbers of the species are found throughout the northwest of Australia, between Eighty Mile Beach and Roebuck Bay.

The red knot was identified as may occur within the operational area and known to occur within the wider EMBA.

Cape Barren Goose

The Cape barren goose (*Cereopsis novaehollandiae grisea*) is listed as vulnerable under the EPBC Act. The Cape Barren Goose (south-western) is concentrated on islands and rocks in the Archipelago of the Recherche, off the coast of southern Western Australia. The subspecies has also been recorded west of the Archipelago of the Recherche on West Island, Red Island and Hauloff Rock, and is a casual visitor to the south-coastal mainland from Bremer Bay to Cape Arid (Barrett et al., 2003; Halse et al., 1995; Johnstone & Storr, 1998; Shaugnessy & Haberley, 1994; Storr, 1991). The Cape Barren Goose (south-western) lays its eggs between April to November (Johnstone & Storr, 1998; Storr, 1987). It builds a saucer-shaped nest of twigs or grass and feather-down. Nests are placed on the ground or, occasionally, close to the ground in a tussock of grass or a dense shrub (Serventy & Whittell, 1976; Shaugnessy & Haberley, 1994). Its clutches consist of four or five (or perhaps up to seven) white eggs that are incubated by the female for a period of 35–40 days (Johnstone & Storr, 1998; Serventy & Whittell, 1976; Storr, 1987). The Cape Barren Goose (south-western) forages on the ground and takes food items from herbage (Marchant & Higgins, 1990). The diet of the subspecies consists of leaves (including those of *Rhagodia baccata*) and seeds (including those of *Myoporum insulare*) (Boden, 1980; Johnstone & Storr, 1998) and, based on studies of the eastern subspecies (*C. n. novaehollandiae*), probably also includes green material from grasses and other plants (Marchant & Higgins, 1990) (DAWE, 2021).

The Cape barren goose was identified as known to occur within the wider EMBA.

Curlew Sandpiper

The curlew sandpiper (*Calidris ferruginea*) is listed as critically endangered and migratory shorebird under the EPBC Act. Curlew sandpiper breeding grounds occur in Siberia and they reach the northern shores of Australia in late August and early September (Higgins & Davies, 1996). Curlew sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast. This species forages mainly on invertebrates, including worms, molluscs, crustaceans, and insects, as well as seeds.

The curlew sandpiper was identified as may occur within the operational area and known to occur in the wider EMBA.

Great Knot

The great knot (*Calidris tenuirostris*) is listed as critically endangered and a migratory shorebird under the EPBC Act. The great knot has a global distribution, breeding in northeast Siberia and spending the non-breeding season along coasts from Arabia to Australia. Non-breeding birds migrate to inlets, bays, harbours, estuaries and lagoons with large intertidal mud and sand flats where they feed on bivalves, gastropods, crustaceans and other invertebrates (Higgins & Davies 1996 in Garnet et al., 2011). The greatest numbers of the species are found in northern Australia, between the Pilbara and the Kimberley. The species typically roosts in the fringing vegetation surrounding coastal inlets where damp sediments lower temperatures.

The great knot was identified as known to roost within the wider EMBA.

Greater Sand Plover

The greater sand plover (*Charadrius leschenaultia*) is listed as vulnerable and migratory under the EPBC Act. This plover breeds in China, Mongolia and Russia, and spends the non-breeding season along coasts from Japan through Southeast Asia to Australasia, (Bamford *et al.*, 2008). Non-breeding birds occur along all Australian coasts, especially in the north for the greater sand plover. Non-breeding birds forage on beaches, saltmarshes, coastal bays and estuaries, and feed on marine invertebrates including molluscs, worms, crustaceans and insects (Marchant & Higgins 1993 in Garnet *et al.*, 2011). The species typically roosts higher up the beach well above the high water mark of sand spits, rocky lagoons or salt marsh.

The greater sand plover was identified as known to roost within the wider EMBA.

Lesser Sand Plover

The lesser sand plover (*Charadrius mongolus*) is listed as endangered and migratory under the EPBC Act. Within Australia, the Lesser Sand-Plover is widespread in coastal regions, and has been recorded in all states. Internationally important sites in Western Australia and maximum counts include: Eighty Mile Beach, 1575; Roebuck Bay, 1057; Broome, 745; Port Hedland Saltworks, 668. The species does not breed in Australia. They roost near foraging areas, on beaches, banks, spits and banks of sand or shells, and occasionally on rocky spits, islets or reefs (DAWE, 2021).

The lesser sand plover was identified as known to roost within the wider EMBA.

Grey-headed Albatross

The grey-headed albatross (*Thalassarche chrysostoma*) is listed as endangered and migratory under the EPBC Act. In Australian territory, Grey-headed Albatross breed on the southern and western flanks of Petrel Peak, Macquarie Island (Copson, 1988). The Grey-headed Albatross has bred in this same restricted area on Macquarie Island for at least the past 30 years (Terauds *et al.*, 2005). This nesting area has been included on the EPBC Act register of Critical Habitat. Macquarie Island is classified as a World Heritage Area, a Biosphere reserve and a National Estate property. The entire island is also classified as a Tasmanian Nature Reserve and is managed by the Tasmanian Parks and Wildlife Service. Breeding and non-breeding birds disperse widely across the Southern Ocean, at more southerly latitudes in summer than in winter, when they frequent the waters off southern Australia and New Zealand (Marchant & Higgins, 1990; Waugh *et al.*, 1999a). Most Australian records come from south and west of Tasmania, occasionally in Victorian waters, rarely in South Australia and Western Australia, and only as a vagrant in NSW. It has only been recorded once in southern Queensland (DEWHA, 2009s; Marchant & Higgins, 1990). The Grey-headed Albatross is marine, pelagic and migratory. Its habitat includes subantarctic, subtropical, and occasionally Antarctic waters in the Pacific, Indian, Atlantic and Southern Oceans (DAWE, 2021).

The grey-headed albatross was identified as having habitat that may occur within the wider EMBA.

Amsterdam Albatross

The Amsterdam albatross (*Diomedea amsterdamensis*) is listed as endangered and migratory under the EPBC Act. The Amsterdam albatross breeds on Amsterdam Island (territory of France), in the southern Indian Ocean and is a non-resident visitor to Australia occurring in southwest and south Australian waters (DAWE, 2020). The Amsterdam albatross numbers in Australian waters are unknown, and believed to be small (if occurring at all). The likelihood of this species being present is low.

The Amsterdam albatross was identified as likely to occur within the wider EMBA.

Tristan Albatross

The Tristan albatross (*Diomedea dabbenena*) is listed as endangered and migratory under the EPBC Act. This large albatross is very similar to the wandering albatross (*Diomedea exulans*) and they are often indistinguishable at sea. Their distribution in Australia is poorly defined with only a few records sightings off the southern coast of WA and SA (DAWE, 2020). The Tristan albatross is a marine, pelagic seabird foraging in open waters close to the waters surface to feed on squid, fish and crustaceans. It is non-breeding in Australia.

The Tristan albatross was identified as likely to occur within the southern extent of the wider EMBA.

Southern Royal Albatross

The southern royal albatross (*Diomedea epomophora*) is listed as vulnerable and migratory under the EPBC Act. The southern royal albatross has a circumpolar distribution within the Southern Oceans. Within Australia, they range over waters of SA at all time of year, especially between July and October and have been recorded from Byron Bay in the east to southwestern WA. Most records are from the shelf-break areas, particularly of western and southern Tasmanian and around Victoria (DSEWPaC, 2011b).

The southern royal albatross was identified to have likely foraging behaviours within the wider EMBA.

Wandering Albatross

The wandering albatross (*Diomedea exulans*) is listed as vulnerable and migratory under the EPBC Act. The species has a circumpolar distribution and breeds on six sub-Antarctic island groups including Macquarie Island and feeds throughout the Southern Ocean (DAWE, 2020). This species is wide-ranging and may potentially over-fly the worst-case hydrocarbon EMBA from time-to-time in transit or for foraging.

The wandering albatross was identified as likely to have foraging behaviours within the wider EMBA. There is no nesting or feeding areas within the EMBA.

Northern Royal Albatross

The northern royal albatross (*Diomedea sanfordi*) is listed as endangered and migratory under the EPBC Act. The northern royal albatross has a circumpolar distribution being most common between 36° S to at least 52° S with most sightings confined to the shelf edge and slope. Within Australia, they are regularly recorded throughout the year around Tasmania and SA at the edge of the continental shelf, and infrequently in waters off NSW (DSEWPaC, 2011b).

The northern royal albatross was identified as likely to have foraging behaviours within the wider EMBA.

Christmas Island Frigatebird

The Christmas Island frigatebird (*Fregata andrewsi*) is listed as endangered and migratory under the EPBC Act. The Christmas Island frigatebird is the ninth most evolutionary distinct and globally endangered bird in the world. Australia shares this bird with Indonesia (TSSC, 2020c). Christmas Island is its home and the only place in the world where it breeds and nests in the forest canopy. The male frigatebird has a bright red throat pouch called a 'gular', that it blows up like a fancy balloon to attract females during the mating season. It takes at least 15 months for a pair of Christmas Island Frigatebirds to raise one chick to independence, and the birds can live as long as 50 years. Frigatebirds primarily forage in the ocean for food, scooping marine organisms such as fish and squid. Over-fishing in its south-east habitat effects food availability for the frigatebird, contributing to the decline of the species. (TSSC, 2020c).

The Christmas Island frigatebird was identified as known to breed within the wider EMBA.

Blue Petrel

The blue petrel (*Halobaena caerulea*) is listed as vulnerable under the EPBC Act. The blue petrel has a circumpolar distribution ranging from the pack ice to 30° S (DAWE, 2020). It breeds on offshore stacks near Macquarie island (500-600 breeding pairs).

The blue petrel may occur within the southern extent of the wider EMBA between July and September.

Northern Siberian Bar-tailed Godwit

The northern Siberian bar-tailed godwit (*Limosa lapponica menzbieri*) is listed as critically endangered under the EPBC Act. This species is closely related to the Baueri sub-species, however breeds in northern Siberia. During the non-breeding period, the species is most commonly found in the north and northwest region of WA and in south east Asia. The species can be found in most coastal environments including lagoons, inlets, estuaries and mudflats.

The northern Siberian bar-tailed godwit was identified as known to occur within the wider EMBA.

Southern Giant Petrel

The southern giant petrel (*Macronectes giganteus*) is listed as endangered and migratory under the EPBC Act. The southern giant petrel is considered to be a sibling species to the northern giant petrel. It is a large seabird with a widespread distribution range through the Southern Ocean from the Antarctic to subtropical waters. The southern giant-petrel breeds once a year between August and September, returning from foraging locations to breeding grounds in Antarctic waters.

The southern giant petrel may occur within the operational area and wider EMBA. There are no breeding, roosting grounds or critical feeding areas within the operational area, although this species may transit the EMBA from time-to-time, foraging for food.

Northern Giant Petrel

The northern giant petrel (*Macronectes halli*) occupies the Antarctic Polar Front (DAWE, 2021b). In summer, it occurs predominantly in sub-Antarctic to Antarctic waters, usually between 40°S and 64°S. The northern giant-petrel breeds on sub-Antarctic islands and visits areas off the Australian mainland mainly during winter months (May – October) (DAWE, 2021). Its breeding range extends into the Antarctic zone at South Georgia. It nests in coastal areas where vegetation or broken terrain offers shelter, on sea-facing slopes, headlands, in the lee of banks, under or against vegetation clumps, below cliffs or overhanging rocks, or in hollows. The northern giant petrel eats seal, whale, and penguin carrion, and seal placentae. It often attends and follows ships to obtain offal. It also eats substantial quantities of euphausiids (krill) and other crustaceans, cephalopods (octopus and squid), fish and a wide variety of seabirds (DAWE, 2021b).

The northern giant petrel may occur within the operational area and wider EMBA.

Eastern Curlew

The eastern curlew (*Numenius madagascariensis*) is listed as a critically endangered and migratory under the EPBC Act. Within Australia, this shorebird has a primarily coastal distribution and is found in all states, particularly the north, east, and southeast regions including Tasmania. They have a continuous distribution from Barrow Island and Dampier Archipelago, through the Kimberley and along the Northern Territory, Queensland, and NSW coasts and the islands of Torres Strait. They are patchily distributed elsewhere. The eastern curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. They are often recorded among saltmarsh and on mudflats fringed by mangroves, and sometimes use the mangroves. This shorebird is carnivorous, mainly eating crustaceans (including crabs, shrimps and prawns), small molluscs, as well as some insects.

The eastern curlew may occur within the operational area and is known to occur within the wider EMBA.

Abbott's Booby

Abbott's booby (*Papasula abbotti*) is listed as endangered under the EPBC Act. In Australia, it is only known to breed on Christmas Island and to forage in the waters surrounding the island. This marine species spends much of its time at sea where it feeds on fish and squid and it is thought that they may travel up to 400 km to feeding grounds (DAWE, 2020).

The Abbott's booby was identified as known to occur within the wider EMBA.

Fairy Prion (Southern)

The fairy prion (southern) (*Pachyptila turtur subantarctica*) is listed as vulnerable under the EPBC Act. It breeds on Macquarie Island, Langdon Point, Davis Point and Bishop and Clerk islands (Garnett and Crowley, 2000). There are 80 to 250 breeding pairs in Australia and a global population of ~80,000 (DAWE, 2020). Some individuals migrate towards New Zealand and southern Australia in winter.

The fairy prion (southern) was identified as known to occur within the wider EMBA.

Christmas Island White-tailed Tropicbird

The Christmas Island white-tailed tropicbird (*Phaethon lepturus fulvus*) is listed as endangered under the EPBC Act. The white-tailed tropicbird (Christmas Island) is endemic to Christmas Island, which is its only known breeding location. It is widely distributed across the island (Christmas Island National Park, 2013) and roosts and forages over the Indian Ocean. Both adults and juveniles appear to disperse widely and have been recorded south and south-east of Christmas Island (Marchant and Higgins, 1990). The subspecies mostly occurs north of 18°S, but may occur up to about 1500 km from Christmas Island, at the edge of the continental shelf off Western Australia at 21°S (Dunlop et al., 1988; 2001).

The Christmas Island white-tailed tropicbird was identified as likely to breed within the wider EMBA.

Sooty Albatross

The sooty albatross (*Phoebastria fusca*) is listed as vulnerable and migratory under the EPBC Act. The sooty albatross breeds on islands in the southern Indian and Atlantic Oceans, and forages south of 30°S, between southern NSW and Argentina (DAWE, 2020). In Australia, it has sometimes been observed foraging in inshore waters in southern Australia. The sooty albatross is a rare, but probably regular migrant to Australia, mostly in autumn and winter. The sooty albatross flies within 10 to 15 m of the sea surface, using updrafts from wave fronts for lift. It forages at the sea surface feeding on fish, cephalopods, crustaceans and penguin carrion (DAWE, 2020).

The sooty albatross is likely to occur within the wider EMBA.

Soft-plumaged Petrel

The soft-plumaged petrel (*Pterodroma mollis*) is listed as vulnerable under the EPBC Act. This marine bird is found in temperate and sub-Antarctic regions. The petrel is a regular and quite common visitor to southern Australian seas, but is more common on the west than in the south and southeast (Marchant & Higgins, 1990). The population in Australia is currently unknown. Breeding is believed to take place on south Australian islands with fledglings dispersing mainly northwards during May and June.

The soft-plumaged petrel was identified as known to forage within the wider EMBA. Foraging BIAs for the species occur in the wider EMBA (Figure 4-15).

Australian Painted Snipe

The Australian painted snipe (*Rostratula australis*) is listed as endangered under the EPBC Act. The painted snipe is a wading shorebird that has been recorded at wetlands in all states of Australia. It is most common in eastern Australia and has been recorded less frequently at a small number of scattered locations in WA, the Northern Territory and South Australia. It is generally seen singly or in pairs, or less often in small flocks (Marchant & Higgins, 1993).

The Australian painted snipe was identified as known to occur within the wider EMBA.

Australian Fairy Tern

The Australian fairy tern (*Sternula nereis nereis*) is listed as vulnerable under the EPBC Act and has been identified as a conservation value in the northwest marine region. Breeding occurs between October to February on continental islands, coral cays, on sandy islands and beaches inside estuaries, and on open sandy beaches (DAWE, 2020).

The Australian fairy tern was identified as likely to forage within the operational area and known to breed within the wider EMBA. The wider EMBA intersects a known BIA (Figure 4-15), with important breeding and foraging locations along coastline and offshore islands in the Pilbara region.

Indian Yellow-nosed Albatross

The Indian yellow-nosed albatross (*Thalassarche carteri*) is listed as vulnerable and migratory under the EPBC Act. This species forages mostly in the southern Indian Ocean where it is particularly abundant off WA. It also breeds on islands of the southern Indian Ocean. In breeding and non-breeding seasons, the species concentrates over the productive waters of continental shelves, often at coastal upwellings and the boundaries of currents (DAWE, 2020).

The Indian yellow-nosed albatross was identified as may forage within the wider EMBA. Foraging BIAs for the species occur in the wider EMBA (Figure 4-15).

Shy Albatross

The shy albatross (*Thalassarche cauta cauta*) is listed as vulnerable and migratory under the EPBC Act. The shy albatross appears to occur in all Australian coastal waters below 25°S. It is most commonly observed over the shelf waters around Tasmania and south-eastern Australia (DAWE, 2020). Breeding occurs on Albatross Island, Bass Strait, and Mewstone and Pedra Branca, off southern Tasmania. The shy albatross feeds in waters over the continental shelf as well as within harbours and bays (DAWE, 2020). This species may occur within the EMBA; although it is not an area this species uses for breeding or resting, it may be used as foraging ground.

The shy albatross was identified as likely to forage within the wider EMBA.

Campbell Albatross

The Campbell albatross (*Thalassarche melanophris impavida*) is listed as vulnerable and migratory under the EPBC Act. The Campbell albatross is a non-breeding visitor to Australian waters. The Campbell albatross only breeds on Campbell Island, south of New Zealand. The population migrates northward towards the end of the breeding season and the species is common during the non-breeding period in continental shelf waters around Australia, New Zealand and the Pacific Islands (DAWE, 2020).

The Campbell albatross may occur within the wider EMBA.

Black-browed Albatross

The black-browed albatross (*Thalassarche melanophris*) is listed as vulnerable and migratory under the EPBC Act. The black-browed albatross breeds within Australian waters on Heard Island, McDonald Islands, Macquarie Island and Bishop and Clerk Islets. Individuals are mostly confined to sub-Antarctic and Antarctic waters surrounding these islands in the breeding season. The population migrates northward towards the end of the breeding season and the species is common in the non-breeding period at the continental shelf and shelf-break of South Australia, Victoria, Tasmania, western and eastern Bass Strait and NSW. Individuals are also observed at these times in lesser numbers at the continental shelf break of southern and south-western WA (DAWE, 2020).

The black-browed albatross may occur within the wider EMBA.

White-capped Albatross

The white-capped albatross (*Thalassarche cauta steadii*) is listed as vulnerable and migratory under the EPBC Act. This is a marine species that occurs in sub-Antarctic and subtropical waters. It occurs in both inshore and offshore waters, and has been observed in shelf-waters around breeding islands during breeding and non-breeding seasons. It is thought that the species breeds annually and colonially, laying eggs in mid-November (DAWE, 2020).

The white-capped albatross was identified as likely to forage within the wider EMBA.

Common Sandpiper

The common sandpiper (*Actitis hypoleucos*) is listed as a migratory species under the EPBC Act, breeding in eastern Europe before migrating to spend its non-breeding season in Australia. In Australia, it can be found singularly or in small groups along all coastlines and many inland areas. Important sites in WA include Roebuck Bay and Nuytsland Nature Reserve. The species inhabits a wide range of coastal wetlands, and is most often found around the muddy margins, mangroves and rocky shores. Their diet consists of bivalves, crustaceans, and a variety of insects and are mostly found in coastal and inland locations.

The common sandpiper may occur within the operational area and is known to occur within the wider EMBA.

Common Noddy

The common noddy (*Anous stolidus*) is listed as migratory under the EPBC Act. There are four sub-species of the common noddy recognised, but only the sub-species *Anous stolidus pileatus* occurs in the Australian region. It occurs mainly off the Queensland coast, but also off the northwest and central WA coast.

The migratory movements of the species are poorly known. The common noddy is a gregarious bird, normally occurring in flocks, sometimes of hundreds of individuals, when feeding or roosting. They feed mainly on fish, but are also known to take squid, pelagic molluscs and aquatic insects by dipping or skimming the sea surface. The species usually feeds during the day, but will also feed at night when there is a full moon. Timing of breeding varies between sites and may be annual, or twice a year. On some islands, the species is known to breed throughout the year.

The common noddy may occur within the operational area and is known to breed within wider EMBA. Foraging BIAs for the species occur in the wider EMBA (Figure 4-15).

Flesh-Footed Shearwater

The flesh-footed shearwater (*Ardenna carneipes*) is a listed migratory species under the EPBC Act. It is a large broad-winged shearwater that typically forages over continental shelves/slopes and occasionally inshore waters. The distribution of the shearwater is mainly off southern Australia migrating between breeding colonies in the southern Indian and south-western to north-western Pacific Ocean (Marchant & Higgins, 1993).

The flesh-footed shearwater may occur within the operational area and is known to breed within the wider EMBA. Aggregation and foraging BIAs for the species occur in the wider EMBA (Figure 4-15).

Ruddy Turnstone

The ruddy turnstone (*Arenaria interpres*) is a listed migratory species under the EPBC Act. This medium-size bird is widespread within Australia during its non-breeding period of the year, when it is found in most coastal regions. It prefers rocky shores or beaches where there is plenty of stranded seaweed. The birds in the western areas of Australia migrate north and south to and from East Asia. Barrow Island is one of five sites of international importance within Australia for the ruddy turnstone.

The ruddy turnstone was identified as known to roost within the wider EMBA.

Fork-Tailed Swift

The fork-tailed swift (*Apus pacificus*) is a listed migratory species under the EPBC Act. It is a medium to large swift that migrates between Australia and its breeding grounds in Siberia. The swift usually arrives in Australia around October and departs in April, passing via Indonesia (Higgins, 1999). Whilst in Australia the swift is highly mobile occurring mostly over inland plains but also coastal areas, over cliffs and on beaches.

The fork-tailed swift was identified as likely to occur within the wider EMBA, most likely between October and April.

Sooty Shearwater

The sooty shearwater (*Ardenna grisea*) is a listed migratory species under the EPBC Act. It is found in the southern hemisphere during summer. This species breeds around New Zealand, southern Australia and southern South America (DAWE, 2021). In winter, these birds move to the North Pacific Ocean, but some move into the North Atlantic Ocean, or remain in the southern hemisphere (DAWE, 2021). It feeds on a wide variety of pelagic prey, including cephalopods, fish and crustaceans.

The sooty shearwater may occur within the wider EMBA.

Wedge-Tailed Shearwater

The wedge-tailed shearwater (*Ardenna pacifica*) is a listed migratory species under the EPBC Act. This medium-sized seabird, can nearly always be found over oceanic waters off WA except when roosting in colonies. It forages at sea, feeding mostly on fish, cephalopods, insects, jellyfish and prawns. In WA, they breed on multiple offshore islands between Ashmore Reef and Carnac Island (Dunlop *et al.*, 2002) and over one million pairs are estimated to breed across these sites (Burbidge *et al.*, 1996). The operational area falls

within a BIA located in the Pilbara region extending northeast from the Cape Range National Park to north of Port Hedland, and includes the Muiron Island and surrounding waters (Figure 4-15). The Islands along North West Cape and near Onslow also house breeding populations (DEWHA, 2008a; Cannell *et al.*, 2019). Within the wider EMBA, the Barrow-Lowendal-Montebello Island complex and northwards, as well as Shark Bay are important nesting areas for the species, and as such the area is a BIA for breeding (Figure 4-15).

The wedge-tailed shearwater was identified as known to breed within the wider EMBA. Breeding and foraging BIAs for the species occur in the wider EMBA (Figure 4-15).

Sharp-Tailed Sandpiper

The sharp-tailed sandpiper (*Calidris acuminata*) is listed as a migratory species under the EPBC Act and spends the non-breeding season in Australia. The species is known to be widespread from Cape Arid to Carnarvon, the coastal plains of the Pilbara region and east Kimberley division. The species inhabits intertidal mudflats, sheltered bays, inlets, estuaries and seashores. Foraging habitat includes the seagrass wrack on shorelines and algal mats. The species are common throughout Australia between August and March.

The sharp-tailed sandpiper may occur within the operational area and is known to roost in the wider EMBA.

Sanderling

Sanderling (*Calidris alba*) is a listed migratory species under the EPBC Act and occurs in most coastal areas from the coast from Eyre to Derby, and north to around southern Shark Bay with more sparsely scattered records further north in the Gascoyne and Pilbara Regions. The species has a circumpolar breeding distribution, migrating south to spend the non-breeding season predominantly on sandy coastal shores of all continents except Antarctica. Sanderling are omnivorous, foraging on beaches, mudflats and on the edges of shallow pools feeding on plants, seeds, worms, crustaceans, insects, and occasionally on fish, larger molluscs, and crustaceans taken as carrion.

Sanderling was identified as known to roost within the wider EMBA.

Pectoral Sandpiper

The pectoral sandpiper (*Calidris melanotos*) is a listed migratory species under the EPBC Act. This small-medium wader spends non-breeding seasons across Australia, but are rare in WA and have been recorded in the coastal Gascoyne, the Pilbara and Kimberley regions, feeding on algae, seeds, crustacean and insects. This species is most commonly found around coastal areas.

The pectoral sandpiper may occur within the operational area and is known to occur in the wider EMBA.

Red-necked Stint

One of the smallest shorebirds in Australia, the red-necked stint (*Calidris ruficollis*) is a listed migratory species under the EPBC Act. It is found in all states and territories inhabiting coastal areas such as bays, sheltered inlets, lagoons and estuaries. The species is present in Australia during the non-breeding season from August through to late September. The species is found in coastal sections in the Pilbara region and towards Eighty Mile Beach.

The red-necked stint was identified as known to roost within the wider EMBA.

Streaked Shearwater

The streaked shearwater (*Calonectris leucomelas*) is a listed migratory seabird under the EPBC Act and spends non-breeding periods in the tropical west Pacific (October to March). It has been regularly recorded offshore from Broome to Timor Sea, and from Barrow Island to the Houtman Abrolhos Islands, occurring over pelagic and inshore waters but usually found offshore more than 18 km from the mainland coast (Marchant & Higgins, 1993).

The streaked shearwater was identified as potentially occurring within the operational area and wider EMBA.

Broad-billed Sandpiper

The broad-billed sandpiper (*Limicola falcinellus*) is a listed migratory seabird under the EPBC Act and breeds in the northern hemisphere, moving south for the non-breeding season. The Broad-billed Sandpiper is a small member of the Calidridinae family. It has a length of 16–18 cm, a wingspan of 34–37 cm and a weight of 40 g.

It is a small, stint-like wader with short legs and a diagnostic long straight black bill that is flattened and kinked downwards at the tip. When viewed from above the bill appears broad with parallel sides, tapering sharply to a pointed tip. The wing tips project a short distance beyond the tail at rest. The species' flight pattern is similar to that of stints (Higgins & Davies, 1996). In Western Australia, few records occur in the south-west, but the Broad-billed Sandpiper may be regular in small numbers at scattered locations, from Warden Lake Nature Reserve and Coramup Creek to Guraga Lake Nature Reserve and Hurstview Lake. They mostly occur on the coasts of the Pilbara and Kimberley between Onslow and Broome, but are also recorded north to the mouth of Lawley River, and inland at Lake Daley. In the Northern Territory, they are an irregular and uncommon visitor near Darwin, though previously considered common at times. They are also recorded on Melville Island (Higgins & Davies, 1996; DAWE, 2021).

The broad-billed sandpiper was identified as having habitat that may occur within the wider EMBA.

Double-banded Plover

The double-banded plover (*Charadrius bicinctus*) is a listed migratory species under the EPBC Act. The double-banded plover can be found in both coastal and inland areas. During the non-breeding season, it is common in eastern and southern Australia, mainly between the Tropic of Capricorn and western Eyre Peninsula, with occasional records in northern Queensland and Western Australia (Marchant & Higgins, 1993). The Double-banded Plover is found on littoral, estuarine and fresh or saline terrestrial wetlands and also saltmarsh, grasslands and pasture. It occurs on muddy, sandy, shingled or sometimes rocky beaches, bays and inlets, harbours and margins of fresh or saline terrestrial wetlands such as lakes, lagoons and swamps, shallow estuaries and rivers. The species is sometimes associated with coastal lagoons, inland saltlakes and saltworks. It is also found on seagrass beds, especially *Zostera*, which, when exposed at low tide, remain heavily saturated or have numerous water-filled depressions. This species sometimes utilises kelp beds (R.J. Pierce in Marchant & Higgins 1993; DAWE, 2021).

The double-banded plover was identified as having habitat that may occur within the wider EMBA.

Little Ringed Plover

The little ringed plover (*Charadrius dubius*) is a listed migratory species under the EPBC Act. They nest in a shallow scrape on loose sand, dry mud or on flat, bare rocks surrounded by mud or sand (Johnsgard, 1981, Urban et al. 1986), sometimes amongst sparse vegetation (del Hoyo *et al.*, 1996; Grimmett *et al.*, 1998) in the vicinity of water, and often on small islands (del Hoyo *et al.*, 1996) or adjacent farmland (Hayman *et al.*, 1986; DAWE, 2021).

The little ringed plover was identified as having habitat that may occur within the wider EMBA.

Oriental Plover

The oriental plover (*Charadrius veredus*) is a listed migratory species under the EPBC Act. It is a non-breeding visitor to Australia and occurs in both coastal and inland areas, mostly in northern Australia between Exmouth Gulf and Derby in WA (DAWE, 2020). Insects are their primary food source from foraging among short grass or on hard stoney ground, mud flats and stranded seaweed. After breeding in the northern hemisphere, they arrive in Australia in early to mid-September, with numbers increasing during October and sometimes November. Once in northern Australia, oriental plovers spend a few weeks in coastal habitats such as estuarine mudflats and sandbanks, on sandy or rocky ocean beaches or nearby reefs, or in near-coastal grasslands, before dispersing further inland and some may fly south across the continent, where they stay before leaving to return to their breeding grounds between February and April, with most having left by the end of March.

The oriental plover was identified as known to roost within the wider EMBA and may be encountered around the coastal sections between August and March.

Lesser Frigatebird

The lesser frigatebird (*Fregata ariel*) is listed as a migratory species under the EPBC Act and is found widespread throughout the northern reaches of Australia, from approximately Geraldton on the West Coast throughout the north to the east coast. The species is found throughout most shorelines. The species is the smallest frigatebird and is well adapted for an aerial existence and may range significant distances from land. This seabird is found in tropical waters of the Indian Ocean and breeds on small, remote tropical and sub-tropical islands in mangroves or bushes, and even on bare ground. It feeds on fish, cephalopods, seabird eggs chicks, carrion and fish scraps. Little information is available on the migratory movements of this species.

Breeding appears to occur between May and December in Australia. Outside the breeding season, the species is sedentary.

The lesser frigatebird may occur within the operational area and is known to breed within the wider EMBA. Breeding BIAs for the species occur in the wider EMBA (Figure 4-15).

Little Curlew

The little curlew (*Numenius minutus*) is listed as a migratory species under the EPBC Act. The Little Curlew is most often found feeding in coastal swamps, mudflats or sandflats of estuaries or beaches on sheltered coasts, mown lawns, gardens, recreational areas, ovals, racecourses and verges of roads and airstrips are also used (Higgins & Davies 1996). In WA, the species is recorded from Peron Peninsula, Carnarvon, McNeill Claypan and Port Cloates-Ningaloo in low numbers; and in the northern Pilbara region around Port Hedland, and in south-west, north and east Kimberley it is widespread (Higgins & Davies 1996) (DAWE, 2021).

The little curlew was identified as having habitat that may occur within the wider EMBA.

Long-toed Stint

The long-toed stint (*Calidris subminuta*) is listed as a migratory species under the EPBC Act. In Western Australia the species is found mainly along the coast, with a few scattered inland records. On the south coast the Long-toed Stint is found from Esperance to Albany and inland to Lake Cassencarry and Dumbleyung. On the south-west coast the species is known from the Vasse River estuary, Guraga Lake and the Namming Nature Reserve. The species has occasionally been recorded in the Gascoyne Region, around Lake Wooleen, Meeberrie Station and McNeill Claypan. It is widespread around the Pilbara region and the Kimberley Division between Karratha and Wyndham-Kununurra. Inland records include Lake Brown, Hannan Lake, Lake Biolet, Newman Sewage Farm and Lake Gregory. In the Northern Territory the species has been recorded at Harrison Dam, Daly Waters, Alice Springs Sewage Farm, Lake Sylvester and around Darwin (Higgins & Davies 1996).

In Australia, the Long-toed Stint occurs in a variety of terrestrial wetlands. They prefer shallow freshwater or brackish wetlands including lakes, swamps, river floodplains, streams, lagoons and sewage ponds. The species is also fond of areas of muddy shoreline, growths of short grass, weeds, sedges, low or floating aquatic vegetation, reeds, rushes and occasionally stunted samphire. It has also been observed at open, less vegetated shores of larger lakes and ponds and is common on muddy fringes of drying ephemeral lakes and swamps. The Long-toed Stint also frequents permanent wetlands such as reservoirs and artificial lakes. They are uncommon, but not unknown, at tidal estuaries, saline lakes, saltponds and bore swamps (Higgins & Davies 1996) (DAWE, 2021).

The long-toed stint was identified as having habitat that may occur within the wider EMBA.

Great Frigatebird

The great frigatebird (*Fregata minor*) is a listed migratory species under the EPBC Act. It is widespread and breeds on numerous tropical islands. Within the North-west Marine Region, it breeds in small numbers on Ashmore Reef (DSWEPaC, 2012d). This species is pelagic although breeding birds probably forage within 100–200 kilometres of the colony during the early stages of the breeding season (DSWEPaC, 2012d). The diet consists mainly of flying fish with some cephalopods.

The great frigatebird was identified as known to breed within the wider EMBA.

Oriental Pratincole

The oriental pratincole (*Glareola maldivarum*) is a listed migratory species under the EPBC Act. This medium-sized bird is almost exclusively insectivorous and widespread in north-west Australia and is prominent in the Pilbara coastal region. This species does not breed in Australia and is known to inhabit mudflats, beaches and coastal lagoons.

The oriental pratincole was identified as known to roost within the wider EMBA.

Oriental Reed Warbler

The oriental reed warbler (*Acrocephalus orientalis*) is a listed migratory species under the EPBC Act. It is a passerine bird of eastern Asia belonging to the reed warbler genus *Acrocephalus*. This species does not breed in Australia (DAWE, 2021).

The oriental reed warbler was identified as having habitat that may occur within the wider EMBA.

Caspian Tern

The Caspian tern (*Hydroprogne caspia*) is a migratory species under the EPBC Act. It is the largest of the terns found in Australia, occurring in both coastal areas (including islands) and inland habitats. It is gregarious when nesting but outside of breeding season it occurs mostly singly or in small known colonies. Limited information is available regarding migratory movements or timing throughout the NW of Australia. Birds may move from coastal breeding colonies to inland.

The Caspian tern was identified as known to breed within the wider EMBA. Foraging BIAs for the species occur in the wider EMBA (Figure 4-15).

Bar-tailed Godwit

The bar-tailed godwit (*Limosa lapponica*) is a listed migratory species under the EPBC Act. It is a large wader slightly bigger and stockier than the black-tailed godwit (*Limosa limosa*). They have been recorded in coastal areas of all Australian states. In WA, it is widespread around the coast from Eyre to Derby, with scattered records in the Kimberley region, and with Eighty Mile Beach recognised as a site of international importance. This godwit species breeds in the north of Scandinavia, Russian and NW Alaska. They usually forage near the edge of water or in shallow water, preferring soft mud, mainly in estuaries and harbours. They have been known to forage among mangroves, coral reefs and rock platforms.

The bar-tailed godwit is known to occur within the wider EMBA.

Black-tailed Godwit

The black-tailed godwit (*Limosa limosa*) is a listed migratory species under the EPBC Act. This large wader occurs singularly or in groups and associates with other waders throughout the coastal regions of Australia, with the largest populations on the north coast between Darwin and Weipa in the NT, as well as the Pilbara region and towards Eighty Mile Beach. The species is commonly found in sheltered bays, estuaries and lagoons with large intertidal mud and sandflats, and occasionally on rocky coasts. Their diet consists of worms, crustaceans, bivalves and fish eggs. The black-tailed godwit does not breed in Australia. They arrive in north-west Australia from late August and depart during March and April to breed in the northern hemisphere.

The black-tailed godwit was identified as known to roost within the wider EMBA.

Whimbrel

The whimbrel (*Numenius phaeopus*) is a medium-sized curlew and a listed migratory species under the EPBC Act. It is a regular non-breeding migrant to Australia and New Zealand. Although scattered inland records of the species is found in all regions, its distribution is primarily coastal, and more common in the north of Australia. It is common and widespread from Carnarvon to the north-west Kimberley and Darwin region. The whimbrel forages on intertidal mudflats, along muddy banks of estuaries and in coastal lagoons and mangroves. The whimbrel begin their migration from breeding grounds in the northern hemisphere in July, arriving on the north coasts from August. They start their northern migration back to breeding grounds by late April.

The whimbrel was identified as known to roost within the wider EMBA.

Bridled Tern

The bridled tern (*Onychoprion anaethetus*) is a listed migratory species under the EPBC Act and is found throughout tropical and sub-tropical regions of Australia. The species is most common on offshore islands as opposed to coastal areas. Foraging singly or in small flocks, primarily on fish by swooping on schools and dipping only the head in the water (as opposed to plunge diving). Breeding populations exist at Ashmore Reef, the Montebello/Lowendal island groups and Barrow Island (DEWHA, 2008a). Birds return to breeding colonies at various island locations throughout northern WA between late September and mid-October and leave from early May to mid-September.

The bridled tern was identified as known to breed within the wider EMBA. Foraging BIAs for the species occur in the wider EMBA (Figure 4-15).

Osprey

The osprey (*Pandion haliaetus*) is a listed migratory species under the EPBC Act. It is a medium-sized raptor that primarily inhabits coastal and estuarine habitats (Marchant & Higgins, 1993). The species prefers littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands (DAWE, 2020). Breeding range extends around the northern coast of Australia from Albany in WA to Lake Macquarie in NSW, with a second breeding population on the coast of SA. The total range of the species is much more widespread (DAWE, 2020).

The osprey was identified as may occur within the operational area and known to breed within the wider EMBA.

White-tailed Tropicbird

The White-tailed tropicbird (*Phaethon lepturus*) is a listed migratory species under the EPBC Act. This species is predominantly pelagic, and hence rarely comes to shore except to breed (DAWE, 2021). The tropicbird forages in warm waters and over long distances, moving many kilometers away from its breeding sites. It has been recorded to disperse as far as ~1,600 km from Christmas Island during foraging trips (Dunlop et al., 2001). The whitetailed tropicbird lays one egg in nests on the ground under bushes, grass and overhanging rock. The species is highly susceptible to disturbance at its nesting sites. It feeds on fish and cephalopods by plunge-diving (Marchant and Higgins, 1990).

The White-tailed tropicbird was identified as known to breed within the wider EMBA. A breeding BIA for white-tailed tropicbirds overlaps with the wider EMBA.

Red-Tailed Tropicbird

The red-tailed tropicbird (*Phaethon rubricauda*) is a listed migratory species under the EPBC Act. It is a marine species native to tropical parts of the Indian and Pacific Oceans where it eats fish, mainly flying fish and squid, after catching them by plunge-diving into the water. Red-tailed tropicbirds spend most of their lives at sea, returning to land only to breed (Surman & Nicholson, 2009b).

The red-tailed tropicbird was identified as known to breed within the wider EMBA.

Pacific Golden Plover

The Pacific golden plover (*Pluvialis fulva*) is listed as migratory under the EPBC Act. In Western Australia, the species is seldom recorded along the southern or south-western coasts, but is more widespread along the Pilbara and Kimberley coasts between North-West Cape and the Northern Territory border. The species is often recorded on Australia's outlying islands, including Lord Howe and Norfolk Islands, as well as on Christmas and Cocos-Keeling Islands in the Indian Ocean (DAWE, 2021).

In non-breeding grounds in Australia this species usually inhabits coastal habitats, though it occasionally occurs around inland wetlands. Pacific Golden Plovers usually occur on beaches, mudflats and sandflats (sometimes in vegetation such as mangroves, low saltmarsh such as *Sarcocornia*, or beds of seagrass) in sheltered areas including harbours, estuaries, and lagoons, and also in evaporation ponds in saltworks. The species is also sometimes recorded on islands, sand and coral cays and exposed reefs and rocks (DAWE, 2021).

The Pacific golden plover was identified as known to roost within the wider EMBA.

Grey Plover

The grey plover (*Pluvialis squatarola*) is a listed migratory species under the EPBC Act. It is a medium-sized plover that is found solitary, in small flocks, and larger flocks at communal roosts often with other waders. Widespread in coastal regions of Australia, it inhabits sheltered embayments, estuaries and lagoons with mud and sand flats, occasionally on rocky coasts with wave cut platforms. Their diet consists of mostly molluscs, insects, crustaceans and polychaete worms. The grey plover arrive in northern Australia from August to September where they remain until April when they return to their breeding grounds in northern Siberia.

The grey plover was identified as known to roost within wider EMBA.

Roseate Tern

The roseate tern (*Sterna dougallii*) is a listed migratory species under the EPBC Act. It is a coastal seabird that occurs in a variety of habitats including beaches, reefs and sandy/coral islands. It is a specialist forager for small pelagic fish, and prefers nesting sites adjacent to clear shallow hunting areas. Nests are generally a bare scrape in sand, shingle or coral rubble. Breeds in large mixed-species colonies from April to June, breeding populations are located around the North West Cape area and the Montebello islands (DEWHA, 2008a), as such the EMBA includes a BIA for breeding and foraging various locations along coastline and offshore islands (in the Pilbara region) (Figure 4-15).

The roseate tern was identified as known to breed within the wider EMBA. Aggregation, breeding and foraging BIAs for the species occur in the wider EMBA (Figure 4-15).

Masked Booby

The masked booby (*Sula dactylatra*) is listed as a migratory species under the EPBC Act. It is the largest and heaviest of the booby family. It's distribution ranges from the Dampier Archipelago in WA to along the entire north coast of Australia. Breeding pairs have been located on Ashmore Reef (DAWE, 2021), but few records have been made in the NT. The diet of the booby is primarily comprised of fish with some cephalopods. Food is obtained by deep plunging in the ocean to depths exceeding 3 m.

The Masked booby was identified as known to breed within the wider EMBA.

Brown Booby

The brown booby (*Sula leucogaster*) is listed as a migratory species under the EPBC Act. It is the smallest of the booby family. The species feeds either individually or in flocks, generally around inshore waters and use both marine and terrestrial habitats. They forage by either plunge diving or by snatching prey from the surface.

Brown booby was identified as known to breed within the wider EMBA. The EMBA overlaps with the Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef breeding BIAs for this species.

Red-footed Booby

The red-footed booby (*Sula sula*) is listed as a migratory species under the EPBC Act. It is a slender bird with conspicuous red feet. Its distribution is confined to tropical waters between 30°N and 30°S in the Indian Ocean. In WA a small breeding population has been recorded on Ashmore Reef (DAWE, 2021). It mostly feeds on fish, especially flying fish, and also cephalopods. Feeding is by plunge diving in groups to shallow depths (DAWE, 2021).

Red-footed booby was identified as known to breed within the wider EMBA. The EMBA overlaps with the Northwest Kimberley and Ashmore Reef breeding BIAs for this species.

Red-necked Phalarope

The red-necked phalarope (*Phalaropus lobatus*) is listed as a migratory species under the EPBC Act. The Red-necked Phalarope breeds in the Arctic and subarctic North America, Europe and Russia. In Western Australia the species has been seen on Rottnest Island, Pelican Point, the Swan River, the Port Hedlands Saltworks, the Eyre Bird Observatory and Hinds Lake Nature Reserve (DAWE, 2021).

The red-necked phalarope has been identified as having habitat that may occur within the wider EMBA.

Ruff (Reeve)

The ruff (reeve) (*Philomachus pugnax*) is listed as a migratory species under the EPBC Act. The Ruff breeds in Europe from north Russia to north-west Kazakhstan. In Western Australia the species has been recorded at the lower King River and it is mostly found in the south-west region of the state. It has been sighted at the Vasse River estuary, north to Namming Lake and Lake McLarty. It has been periodically recorded at Port Hedland, Kununurra and the Argyle Diamond Mine. There are unconfirmed reports at Curlewis Camp, Millstream Chichester, Broome and Roebuck Bay. In the Northern Territory the species has been recorded

around Darwin, Colac Bay, Lake Ellesmere, Lake Poukawa and Lake Wainono (Higgins & Davies 1996) (DAWE, 2021).

The ruff (reeve) has been identified as having habitat that may occur within the wider EMBA.

Asian Dowitcher

The Asian dowitcher (*Limnodromus semipalmatus*) is listed as a migratory species under the EPBC Act. The Asian Dowitcher breeds in isolated colonies in central and eastern Siberia, Mongolia and north-east China. In Western Australia the species has been recorded at Albany, Lake McLarty, Lake McLeod, north-east Pilbara and the south-west Kimberley division. It has also been recorded at the Port Hedland Saltworks, Roebuck Bay, Ashmore Reed and Eighty Mile Beach (Higgins & Davies 1996) (DAWE, 2021).

The Asian dowitcher has been identified as likely to occur or having habitat likely to occur within the wider EMBA.

Marsh Sandpiper

The marsh sandpiper (*Tringa stagnatilis*) is listed as a migratory species under the EPBC Act. The Marsh Sandpiper breeds from eastern Europe to eastern Siberia. The Marsh Sandpiper is found on coastal and inland wetlands throughout Australia. There are scattered records in Western Australia and the Northern Territory. In Western Australia they are mainly found around the coast. (DAWE, 2021).

The marsh sandpiper has been identified as having habitat that may occur within the wider EMBA.

Pin-tailed Snipe

The pin-tailed snipe (*Gallinago stenura*) is listed as a migratory species under the EPBC Act. The species distribution within Australia is not well understood. There are confirmed records from NSW, south-west Western Australia, Pilbara and the Top End. In NSW a single banded bird was reported near West Wyalong. In Western Australia the species was reported at Pilbara, Port Headland, Myaree Pool, Maitland River and near Karratha. In Pilbarra the distribution is believed to be bound by Pardoo (Banningarra Spring) and the lower Maitland River and Shay Gap. The Pin-tailed Snipe has also been reported on the Cocos-Keeling Islands as well as Christmas Island (Higgins & Davies 1996) (DAWE, 2021).

The pin-tailed snipe has been identified as having habitat that may occur within the wider EMBA.

Swinhoe's Snipe

The Swinhoe's snipe (*Gallinago megala*) is listed as a migratory species under the EPBC Act. The species has been recorded in the north between the Kimberley Divide and Cape York Peninsula. In Western Australia the species has been recorded in Pilbara, the Kimberley region, Mount Goldsworthy, Mount Blaize and in the north-west regions around the Mitchell Plateau. In the Northern Territory the species is believed to be common and widespread in the Top End. Definite records exist from Darwin, Melville Island, Cannon Hill, Red Lily Lagoon and Mount Brockman (DAWE, 2021). During the non-breeding season Swinhoe's Snipe occurs at the edges of wetlands, such as wet paddy fields, swamps and freshwater streams. Swinhoe's Snipe is recorded in north Australia, particularly the Kimberley region, from October–April. The species may occur in Pilbara from October–March. It is believed to be a common visitor to subcoastal Northern Territory during the wet season.

The Swinhoe's snipe has been identified as having habitat that may occur within the wider EMBA.

Greater Crested Tern

The crested tern (*Sterna bergii*) is listed as a migratory species under the EPBC Act. The crested tern inhabits tropical and subtropical coastlines and forages in the shallow waters of lagoons, coral reefs, bay, harbours, inlets and estuaries; along sandy, rocky, coral or muddy shores; on rocky outcrops in open sea; in mangrove swamps; and in offshore and pelagic waters (Higgins and Davies, 1996). The crested tern usually feeds from the surface of the sea to less than 1 m water depth but can also forage well out to sea. It's diet consists predominantly of pelagic fish, although it will also feed on crustaceans, insects and hatchling turtles

opportunistically. The crested tern shows a preference for nesting on offshore islands, low-lying coral reefs, low-lying coral reefs, sandy or rocky coastal islets, coastal spits and lagoon mudflats.

The Greater crested tern was identified as known to breed within the wider EMBA. Breeding BIAs for the species occur in the wider EMBA (Figure 4-15).

Grey-tailed Tattler

The grey-tailed tattler (*Tringa brevipes*) is listed as a migratory species under the EPBC Act. This medium-sized wader is found in most coastal regions in Australia, but primarily in the north. In WA, the species is widespread from Houtman Abrolhos and mainland to the Kimberley region, with known populations on Barrow Island. The bird is often found on sheltered coasts with reefs and rock platforms or intertidal muds. Their diet consists primarily of worms, molluscs, crustaceans, insects and occasionally fish. The grey-tailed tattler breeds in Siberia and moves south for the boreal winter, arriving in Australia around August and departing for its breeding grounds by early or mid-April.

The grey-tailed tattler was identified as known to roost within the wider EMBA.

Wood Sandpiper

The Wood sandpiper (*Tringa glareola*) is listed as a migratory species under the EPBC Act. It is a small thin wader that lives in well-vegetated, shallow, freshwater wetlands such as swamps, billabongs, lakes, pools and waterholes (DAWE, 2021). The largest number of wood sandpipers in Australia have been recorded in north-west Australia, with all areas of national importance located in WA (2021). The wood sandpiper does not breed in Australia. They are carnivorous and in Australia eat mainly insects and molluscs (DAWE, 2021).

Wood sandpiper was identified as known to roost within the wider EMBA.

Common Greenshank

The common greenshank (*Tringa negularia*) is a listed migratory species under the EPBC Act. It is a heavily built, elegant wader, seen singly or in small to large flocks (sometimes with hundreds) in a variety of coastal and inland wetlands (Higgins & Davies, 1996). It does not breed in Australia; however, the species occurs in all types of wetlands and has the widest distribution of any shorebird in Australia (Higgins & Davies, 1996).

The common greenshank is known to occur in the coastal sections of the wider EMBA.

Terek Sandpiper

The Terek sandpiper (*Xenus cinereus*) is a listed migratory species under the EPBC Act. This sandpiper primarily has a coastal distribution in Australia, being more widespread and common in the north and east than in the south of Australia. In WA, the Terek sandpiper is widespread in the Pilbara and Kimberley regions and occasionally around Shark Bay. The species prefers intertidal mudflats and has also been recorded on sand spits, near mangroves and also rocky areas. The Terek sandpiper feeds on a variety of invertebrates including crustaceans, insects and molluscs. The species breeds in Eurasia before moving south for the boreal winter.

The Terek sandpiper was identified as known to roost within the wider EMBA.

4.10 Other Values and Sensitivities

4.10.1 Australian Marine Parks

The Commonwealth Marine Reserves Network was established in 2012 for the purpose of protecting the biological diversity and sustainable use of the marine environment. There are six management plans – one for each of the five marine park networks (the North, the North-west, the South-east, the South-west and the Temperate East) and one for the Coral Sea. The operational area does not intersect any marine parks. A number of marine parks fall within the wider EMBA (Table 4-17 and Figure 4-19). Information on the Australian Marine Parks has been extracted from the Parks Australia website (<https://parksaustralia.gov.au/>) and is summarised below.

Table 4-17: Australian marine parks within the EMBA

Value / Sensitivity		Approx. closest distance to operational area	EMBA		
			Operational area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
North-West Marine Region					
Argo-Rowley Terrace	Multiple Use Zone (IUCN Category VI)	485 km	x	✓	✓
	National Park Zone (IUCN Category II)				
	Special Purpose Zone (IUCN Category VI)				
Ashmore Reef	Recreational Use Zone (IUCN Category IV)	1,383 km	x	✓	✓
	Sanctuary Zone (IUCN Category Ia)				
Carnarvon Canyon	Habitat Protection Zone (IUCN Category IV)	345 km	x	✓	✓
Cartier Island	Habitat Protection Zone (IUCN Category IV)	1,400 km	x	x	✓
Dampier	Habitat Protection Zone (IUCN Category IV)	313 km	x	✓	✓
	Multiple Use Zone (IUCN Category VI)				
	National Park Zone (IUCN Category II)				
Eighty Mile Beach	Multiple Use Zone (IUCN Category VI)	536 km	x	✓	✓
Gascoyne	Habitat Protection Zone (IUCN Category IV)	16 km	x	✓	✓
	Multiple Use Zone (IUCN Category VI)				
	National Park Zone (IUCN Category II)				
Kimberley	Multiple Use Zone (IUCN Category VI)	880 km	x	✓	✓
	National Park Zone (IUCN Category II)				
Mermaid Reef	National Park Zone (IUCN Category II)	740 km	x	✓	✓
Montebello	Multiple Use Zone (IUCN Category VI)	143 km	x	✓	✓
Ningaloo	National Park Zone (IUCN Category II)	13 km	x	✓	✓
	Recreational Use Zone (IUCN Category IV)				

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Roebuck	Multiple Use Zone (IUCN Category VI)	902 km	x	✓	✓
Shark Bay	Multiple Use Zone (IUCN Category VI)	322 km	x	✓	✓
South-West Marine Region					
Abrolhos	Habitat Protection Zone (IUCN Category IV)	490 km	x	✓	✓
	Multiple Use Zone (IUCN Category VI)				
	National Park Zone (IUCN Category II)				
	Special Purpose Zone (IUCN Category VI)	650 km	x	✓	✓
Bremer	National Park Zone (IUCN Category II)	1,860 km	x	x	✓
	Special Purpose Zone (Mining Exclusion) (IUCN Category VI)				
Jurien	National Park Zone (IUCN Category II)	960 km	x	✓	✓
	Special Purpose Zone (IUCN Category VI)				
Perth Canyon	Habitat Protection Zone (IUCN Category IV)	1,108 km	x	✓	✓
	Multiple Use Zone (IUCN Category VI)				
	National Park Zone (IUCN Category II)				
South-West Corner	Habitat Protection Zone (IUCN Category IV)	1,312 km	x	✓	✓
	Multiple Use Zone (IUCN Category VI)				
	National Park Zone (IUCN Category II)				
	Special Purpose Zone (IUCN Category VI)				
	Special Purpose Zone (Mining Exclusion) (IUCN Category VI)				
Two Rocks	Multiple Use Zone (IUCN Category VI)	1,092 km	x	✓	✓
	National Park Zone (IUCN Category II)				

Argo-Rowley Terrace Marine Park

The Argo-Rowley Terrace Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Argo-Rowley Terrace Marine Park on 9 October 2017. The park includes three zones, National Park Zone (IUCN Category II), Multiple Use Zone (IUCN Category VI) and Special Purpose Zone (Trawl) (IUCN Category VI). The wider EMBA overlaps all three zones. The marine park is the largest in the North-west Network covering an area of 146,003 km² and with water depths ranging from 220 m to 6,000 m. The marine park is located approximately 270 km northwest of Broome, WA, and extends to the limit of Australia’s EEZ. The marine park is adjacent to the Mermaid Reef Marine Park and the WA Rowley Shoals Marine Park. The marine park has the following conservation values (Director of National Parks, 2018a):

- Supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act;
- Includes BIAs:
 - Migratory path for the pygmy blue whale;
 - Resting and breeding habitat for seabirds;
- Includes two key ecological features (KEFs):
 - Canyons linking the Cuvier Abyssal Plain with the Scott Plateau – an area likely to result in upwelling of nutrient rich water and aggregations of marine life; and
 - Mermaid Reef and Commonwealth waters surrounding Rowley Shoals – an area of enhanced productivity and high species richness, thought to be facilitated by internal wave action generated by internal tides);
- Includes a range of seafloor features such as canyons on the slope between the Argo Abyssal Plain, Rowley Terrace and Scott Plateau – these are believed to be up to 50 million years old;
- Contains two known shipwrecks listed under *Underwater Cultural Heritage Act 2018*: the *Alfred* (wrecked in 1908) and the *Pelsart* (wrecked in 1908);
- Includes examples of ecosystems representative of the Northwest Transition and the Timor Province; and
- Commercial fishing and mining are important activities in the marine park.

Ashmore Reef (and Cartier Island) Marine Park

The Marine Park was originally proclaimed under the National Parks and Wildlife Conservation Act 1975 on 16 August 1983 as the Ashmore Reef National Nature Reserve, and proclaimed under the EPBC Act on 14 December 2013 and renamed Ashmore Reef Marine Park on 9 October 2017. The Marine Park is assigned IUCN category Ia and includes two zones assigned under this plan: Sanctuary Zone (Ia) and Recreational Use Zone (IV).

The Ashmore Reef Marine Park is located approximately 630 km north of Broome and 110 km south of the Indonesian island of Roti. The Marine Park is located in Australia's External Territory of Ashmore and Cartier Islands and is within an area subject to a Memorandum of Understanding (MoU) between Indonesia and Australia, known as the MoU Box. The Marine Park covers an area of 583 km² and water depths from less than 15 m to 500 m. The Marine Park contains three vegetated sand cays that are permanently above water: West, Middle and East island. The marine park has the following conservation values (Director of National Parks, 2018a):

- two key ecological features:
 - Ashmore Reef and Cartier Island and surrounding Commonwealth waters (valued for high productivity and breeding aggregations of birds and other marine life);
 - continental slope demersal fish communities (valued for high levels of endemism).
- The Marine Park supports a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act
- The reefs and islands of the bioregion are regarded as biodiversity hotspots.
- Endemism in demersal fish communities of the continental slope is high with two distinct communities identified: one on the upper slope, the other mid slope.
- Include BIAs:
 - breeding, foraging and resting habitat for seabirds,
 - resting and foraging habitat for migratory shorebirds,
 - foraging, mating, nesting and inter-nesting habitat for marine turtles,

- foraging habitat for dugong, and
- migratory pathway for pygmy blue whales
- Ashmore Reef Ramsar site supports internationally significant populations of seabirds and shorebirds, is important for turtles (green, hawksbill and loggerhead) and dugong, and has the highest diversity of hermatypic (reef-building) corals on the West Australian coast. It is known for its abundance and diversity of sea snakes.
- The Marine Park contains Indonesian artefacts and grave sites and Ashmore lagoon is still accessed as a rest or staging area for traditional Indonesian fishers travelling to and from fishing grounds within the MoU Box.
- Ashmore Reef was listed on the Commonwealth Heritage List in 2004, meeting Commonwealth heritage listing (criteria A, B and C).

Carnarvon Canyon Marine Park

The Carnarvon Canyon Marine Park includes one zone, Habitat Protection Zone (IUCN Category IV). The marine park covers an area of 6,177 km² and a water depth range from 1,500 m to 6,000 m. The marine park is located approximately 300 km northwest of Carnarvon. The marine park includes the Carnarvon Canyon, a single-channel canyon covering the entire depth range of the marine park. The marine park was proclaimed under the EPBC Act on 14 December 2013 and renamed Carnarvon Canyon Marine Park on 9 October 2017. The marine park has the following conservation values (Director of National Parks, 2018a):

- Supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act;
- Includes deep-water ecosystems associated with the Carnarvon Canyon. The soft-seafloor environment at the base of the canyon is likely to support species that are typical of the deep seafloor (e.g. holothurians, polychaetes and seapens);
- Includes examples of ecosystems representative of the Central West Transition; and
- Commercial fishing is an important activity in the marine park.

Dampier Marine Park

The Dampier Marine Park covers an area of 1,252 km² and a water depth range between less than 15 m and 70 m. It is significant because it contains habitats, species and ecological communities associated with the Northwest Shelf Province. The marine park provides protection for offshore shelf habitats adjacent to the Dampier Archipelago, and the area between Dampier and Port Hedland, and is a hotspot for sponge biodiversity. The Dampier Marine Park includes several submerged coral reefs and shoals including Delambre Reef and Tessa Shoals (DNP, 2018a). The marine park has the following conservation values (Director of National Parks, 2018a):

- The marine park supports a range of species including those listed as threatened, migratory, marine or cetacean under the EPBC Act.
- BIAs within the marine park include:
 - breeding and foraging habitat for seabirds,
 - inter-nesting habitat for marine turtles
 - migratory pathway for humpback whales
- The Ngarluma, Yindjibarndi, Yaburara, and Mardudhunera indigenous people have responsibilities for sea country in the Dampier Marine Park.
- Port activities, commercial fishing and recreation (including fishing), are important activities in this AMP.

Eighty Mile Beach Marine Park

The Eighty Mile Beach Marine Park covers an area of 10,785 km² and water depths range between less than 15 m and 70 m. It is located approximately 74 km north-east of Port Hedland, adjacent to the WA Eighty Mile Beach Marine Park (DNP, 2018a).

The Eighty Mile Beach Marine Park is significant because it contains habitats, species and ecological communities associated with the Northwest Shelf Province and consists of shallow shelf habitats, including terrace, banks and shoals. The marine park is adjacent to the Eighty Mile Beach Ramsar site, recognised as one of the most important areas for migratory shorebirds in Australia; and the WA Eighty Mile Beach Marine Park, providing connectivity between offshore and inshore coastal waters of Eighty Mile Beach (DNP, 2018a). The marine park has the following conservation values (Director of National Parks, 2018a):

- The marine park supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act.
- BIAs within the marine park include:
 - breeding, foraging and resting habitat for seabirds,
 - inter-nesting and nesting habitat for marine turtles,
 - foraging, nursing and pupping habitat for sawfish
 - migratory pathway for humpback whales.
- The sea country of the Nyangumarta, Karajarri and Ngarla indigenous people extends into Eighty Mile Beach Marine Park.
- Tourism, commercial fishing, pearling and recreation are important activities in this AMP.

Gascoyne Marine Park

The Gascoyne Marine Park is located approximately 20 km off the west coast of the Cape Range Peninsula, adjacent to the Ningaloo Reef Marine Park and the WA Ningaloo Marine Park, and extends to the limit of Australia's exclusive economic zone (EEZ). The marine park covers an area of 81,766 km² and lies in waters ranging from 15 m to 6,000 m. The marine park was proclaimed under the EPBC Act on 14 December 2013 and renamed Gascoyne Marine Park on 9 October 2017. The marine park includes areas zoned as National Park Zone (IUCN Category II), Habitat Protection Zone (IUCN Category IV), and Marine Use Zone (IUCN Category VI). The marine park has the following conservation values (Director of National Parks, 2018a):

- Contains habitats, species and ecological communities associated with the Central Western Shelf Transition, the Central Western Transition and the North West Province;
- Includes some of the most diverse continental slope habitats in Australia, such as the continental slope area between the North West Cape and the Montebello Trough;
- The Marine Park provides a continuous connectivity corridor from shallow depths of around 15 m out to deep offshore waters on the abyssal plain at over 5,000 m in depth.
- Supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act;
- Includes BIAs:
 - Inter-nesting sites for marine turtles;
 - Includes part of the migratory pathway of the protected humpback whale;
 - Foraging habitat and migratory path for pygmy blue whales; and
 - Breeding habitat for seabirds;
- Includes four KEFs:
 - Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula;

- Commonwealth waters adjacent to Ningaloo Reef;
- Continental slope demersal fish communities; and
- Exmouth Plateau (valued as a unique seafloor feature with ecological properties of regional significance);
- Contains more than five known shipwrecks listed under Underwater Cultural Heritage Act 2018; and
- Diverse social values including commercial fishing, mining and recreation.

Kimberley Marine Park

The Kimberley Marine Park covers an area of 74,469 km² and water depths from less than 15 m to 800 m. It provides connectivity between deeper offshore waters, and the inshore waters of the adjacent WA North Kimberley Marine Park and Lalang-garram/Camden Sound Marine Park (DNP, 2018a).

The Kimberley Marine Park is significant because it includes habitats, species and ecological communities associated with the Northwest Shelf Province, Northwest Shelf Transition and Timor Province. The marine park has the following conservation values (Director of National Parks, 2018a):

- The marine park supports a range of species, including protected species listed as threatened, migratory, marine or cetacean under the EPBC Act.
- BIAs within the marine park include:
 - breeding and foraging habitat for seabirds,
 - inter-nesting and nesting habitat for marine turtles,
 - breeding, calving and foraging habitat for inshore dolphins,
 - calving, migratory pathway and nursing habitat for humpback whales,
 - migratory pathway for pygmy blue whales,
 - foraging habitat for dugong and foraging habitat for whale sharks.
- It includes two KEFs:
 - The ancient coastline at the 125-m depth contour; and
 - Continental slope demersal fish communities.
- The Wunambal Gaambera, Dambimangari, Mayala, Bardi Jawi and the Nyul Nyul indigenous people's sea country extends into the Kimberley Marine Park.
- Tourism, commercial fishing, mining, recreation, including fishing, and traditional use are important activities in this AMP.

Mermaid Reef Marine Park

The Mermaid Reef Marine Park covers an area of 540 km² and water depths from less than 15 m to 500 m. It is significant because it contains habitats, species and ecological communities associated with the Northwest Transition. It includes one KEF: the Mermaid Reef and Commonwealth waters surrounding Rowley Shoals, and is one of three reefs forming the Rowley Shoals. The other two are Clerke Reef and Imperieuse Reef, to the south-west of the marine park, which are included in the WA Rowley Shoals Marine Park (DNP, 2018a). Ecosystems of the marine park are associated with emergent reef flat, deep reef flat, lagoon, and submerged sand habitats. The Marine Park was originally proclaimed under the *National Parks and Wildlife Conservation Act 1975* on 10 April 1991 as the Mermaid Reef Marine National Nature Reserve, and proclaimed under the EPBC Act on 14 December 2013 and renamed Mermaid Reef Marine Park on 9 October 2017. The marine park has the following conservation values (Director of National Parks, 2018a):

- The Mermaid Reef Marine Park supports a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act.
- BIAs within the marine park include:
 - breeding habitat for seabirds
 - migratory pathway for the pygmy blue whale.
- Marine tourism such as charter fishing, snorkelling, diving and wildlife watching are also important commercial activities that occur around Mermaid Reef.

Montebello Marine Park

The Montebello Marine Park is located offshore of Barrow Island and 80 km west of Dampier extending from the WA State waters boundary, and is adjacent to the WA Barrow Island and Montebello Islands Marine Parks. Covering an area of 3,413 km² and water depths ranging from less than 15 m to 150 m, the marine park includes one area zoned as Multiple Use Zone (IUCN Category VI). The marine park was proclaimed under the EPBC Act on 14 December 2013 and renamed the Montebello Marine Park on 9 October 2017. The marine park has the following conservation values (Director of National Parks, 2018a):

- Includes habitats, species and ecological communities associated with the North West Shelf Province;
- Includes diverse benthic and pelagic fish communities;
- Supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act;
- Includes BIAs:
 - Inter-nesting, foraging, mating and nesting habitat for marine turtles;
 - Includes part of the migratory pathway of the protected humpback whale;
 - Foraging habitat for whale sharks; and
 - Breeding habitat for seabirds;
- Includes one KEF for the region, the Ancient Coastline at the 125-m Depth Contour (valued as a unique seafloor feature with ecological properties of regional significance);
- Includes a prominent seafloor feature, the Trial Rocks, consisting of two close coral reefs. The reefs are emergent at low tide;
- Includes two known historic shipwrecks listed under *Underwater Cultural Heritage Act 2018*; and
- Diverse social values including tourism, fishing, mining and recreation.

Ningaloo Marine Park

The Ningaloo Marine Park includes two zones, National Park Zone (IUCN Category II) and Recreational Use Zone (IUCN Category IV). The marine park covers an area of 2,435 km² and a water depth range of 30 m to more than 500 m. Together with the Ningaloo Marine Park and the Muiron Islands Marine Management Area, both in State waters, make up the Ningaloo Coastal World Heritage Area (Section 4.5.2). The marine park stretches approximately 300 km along the west coast of the Cape Range Peninsula near Exmouth approximately 1,200 km north of Perth. The marine park was originally proclaimed under the *National Parks and Wildlife Conservation Act 1975* on 20 May 1987 as the Ningaloo Marine Park (Commonwealth Waters), and proclaimed under the EPBC Act on 14 December 2013 and renamed Ningaloo Marine Park on 9 October 2017. The marine park has the following conservation values (Director of National Parks, 2018a):

- Supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act;
- Includes BIAs:
 - Foraging habitat for the vulnerable and migratory whale shark;
 - Foraging habitat adjacent to important nesting and inter-nesting sites for marine turtles;

- Includes part of the migratory pathway of the protected humpback whale;
- Foraging habitat and migratory path for pygmy blue whales;
- Breeding, calving, foraging and nursing habitat for dugong; and
- Breeding and foraging habitat for seabirds;
- Includes three KEFs:
 - Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula (valued for unique seafloor features with ecological properties of regional significance);
 - Commonwealth waters adjacent to Ningaloo Reef (valued for high productivity and aggregations of marine life); and
 - Continental slope demersal fish communities (valued for high levels of endemism and diversity);
- Includes shallow shelf environments and provides protection for shelf and slope habitats, as well as pinnacle and terrace seafloor features;
- Contains more than 15 known shipwrecks listed under *Underwater Cultural Heritage Act 2018* (replaced the *Historic Shipwrecks Act 1976*);
- Includes examples of the seafloor habitats and communities associated with the Central Western Shelf Transition, the Central Western Transition, the North West Province and the North West Shelf Province; and
- Diverse social values including tourism and recreation, and fishing.

Roebuck Marine Park

The Roebuck Marine Park is located approximately 12 km offshore of Broome, and is adjacent to the Western Australian Yawuru Nagulagun/Roebuck Bay Marine Park. The Marine Park covers an area of 304 km² and a water depth range of less than 15 m to 70 m. The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Roebuck Marine Park on 9 October 2017.

The Roebuck Marine Park is significant because it contains habitats, species and ecological communities associated with the Northwest Shelf Province, and consists entirely of shallow continental shelf habitat. The Marine Park is adjacent to the Roebuck Bay Ramsar site, recognised as one of the most important areas for migratory shorebirds in Australia; and the Western Australian Yawuru Nagulagun/Roebuck Bay Marine Park, providing connectivity between offshore and inshore coastal waters of Roebuck Bay. The marine park has the following conservation values (Director of National Parks, 2018a):

- The Marine Park supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act.
- BIAs within the Marine Park include:
 - breeding and resting habitat for seabirds,
 - foraging and inter-nesting habitat for marine turtles,
 - migratory pathway for humpback whales
 - foraging habitat for dugong.
- Yawuru people connection to the waters of Roebuck Bay.
- Diverse social values including tourism and recreation, and fishing.

Shark Bay Marine Park

The Shark Bay Marine Park is located approximately 60 km offshore of Carnarvon, adjacent to the Shark Bay World Heritage Property and National Heritage Place. The marine park covers an area of 7,443 km², extending from the WA state waters boundary, and with water depths ranging from 15 m to 220 m. Proclaimed under the EPBC Act on 14 December 2013, the marine park was renamed Shark Bay Marine Park on 9 October 2017. The marine park includes one zone, Multiple Use Zone (IUCN Category VI). The marine park has the following conservation values (Director of National Parks, 2018a):

- Includes habitats, species and ecological communities associated with the Central Western Shelf Province and Central Western Transition;
- Provides connectivity between the deeper Commonwealth waters and the inshore waters of the Shark Bay World Heritage Property;
- Supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act;
- BIAs include breeding habitat for seabirds, inter-nesting habitat for marine turtles, and a migratory pathway for humpback whales;
- Includes BIAs:
 - Inter-nesting habitat for marine turtles;
 - Migratory pathway of the protected humpback whale; and
 - Breeding habitat for seabirds;
- The marine park and adjacent coastal areas are important for shallow-water snapper;
- Approximately 20 known shipwrecks listed under the *Underwater Cultural Heritage Act 2018*; and
- Diverse social values including tourism, commercial fishing, mining and recreation.

Abrolhos Marine Park

The Abrolhos Marine Park includes four zones, National Park Zone (IUCN Category II), Habitat Protection Zone (IUCN Category IV), Multiple Use Zone (IUCN Category VI) and Special Purpose Zone (IUCN Category VI). The marine park is located adjacent to the WA Houtman Abrolhos Islands, covering a large offshore area extending from the WA State water boundary to the edge of Australia's EEZ. The marine park covers an area of 88,060 km² and with a water depth range between less than 15 m and 6,000 m. The marine park is located approximately 27 km south-west of Geraldton and extends north to approximately 330 km west of Carnarvon. The marine park is adjacent to the WA Shark Bay World Heritage Property, listed as an area of outstanding universal value under the World Heritage Convention in 1991. The marine park was proclaimed under the EPBC Act on 14 December 2013 and renamed Abrolhos Marine Park on 9 October 2017. The marine park has the following conservation values (Director of National Parks, 2018b):

- Supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act;
- Includes BIAs:
 - Migratory path for humpback and pygmy blue whales;
 - Foraging and breeding habitat for seabirds;
 - Foraging habitat for Australian sea lions and white sharks;
- Includes seven KEFs:
 - Commonwealth marine environment surrounding the Houtman Abrolhos Islands;
 - Demersal slope and associated fish communities of the Central Western Province;
 - Mesoscale eddies;
 - Perth Canyon and adjacent shelf break, and other west-coast canyons;

- Western rock lobster;
- Ancient coastline between 90 m and 120 m depth; and
- Wallaby Saddle
- Contains a number of seafloor features including the Houtman Canyon, the second largest submarine canyon on the west coast of Australia;
- Contains 11 known shipwrecks listed under *Underwater Cultural Heritage Act 2018*, including the Zuytdorp (wrecked in 1712), the *HMAS Sydney II* and *HSK Kormoran* (both wrecked in 1941); and the *Batavia* (wrecked on the adjacent Abrolhos Islands in 1629) shipwreck site and survivor camps area are on the National Heritage List;
- Sea country valued for indigenous cultural values. The Nanda and Naaguja People have responsibilities for sea country in the marine park. Artefacts from ancestors are abundant on islands in the adjacent State marine park;
- Includes examples of ecosystems representative of the Central Western Province, the Central Shelf Province; the Central Western Transition and the South-west Shelf Transition; and
- Tourism, commercial fishing, mining and recreation (including recreational fishing) are important activities in the marine park.

Jurien Marine Park

The Jurien Terrace Marine Park includes two zones, National Park Zone (IUCN Category II) and Special Purpose Zone (IUCN Category VI). The marine park covers an area of 1,851 km² of continental shelf, extending from the WA State water boundary, and a water depth range of between 15 m and 220 m. The marine park is located approximately 148 km north of Perth and 155 km south of Geraldton, adjacent to the WA Jurien Bay Marine Park. The marine park was proclaimed under the EPBC Act on 14 December 2013 and renamed Jurien Bay Marine Park on 9 October 2017. The marine park has the following conservation values (Director of National Parks, 2018b):

- Supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act;
- Includes BIAs:
 - Migratory path for humpback and pygmy blue whales;
 - Foraging habitat for seabirds, Australian sea lions and white sharks;
- Includes three KEFs:
 - Ancient coastline between 90 m and 120 m depth – high benthic biodiversity and productivity occur where the ancient coastline forms a prominent escarpment;
 - Demersal slope and associated fish communities of the Central Western Province – an area that provides important habitat for demersal fish communities and is characterised by high species diversity and endemism; and
 - Western rock lobster – plays an important trophic role in many of the inshore ecosystems of the South-west Marine Region. Western rock lobsters are an important part of the food web on the inner shelf, particularly as juveniles;
- Contains a mixture of tropical species carried south by the Leeuwin Current, and temperate species carried north by the Capes Current. Seagrass meadows occur in more sheltered areas as well in the inter-reef lagoons along exposed sections of the coast;
- Cultural values for indigenous peoples – The Noongar people have responsibilities for sea country in the marine park. Artefacts from ancestors are abundant on islands in the adjacent State marine park.
- Contains two known shipwrecks listed under *Underwater Cultural Heritage Act 2018*: the *SS Cambewarra* (wrecked in 1914) and the *Oleander* (wrecked in 1884);
- Includes examples of ecosystems representative of the South-west Shelf Transition and the Central Western Province; and

- Tourism, commercial fishing, mining and recreation (including recreational fishing) are important activities in the marine park.

Perth Canyon Marine Park

The Perth Canyon Marine Park covers an area of 7,409 km² and water depth range between 120 m and 5,000 m (DNP, 2018b). It is significant because it contains habitats, species and ecological communities associated with four bioregions: Central Western Province, South-west Shelf Province, Southwest Transition and Southwest Shelf Transition. The marine park includes the majority of the Perth Canyon, which is Australia's largest submarine canyon and home to the largest feeding aggregations of blue whales in Australia (DNP, 2018b). The marine park has the following conservation values (Director of National Parks, 2018b):

- The marine park supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act.
- BIAs within the marine park include:
 - foraging habitat for seabirds, Antarctic blue, pygmy blue and sperm whales,
 - migratory pathway for humpback, Antarctic blue and pygmy blue whales,
 - calving buffer area for southern right whales.
- It includes three KEFs:
 - Perth Canyon and adjacent shelf break, and other west-coast canyons;
 - Demersal slope and associated fish communities of the Central Western Province; and
 - Western rock lobster.
- The Swan River traditional owners have responsibilities for sea country in the Perth Canyon marine park.
- Tourism, commercial shipping, commercial fishing, recreation (including fishing) and defence training are important activities in this AMP (DNP, 2018b).

South-West Corner Marine Park

The South-west Corner Marine Park covers an area of 271,833 km² and a water depth range between less than 15 m and 6,400 m. It is located adjacent to the WA Ngari Capes Marine Park and covers a large offshore area extending from the WA state water boundary to the edge of Australia's EEZ (DNP, 2018b).

The South-west Corner Marine Park is significant because it contains habitats, species and ecological communities associated with three bioregions: Southern Province, Southwest Transition and Southwest Shelf Province. The marine park has the following conservation values (Director of National Parks, 2018b):

- It includes six KEFs:
 - Albany Canyon group and adjacent shelf break;
 - Cape Mentelle upwelling;
 - Diamantina Fracture Zone;
 - Naturaliste Plateau;
 - Western rock lobster; and
 - Ancient coastline between 90 and 120 m depth.
- The marine park supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act.
- BIAs within the marine park include:
 - foraging habitat for seabirds, Australian sea lions, white sharks, and sperm whales,
 - migratory pathway for Antarctic blue, and pygmy blue and humpback whales,

- calving buffer area for southern right whales.
- The Noongar indigenous people have responsibilities for sea country in the South-west Corner Marine Park.
- Tourism, commercial shipping, commercial fishing and recreation (including fishing) are important activities in this AMP.

Two Rocks Marine Park

The Two Rocks Marine Park covers an area of 882 km², extending from the WA state water boundary, and a water depth range from 15 m to 120 m (DNP, 2018b). The Two Rocks Marine Park is significant because it contains habitats, species and ecological communities associated with the Southwest Shelf Transition. The marine park has the following conservation values (Director of National Parks, 2018b):

- It includes three KEFs:
 - The Commonwealth marine environment within and adjacent to the west-coast inshore lagoons;
 - Western rock lobster; and
 - Ancient coastline between 90 and 120 m depth.
- The marine park supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act.
- BIAs within the marine park include
 - foraging habitat for seabirds and Australian sea lions,
 - migratory pathway for humpback and pygmy blue whales,
 - calving buffer area for southern right whales.
- The Swan River traditional owners have responsibilities for sea country in the Two Rocks Marine Park.
- Tourism, commercial fishing, recreation (including fishing) and scientific research are important activities in this AMP.

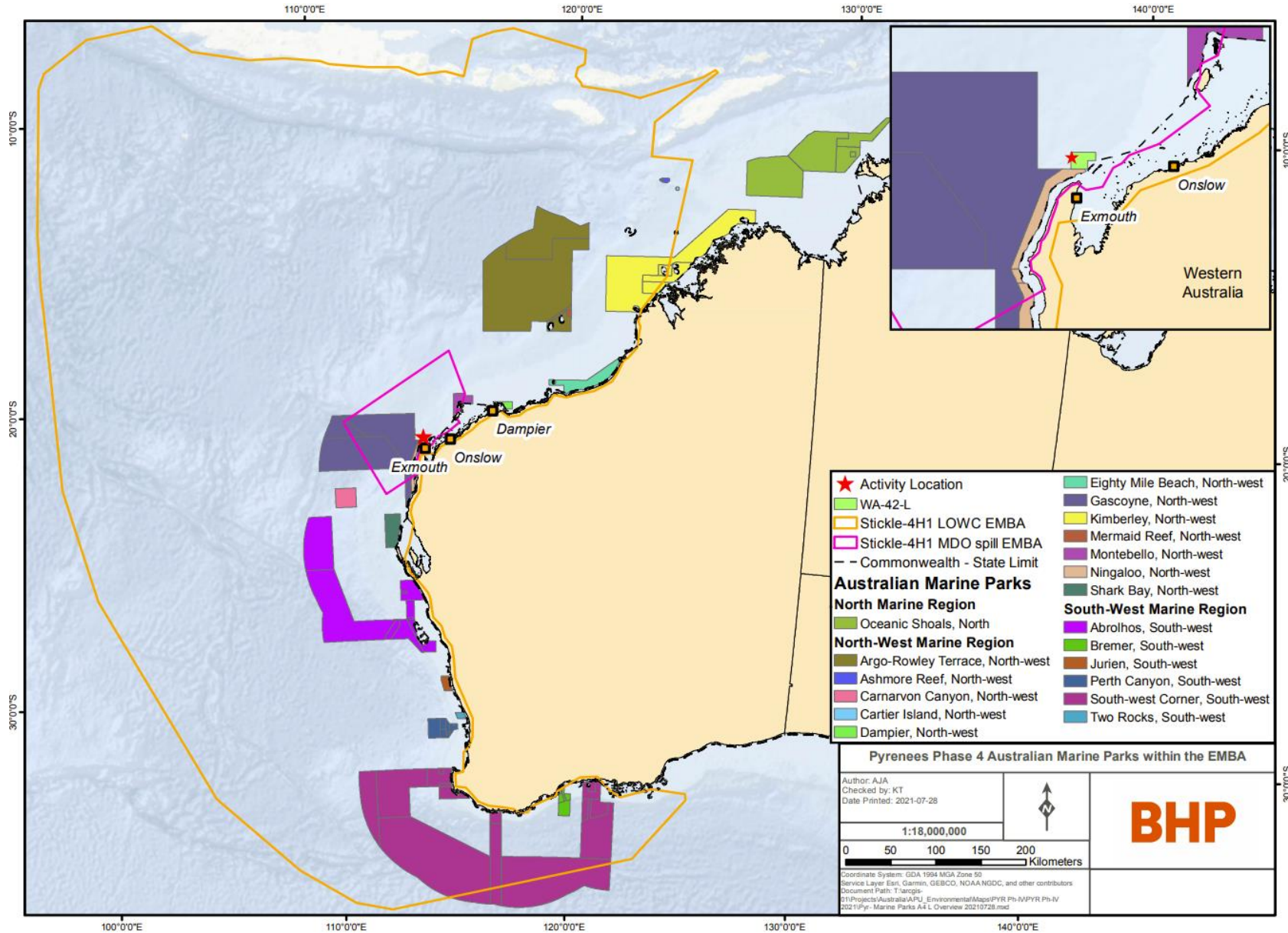


Figure 4-19: Australian Marine Parks within the EMBA

4.10.2 State Marine Parks and Marine Management Areas

There are no State Marine Parks or Marine Management Areas located within the operational area (Figure 4-20). Twenty-two State Marine Parks and Marine Management Areas that fall within the wider EMBA are listed in Table 4-18, shown on Figure 4-20, and described below.

Table 4-18: State marine parks and marine management areas within the EMBA

Value / Sensitivity		Approx. closest distance to operational area	EMBA		
			Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
Arolhos Islands	Fish Habitat Protection Area (IUCN IV)	733 km	x	✓	✓
Beagle Islands	Nature Reserve (IUCN Ia)	913 km	x	✓	✓
Barrow Island	Marine Park (IUCN Ia)	138 km	x	✓	✓
	Marine Management Area (IUCN VI)				
Eighty Mile Beach	Marine Park (IUCN VI)	580 km	x	✓	✓
Great Sandy Island	Nature Reserve (IUCN Ia)	138 km	x	✓	✓
Jurien Bay	Marine Park (IUCN II)	950 km	x	✓	✓
	Marine Park (IUCN Ia)				
Kalbarri Blue Holes	Fish Habitat Protection Area (IUCN IV)	677 km	x	✓	✓
Lancelin Island Lagoon	Fish Habitat Protection Area (IUCN IV)	1,049 km	x	✓	✓
Marmion	Marine Park (IUCN IV)	1,126 km	x	✓	✓
Miaboonya beach	Fish Habitat Protection Area (IUCN IV)	349 km	x	x	✓
Montebello Islands Marine Park	Marine Park (IUCN IV)	177 km	x	✓	✓
	Marine Park (IUCN Ia)				
	Marine Park (IUCN II)				
Muiron Islands	Marine Management Area (IUCN VI)	22 km	x	✓	✓
	Marine Management Area (IUCN Ia)				
Ngari Capes	Marine Park (IUCN VI)	1,322 km	x	✓	✓
Ningaloo	Marine Park (IUCN II)	19 km	x	✓	✓
	Marine Park (IUCN Ia)				
Nyangumarta Warram	Indigenous Protected Area (IUCN VI)	642 km	x	✓	✓
Point Quobba	Fish Habitat Protection Area (IUCN IV)	329 km	x	✓	✓
Rowley Shoals	Marine Park (IUCN II)	652 km	x	✓	✓
	Marine Park (IUCN Ia)				

Scott Reef	Nature Reserve (IUCN Ia)	1,138 km	x	✓	✓
Shark Bay	Marine Park (IUCN II)	378 km	x	✓	✓
	Marine Park (IUCN Ia)				
Shoalwater Island	Marine Park (IUCN VI)	1,193 km	x	✓	✓
	Marine Park (IUCN Ia)				
Thevenard Island	Nature Reserve (IUCN Ia)	87 km	x	✓	✓
Walpole and Nornalup Inlets	Marine Park (IUCN II)	1,495 km	x	✓	✓

Abrolhos Islands Fish Habitat Protection Area

The Abrolhos Islands include 122 islands that lie 60 km west of Geraldton on WA’s mid-west coast. The waters surrounding the islands have special status as a Fish Habitat Protection Area for the conservation of fish, fish breeding areas and associated aquatic ecosystem, and are popular for aquatic tourism and recreational activities (DoF, 2015).

The Abrolhos lie in the southward-flowing Leeuwin Current, which funnels warm, low-nutrient, tropical water along the edge of the continental shelf, from the north of WA down the coast. The current carries larvae, eggs and juveniles of many species of corals and other marine life far south of their usual range. Water temperatures in the current are maintained throughout the winter at around 20 to 22 °C, enabling corals and tropical species of fish and invertebrates to thrive in latitudes where they normally would not survive (DoF, 2015).

Beagle Island Nature Reserve

The Beagle Islands Nature Reserve was gazetted in 1991 and covers ~45 ha. The Beagle Islands are a small group of islands located ~15 km from Leeman. They are at the northern end of the Turquoise Coast islands nature reserve group and home to the largest population of Australian sea lions in Western Australia.

Barrow Island Marine Park and Marine Management Area, Montebello Islands Marine Park

The Barrow Island Marine Park, the Barrow Island Marine Management Area and the Montebello Island Marine Park lie adjacent to one another and cover areas of approximately 42 km², 1,147 km², and 583 km² respectively (DEC, 2006). The Marine Parks and Marine Management Area comprise numerous low-lying limestone islands, islets and rocky stacks with intertidal and subtidal coral reefs, mangrove macroalgal communities and sheltered lagoons. Many of the islands are nature reserves such as Montebello Islands Conservation Park, Barrow Island Nature Reserve and Boodie, Double and Middle Islands Nature Reserve, and the Lowendal Islands Nature Reserve. The boundary of the majority of the island reserves extends to the low water mark and therefore the intertidal communities are part of these terrestrial reserves. The exception is the Lowendal Islands Nature Reserve, which extends to the high water mark (DEC, 2006).

The island group lies entirely within WA State waters, with the State-Commonwealth boundary extending out to encompass the islands and waters 3 nmi west of Barrow Island and north of the Montebello Islands. A summary of specific ecological values include:

- Foraging areas for seabirds and migratory shorebirds;
- Foraging areas for whale sharks;
- Aggregation and nesting sites for marine turtles;
- Includes part of the migratory pathway of the protected humpback whale;
- Feeding grounds for dugongs;
- Mangrove communities on the Montebello Islands are considered to be globally unique;
- Special purpose zones for commercial pearling; and
- Fringing coral reef communities.

Eighty Mile Beach Marine Park

The Eighty Mile Beach Marine Park, located between Port Hedland and Broome, was gazetted on 29 January 2013. It covers an area of approximately 200,000 ha stretching for some 220 km from Cape Missiessy to Cape Keraudren, and includes sanctuary, recreation, general use and special purpose zones. The park is managed under the Eighty Mile Beach Marine Park Management Plan 2014-2024 (DPaW, 2014).

The listed ecological values of the Eighty Mile Beach Marine Park include the high sediment and water quality, the juxtaposition of the beach, coastal topography and seabed and the diverse and ecologically important habitats and marine/coastal flora and fauna. The listed habitat values of the marine park are as follows:

- The intertidal sand and mudflat communities supporting a high abundance and diversity of invertebrate life and providing a valuable food source for shorebirds (including migratory species) and other fauna;
- The diverse subtidal filter-feeding communities;
- Macroalgal and seagrass communities providing habitat and feeding opportunities for fish, invertebrates and dugongs;
- High diversity intertidal and subtidal coral reef communities; and
- Mangrove communities and adjacent saltmarshes provide nutrients to the surrounding waters and habitat for fish and invertebrates.

The marine park contains vast intertidal sand and mudflats that extend up to 4 km wide at low tide and provide a rich source of food for many species. Eighty Mile Beach Marine Park is one of the world's most important feeding grounds for small wading birds that migrate to the area each summer, travelling from countries thousands of kilometres away (DPaW, 2014).

In addition to these natural values, the marine park contains land and sea important to traditional Indigenous owners through identity and place, family networks, spiritual practice and resource gathering. The marine park also has a history of European activity including exploration, pastoralism and commercial fishing (e.g. the pearl oyster fishery).

The park contains a historical WWII plane wreck (Dornier Do-24 X-36) and shipwrecks (two pearl luggers). The marine park provides tourism opportunity and recreational value through its remoteness, diversity and abundance of habitats and marine fauna and the pristine nature of the marine and coastal environment.

Great Sandy Island Nature Reserve

Great Sandy Island Nature Reserve protects more than 30 islands off the Pilbara coast within an area extending generally from about 15 km east of Cape Preston to the mouth of the Robe River, and ranging from approximately 10 to 35 km offshore. It does not, however, include the surrounding marine waters (Maunsell, 2005).

No formal management for the reserve has been prepared but the reserve provides valuable nesting sites for migratory birds which, because of their island location, are generally free from disturbance by introduced predators (Maunsell, 2005).

Jurien Bay Marine Park

The Jurien Bay Marine Park is located on the central west coast of WA about 200 km north of Perth. The marine park covers an area of 82,375 ha and begins south of Wedge Island (South Rocks) and runs to Dynamite Bay in Green Head. The Jurien Bay Marine Park was gazetted on 26 August 2003 as a Class A Marine Park.

The marine park is considered to be broadly representative of the Central West Coast limestone reef system, which is a major marine ecosystem within the bioregion. The marine biota of the area consists of an unusual mix of tropical and temperate species as well as many endemic species (CALM/MRPA, 2005b). The marine biota of the Jurien Bay region is dominated by five major marine habitat types: seagrass beds, bare or sparsely vegetated mobile sand; shoreline and offshore intertidal reef platforms; subtidal limestone reefs; and reef pavements (CALM/MRPA, 2005b). At least nine species of seagrass exist in the extensive seagrass meadows

in the marine park. Marine wildlife includes 14 species of cetaceans, a variety of seabirds and shorebirds which nest on the islands and the Australian sea lion – North Fisherman Island to the north of Jurien Bay is one of the main breeding sites for sea lions in the Central West Coast region, and it is believed this breeding population is genetically distinct from the southern coast population. Commercial fishing for western rock lobster as well as commercial wetlining, abalone, shark netting, beach seining for mullet and collecting of specimen shells and aquarium fish are carried out within the marine park (CALM//MRPA, 2005b).

Kalbarri Blue Holes Fish Habitat Protection Area

The Kalbarri Blue Holes Fish Habitat Protection Area (FHPA) is located immediately to the west of the town of Kalbarri and includes part of a near-shore limestone reef system, which stretches intermittently from Red Bluff in the South to the Murchison River Mouth in the North (DoF, 2004a).

The reef is accessible to the general public, and intensively used by locals and visitors to the Kalbarri area. The reef system is a popular recreational fishing site, particularly during summer months. Western Rock Lobster (*Panulirus cygnus*) and Roe's Abalone (*Haliotis roei*) are also removed in season in the vicinity by both recreational and commercial fishing licence holders. Other marine organisms, such as oysters are also opportunistically harvested (DoF, 2004a).

Lancelin Island Lagoon Fish Habitat Protection Area

Lancelin Island is an emergent limestone feature of the coastal marine environment of the mid-west coast of WA. The island is located at 31°00' 30" S and 115°18' 55" E, approximately 110 km North of Perth and 800 m offshore from the Lancelin town site. It is linked by intertidal and subtidal reef platforms to Edward Island to its south (DoF, 2001).

The Lancelin Island Lagoon is a small area of reef habitat on the western side of Lancelin Island and a popular snorkelling and diving destination. Water depth ranges from less than 0.3 m on the intertidal reefs to less than 3 m on the sand or seagrass-covered bottom. The area has a diverse array of benthic marine habitat (DoF, 2001). The Lancelin Island Lagoon FHPA encompasses the waters of the Indian Ocean to the west of the northern and southernmost points of Lancelin Island and extending to the seaward edge of the intertidal/subtidal reef platforms.

During a marine survey of the area, over 200 flora and fauna species were positively identified, with many more remaining unidentified due to the diversity of species supported in this marine environment.

The purposes of the Lancelin Island Lagoon FHPA are:

- The conservation and protection of fish, fish breeding areas, fish fossils or the aquatic ecosystem; and
- The management of fish and activities relating to the appreciation or observation of fish.

Marmion Marine Park

Marmion was the State's first marine park and was declared on 13 March 1987. Marmion Marine Park is offshore from Perth's northern suburbs between Trigg Island and Burns Beach. The marine park includes Mettams Pool, Hillarys Boat Harbour and Ocean Reef Boat Harbour. Marmion Marine Park consists of three zone types: 'no-take' sanctuary zones, Watermans Reef Observation Area and a general use zone.

The key species likely to be found in the waters of Marmion Marine Park include western rock lobster, abalone, dhufish, pink snapper, tailor, whiting, mulloway and Australian herring.

Miaboolya beach Fish Habitat Protection Area

Miaboolya Beach is an area of the Gascoyne River delta near Carnarvon. The Fish Habitat Protection Area (FHPA) covers the nearshore waters and extends north to South Bejaling and south to the northern side of the Gascoyne River mouth. In addition, it includes the adjoining mangrove system, associated seasonal creeks and salt marshes. Miaboolya beach is home to a rich array of species and habitats – including an important fish nursery. Popular with locals and tourists for recreational fishing, crabbing and swimming, it is also culturally significant to Aboriginal people. The nearshore waters of Miaboolya Beach are the only known nursery for tailor in the Gascoyne. At Miaboolya, you may also see mulloway, flathead, giant threadfin, goldspotted

rockcod, mangrove jack, western yellowfin bream, dart, yellowfin whiting and goldenline whiting – as well as crustaceans such as crabs, prawns and shrimp.

Muiron Islands Marine Management Area

The Muiron Islands Marine Management Area was established in 2004 and covers approximately 280 km². The area was designated to protect the waters surrounding South Muiron Island, North Muiron Island and Sunday Island. The Muiron Islands Marine management Area is also part of the Ningaloo Coast World Heritage Area.

The Muiron Islands are a continuation of the Cape Range Peninsula and are low dome-shaped, limestone islands separated by a deep navigable channel. The marine fauna and flora of the Muiron Islands are similar to that of the Ningaloo Reef; the western shores of the islands are characterised by limestone cliffs fronted by sandy beaches and intertidal rock platforms beyond which the seafloor slopes away to the shelf edge some 30 km seaward (CALM, 2005a). The Muiron Islands Marine Management Area contains a very diverse marine environment, with coral reefs, filter-feeding communities and macroalgal beds. The foreshores and nearshore reefs of the Muiron/Sunday Islands provide important aggregation and nesting areas for turtle populations. Four species of turtle (green, loggerhead, hawksbill and flatback) have been recorded nesting on the Muiron Islands (Rob *et al.*, 2019). The islands are also important seabird nesting areas.

Ngari Capes Marine Park

The Ngari Capes Marine Park is gazetted as a Class A Marine Park. The park is located off the southwest coast of WA, approximately 250 km south of Perth, covering approximately 123,790 ha. The seaward boundary of the marine park is congruent with the seaward limit of WA waters (3 nmi from the territorial baseline).

The marine park consists of four areas that are representative of the Leeuwin–Naturaliste marine bioregion: Geographe Bay; Cape Naturaliste to Cape Mentelle coast; the Cape Mentelle to Cape Leeuwin coast; and Flinders Bay. These areas show distinct differences in geomorphology, oceanography, habitats and flora and fauna.

The Ngari Capes Marine Park was identified as one of the most diverse temperate marine environments in Australia. Warm, tropical waters of the Leeuwin Current mix with the cool waters of the Capes Current, resulting in high finfish diversity, including tropical and temperate species and internationally significant seagrass diversity with seagrasses occurring at depths greater than 40 m.

The marine park also surrounds a number of islands that are important seabird nesting habitat and pinniped haul-outs, including Hamelin Island, Sugarloaf Rock and the Saint Alouarn Islands which include Flinders Island, Seal Island and Square Rock (DEC, 2013). The marine park is also adjacent to the Leeuwin Naturaliste National Park which extends to the high water mark (DEC, 2013).

The Ngari Capes Marine Park was also created for its high social values. The unique geographical location of this region exposes it to large, uninterrupted ocean swells and results in the South West capes area being recognised as one of the world's premier surfing regions. Many activities occurring in the region are marine based, including commercial and recreational fishing, swimming, surfing, diving, snorkelling, boating, and marine nature-based tourism.

Ningaloo Marine Park

The Ningaloo Marine Park and the Muiron Islands Marine Management Area are the marine conservation areas closest in distance to the operational area. The Ningaloo Marine Park was originally declared in 1987 and in June 2011 became part of the World Heritage listed Ningaloo Coast (refer to Section 4.5.2). The marine is a multiple-use marine park that stretches approximately 300 km along the west coast of the Cape Range Peninsula near Exmouth, WA from Bundegi in the north to Red Bluff in the south. The marine park consists of both State and Commonwealth Waters, which are declared under Western Australian and Commonwealth legislation. The combined State and Commonwealth waters of the marine park cover a total area of 5,070 km².

The marine park provides habitat for a diverse range of marine species including over 200 species of corals, over 460 species of reef fish, as well as populations of marine turtles, manta rays, sharks, whale sharks, dugongs, dolphins, and whales. Intertidal systems such as rocky shores, sandy beaches, estuaries, and mangroves are also found within the marine park. The most dominant marine habitat is the Ningaloo Reef comprising a mosaic of substrata that includes hard coral, macroalgae, turfing algae, limestone pavement and sand.

Nyangumarta Warram Indigenous Protected Area

In 2015 a dedication ceremony was held to signify the establishment of the Indigenous Protected Area (IPA) for the Nyangumarta People. The Nyangumarta IPA covers about 28,420 km² and is managed by the Nyangumarta Rangers according to IUCN standards. The IPA is situated in the southern part of the Canning Basin and encompasses a range of diverse habitats. It extends some 310 km inland to the east through the Great Sandy Desert from the coastline of the Indian Ocean at Eighty Mile Beach.

See Eighty Mile Beach Marine Park for further conservation values.

Point Quobba Fish Habitat Protection Area

The Point Quobba FHPA adjoins the well-known 'Blowholes' tourist attraction at Quobba Station, 75 km north-west of Carnarvon WA, at the northernmost point of Shark Bay (DoF, 2004b). The marine habitat at Point Quobba is located in a transition zone between tropical and temperate climatic zones, and is therefore highly diverse. It contains a mix of endemic temperate south-west Australian species and tropical and temperate Indo-Pacific species.

The Point Quobba coral reef and lagoon provides a good example of a sheltered near-shore reef. It is considered to have a high conservation value by virtue of the protection of the reef platform area within the existing Section 43 fisheries closure proclaimed in 1987, which prohibits the taking of all fish and aquatic organisms except for oysters (by hand) (Dof, 2004b).

Rowley Shoals Marine Park

Rowley Shoals Marine Park is at the edge of the continental shelf, approximately 260 km west northwest of Broome. The marine park protects two reefs (Clerke Reef and Imperieuse Reef) that make up a chain of three coral atolls at the edge of the continental shelf. The nearby Mermaid Reef lies within a Commonwealth marine reserve and is managed under Commonwealth legislation (DPIRD, 2020a). Each reef covers around 80 to 90 km² and rises with near-vertical sides from very deep water. At high tide, the reefs disappear beneath the sea, with only the sandy islands of Clerke and Imperieuse visible (DPaW, 2020a).

Scott Reef Nature Reserve

Scott Reef is a large, emergent shelf atoll located on the edge of the broad continental shelf, about 300 km from mainland north-western Australia. The listing comprises the areas of Scott Reef that are within Commonwealth waters to the 50 m bathymetric contour. This includes North Reef, an annular reef, 16.3 km long and 14.4 km wide; and parts of the lagoon of South Reef, a crescent shaped reef 17 km across (DSEWPaC, 2012d).

This place is regionally significant both because of its high representation of species not found in coastal waters off WA and for the unusual nature of its fauna which has affinities with the oceanic reef habitats of the Indo-west Pacific as well as the reefs of the Indonesian region (DSEWPaC, 2012d).

Shark Bay Marine Park

The Shark Bay Marine Reserves comprise the Shark Bay Marine Park and the Hamelin Pool Marine Nature Reserve, both of which lie within the Shark Bay World Heritage Area (see previous Section 4.5.2). The Shark Bay Marine Park was gazetted on 30 November 1990 as a Class A Marine Park Reserve No. 7 and vested in the National Park and Nature Conservation Authority (NPNCA) under *the Conservation and Land Management Act 1984* (CALM Act). The marine park covers an area of 748,725 hectares (CALM, 1996).

Shark Bay is renowned for its marine fauna. It is located near the northern limit of a transition region between temperate and tropical marine fauna. Of the 323 fish species recorded from Shark Bay, 83% are tropical with 11% warm temperate and 6% cool temperate species. Similarly, of the 218 species of bivalve molluscs recorded in Shark Bay, 75% have a tropical range and 10% a southern Australian range, with 15% being endemic to the west coast (CALM, 1996).

Key conservation values of the marine park include (CALM, 1996):

- High diversity (12 species) of seagrass, with the 1,030 km² Wooramel seagrass bank being the largest known structure of its type in the world;
- A dugong population estimated in the region of 10,000, one of the largest populations in the world;

- Staging post for humpback whales during their migration along the west coast;
- Important nesting sites for green and loggerhead turtles, with Dirk Hartog Island providing the most important nesting site for loggerheads in WA;
- Major nursery area for commercially important fish resources;
- Rich birdlife with a high occurrence of migratory and breeding seabirds;
- Supports significant populations of sharks, rays and seasnakes; and
- Hamelin Pool in Shark Bay contains the most diverse and abundant examples of stromatolite forms in the world, representative of life-forms which lived some 3,500 million years ago.

Shoalwater Island Marine Park

Shoalwater Islands Marine Park is 50 km south of Perth (near Rockingham) and includes Shoalwater Bay and Warnbro Sound. The marine park surrounds a chain of limestone islands, including Penguin Island. Shoalwater Islands Marine Park consists of four zone types: 'no-take' sanctuary zones, a special purpose (wildlife protection) zone, a special purpose (scientific reference) zone and a general use zone. Shoalwater Islands Marine Park is a place where penguins, sea lions, dolphins, rocky reefs, seagrass and shipwrecks converge. The key species likely to be found in the waters of Shoalwater Islands Marine Park include western rock lobster, blue swimmer crabs, abalone, pink snapper, King George whiting, flathead, mulloway, tailor, tarwhine, sand whiting, Australian herring, squid and octopus.

Thevenard Island Nature Reserve

Thevenard Island is classified as a class C nature reserve, and covers an area of approximately 550 ha (EPA, 2003). It is surrounded by limestone reefs and platforms, with diverse coral assemblages on the northern side. The benthic marine environment within the Thevenard Island area is broadly characterised by five intertidal and subtidal habitats (sandy beaches, intertidal limestone pavement, subtidal limestone pavement, coral communities, and subtidal sand).

Four species of marine turtle (green, loggerhead, hawksbill and flatback) have major nesting sites on Thevenard Island, and use the surrounding waters for foraging (DSEWPaC, 2012b).

Walpole and Nornalup Inlets Marine Park

The Walpole and Nornalup Inlets Marine Park was gazetted on 8 May 2009 as a Class A reserve. The marine park is located approximately 450 km south of Perth on the south coast of Western Australia. It is a discrete estuarine system, comprising both the Walpole and Nornalup inlets and the tidal reaches of the Frankland, Deep and Walpole rivers, covering an area of approximately 1442 ha (DEC, 2009).

The waters of the marine park support seagrasses and algae, a diverse benthic fauna, at least 40 marine and estuarine fish species and a variety of waterbirds, seabirds and shorebirds. The marine park is geologically complex, forming an estuary consisting of two connected inlets that are permanently open to the sea (DEC, 2009).

Shorelines of the Walpole and Nornalup inlet system comprise rocky shores, sandy beaches and a variety of vegetation assemblages. The inlet system is biologically diverse compared to most estuaries in south-west WA because it is permanently open to the ocean and maintains marine-like conditions for most of the year. The inlet basins, which are dominated by mud and sand flats with some rocky shallows support ephemeral seagrasses and numerous species of algae. Polychaetes, crustaceans and molluscs dominate the relatively rich benthic invertebrate fauna.

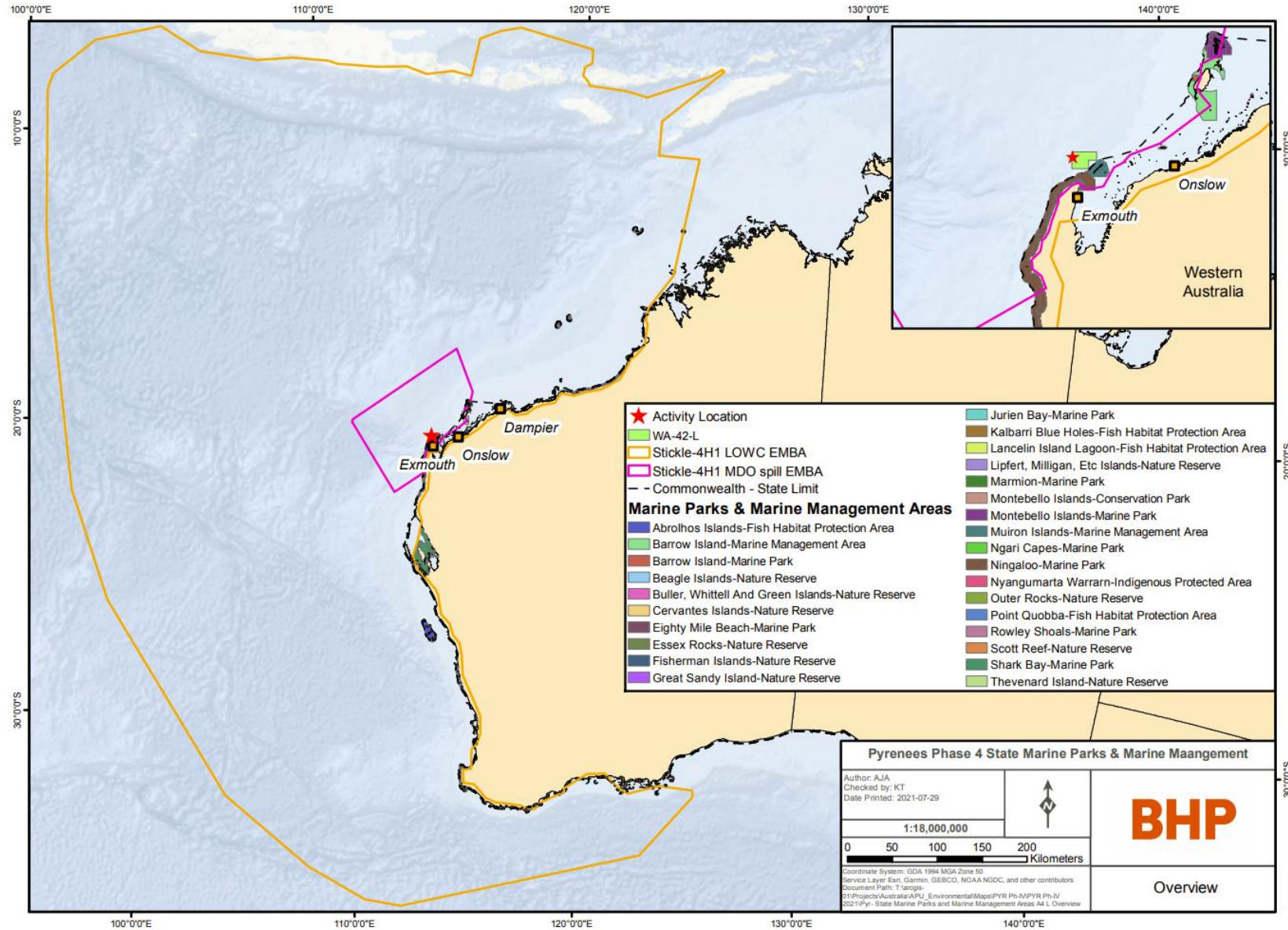


Figure 4-20: State marine reserves and marine management areas within the EMBA

4.10.3 Key Ecological Features

KEFs are areas of regional importance for either biodiversity or ecosystem function and integrity within the Commonwealth marine environment and have been identified through the marine bioregional planning process (DSEWPaC, 2012b). KEFs meet one or more of the following criteria:

- A species, group of species or a community with a regionally important ecological role (e.g. a predator, prey that affects a large biomass or number of other marine species);
- A species, group of species or a community that is nationally or regionally important for biodiversity;
- An area or habitat that is nationally or regionally important for:
 - enhanced or high productivity (such as predictable upwellings - an upwelling occurs when cold nutrient-rich waters from the bottom of the ocean rise to the surface);
 - aggregations of marine life (such as feeding, resting, breeding or nursery areas);
 - biodiversity and endemism (species which only occur in a specific area); or;
- A unique seafloor feature, with known or presumed ecological properties of regional significance.

One KEF overlaps the operational area and 23 and 21 KEFs have boundaries that lie within the low and moderate EMBA (Table 4-19 and Figure 4-21). Information on the relevant KEFs has been extracted DSEWPaC (2012b; 2012c) and is summarised below.

Table 4-19: Key ecological features within the EMBA

Value / Sensitivity	Approx. closest distance to Operational Area	EMBA		
		Operational area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
North-West Marine Region				
Ancient coastline at 125-m depth contour	10 km	x	✓	✓
Ashmore Reef and Cartier Island and surrounding Commonwealth waters	1,383 km	x	✓	✓
Canyons linking the Argo Abyssal Plain and Scott Plateau	220 km	x	✓	✓
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	Overlaps with operational area	✓	✓	✓
Continental slope demersal fish communities	3 km	x	✓	✓
Commonwealth waters adjacent to Ningaloo Reef	13 km	x	✓	✓
Exmouth Plateau	87 km	x	✓	✓
Glomar Shoals	340 km	x	✓	✓
Mermaid Reef and Commonwealth waters surrounding Rowley Shoals	632 km	x	✓	✓
Seringapatam Reef and Commonwealth waters in the Scott Reef complex	1,132 km	x	✓	✓
Wallaby Saddle	500 km	x	✓	✓
South-West Marine Region				
Albany Canyons group and adjacent shelf break	1,515 km	x	✓	✓

Value / Sensitivity	Approx. closest distance to Operational Area	EMBA		
		Operational area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold
Ancient coastline at 90-120 m depth	680 km	x	✓	✓
Cape Mentelle upwelling	1,321 km	x	✓	✓
Commonwealth marine environment surrounding the Houtman Abrolhos Islands	720 km	x	✓	✓
Commonwealth marine environment surrounding the Recherche Archipelago	1,551 km	x	x	✓
Commonwealth marine environment within and adjacent to Geographe Bay	1,302 km	x	✓	✓
Commonwealth marine environment within and adjacent to the west coast inshore lagoons	725 km	x	✓	✓
Diamantina Fracture Zone	1,582 km	x	x	✓
Naturaliste Plateau	1,310 km	x	✓	✓
Perth Canyon and adjacent shelf break, and other west coast canyons	710 km	x	✓	✓
Western demersal slope and associated fish communities	480 km	x	✓	✓
Western rock lobster	680 km	x	✓	✓

Ancient Coastline at the 125-m Depth Contour

This KEF is recognised for its biodiversity values (unique seafloor feature with ecological properties of regional significance), which apply to both the benthic and pelagic habitats within the KEF. The shelf of the North West Marine Region contain several terraces and steps that reflect increases in sea level across the shelf that occurred during the Holocene period. The most prominent of these occurs episodically as an escarpment through the North West Shelf Province and the North West Shelf Transition, at a depth of approximately 125 m.

Parts of the ancient coastline, particularly where it exists as a rocky escarpment, are thought to provide biologically important habitats in areas otherwise dominated by soft sediments. Little is known about fauna associated with the hard substrate of the escarpment but it is likely to include sponges, corals, crinoids, molluscs, echinoderms and other benthic invertebrates representative of hard substrate fauna in the North West Shelf bioregion.

The topographic complexity of the escarpment may also facilitate vertical mixing of the water column, providing relatively nutrient-rich local environments. Enhanced productivity may also attract opportunistic feeding by larger marine life including humpback whales, whale sharks and large pelagic fish.

Ashmore Reef and Cartier Island and surrounding Commonwealth waters

Ashmore Reef and Cartier Island and surrounding Commonwealth waters are defined as a KEF for their high productivity, biodiversity and aggregation of marine life, in both the benthic and pelagic habitats within this feature (DAWE, 2020a).

Ashmore Reef and Cartier Island are situated on the shallow upper slope of the Sahul Shelf, north of Scott and Seringapatam reefs. Rising from a depth of more than 100 m, the Ashmore reef platform is at the edge of the NWS and covers an area of 239 km², and the Ashmore Reef Commonwealth Marine Reserve encloses an area of about 583 km² of seabed (DAWE, 2020a).

Cartier Island Marine Reserve is located in the West Sahul region of the Indian Ocean. It contains one unvegetated sand cay and mature reef flat with two shallow pools to the north-east of the cay and covers 167 km² (DAWE, 2020a).

Sandy beaches provide important habitat for nesting green and hawksbill turtles throughout the year. Seagrass present at Ashmore Reef provides critical breeding (April–May) and foraging (throughout the year) habitat for a genetically distinct population of dugong with their range probably extending to other submerged shoals within the area (DAWE, 2020a).

The emergent habitat at Ashmore also provides important nesting sites for seabirds, many of which are migratory. Ashmore's islands are regarded as supporting some of the most important seabird rookeries on the NWS seasonally supporting up to 50,000 seabirds (26 species) and up to 2,000 waders (30 species, representing almost 70% of wader species that regularly migrate to Australia) (DAWE, 2020a).

Large colonies of sooty terns, crested terns, bridled terns and common noddies breed on the east and middle islands. Smaller breeding colonies of little egrets, eastern reef egrets, black noddies and possibly lesser noddies also occur. Migratory wading birds include eastern curlews, ruddy turnstones, whimbrels, bar-tailed godwits, common sandpipers, Mongolian plovers, red-necked stints and tattlers, during October–November and March–April as part of the migration between Australia and the Northern Hemisphere (DAWE, 2020a).

Canyons Linking the Argo Abyssal Plain and Scott Plateau

The spatial boundary of this KEF includes the three canyons, adjacent to the south-west corner of Scott Plateau. They are defined as a KEF for their high productivity and aggregations of marine life (DAWE, 2020a). These values apply to both the benthic and pelagic habitats within the feature.

The canyons cut deeply into the south-west margin of the Scott Plateau at an approximate depth of 2,000–3,000 m, and act as conduits for transport of sediments to depths of more than 5500 metres on the Argo Abyssal Plain. The water masses at these depths are deep Indian Ocean water on the Scott Plateau and Antarctic bottom water on the Argo Abyssal Plain. Both water masses are cold, dense and nutrient-rich (DAWE, 2020a).

Canyons Linking the Cuvier Abyssal Plain and the Cape Range Peninsula

This KEF is recognised for its biodiversity values (unique sea-floor feature with ecological properties of regional significance), which apply to both the benthic and pelagic habitats within the KEF. The canyons are associated with upwelling as they channel deep water from the Cuvier Abyssal Plain onto the slope. This nutrient-rich and cooler waters interact with the Leeuwin Current at the canyon heads. Thus the canyons probably play a part in the enhanced productivity of the Ningaloo Reef system.

The canyons are also repositories for organic and inorganic particulate matter from the shelf and serve as conduits for its transfer from the surface and shelf to greater depths. Aggregations of whale sharks, manta rays, large predatory fish and seabirds are known to occur in the area.

Continental Slope Demersal Fish Communities

This species assemblage is recognised as a KEF because of its biodiversity values, including high levels of endemism. The diversity of demersal fish assemblages on the continental slope in the Timor Province, the Northwest Transition and the Northwest Province is high compared to elsewhere along the continental slope. The continental slope between North West Cape and the Montebello Trough has more than 500 fish species, 76 of which are endemic, making it the most diverse slope bioregion in Australia. The demersal fish species occupy two distinct demersal community types associated with the upper slope (water depth of 225–500 m) and the mid slope (750–1,000 m).

Commonwealth Waters adjacent to Ningaloo Reef

This KEF is recognised for its biodiversity (aggregations of marine life) values, which apply to both the benthic and pelagic habitats within the KEF. The Commonwealth waters adjacent to Ningaloo reef include Ningaloo Marine Park (Commonwealth waters) covering an area of 2,435 km². This feature lies adjacent to the Ningaloo Reef State waters margin at the 3 nautical mile limit. Ningaloo Reef is globally significant as the only extensive coral reef in the world that fringes the west coast of a continent. Upwellings associated with canyons on the adjacent slope and interactions between the Ningaloo and Leeuwin currents result in areas of enhanced productivity in the Commonwealth waters adjacent to Ningaloo Reef.

Shelf waters and nutrient-rich upwellings support aggregations and migration pathways of whale sharks, manta rays, humpback whales, seasnakes, sharks, large predatory fish and seabirds. Deepwater biodiversity includes fish, molluscs, sponges, soft corals and gorgonian corals.

Exmouth Plateau

This KEF is recognised for its biodiversity values (unique sea-floor feature with ecological properties of regional significance), which apply to both the benthic and pelagic habitats within the KEF.

The Exmouth Plateau is located in the North West Province and covers an area of 49,310 km² in water depths ranging from 800 m to 4,000 m. The Exmouth Plateau is a regionally and nationally unique deep-sea plateau in tropical waters. The plateau is a large topographic obstacle that may modify the flow of deep waters, generating internal tides and may contribute to upwelling of nutrients, thus serving an important ecological role.

Glomar Shoals

The Glomar Shoals are a submerged littoral feature located approximately 150 km north of Dampier on the Rowley Shelf at water depths of 33–77 m. The shoals consist of a high percentage of marine-derived sediments with high carbonate content and gravels of weathered coralline algae and shells. The area's higher concentrations of coarse material compared to surrounding areas are indicative of a high energy environment subject to strong seafloor currents.

Biological communities found at the Glomar Shoals have not been comprehensively studied; however, the shoals are known to be an important area for a number of commercial and recreational fish species such as rankin cod, brown striped snapper, red emperor, crimson snapper, bream and yellow-spotted triggerfish. High catch rates for these species indicate that the shoals are an area of high productivity.

The Glomar Shoals are regionally important for their potentially high biological diversity and high localised productivity. Biological data specific to the Glomar Shoals is limited, however the fish of the shoals are probably a subset of reef-dependent species and anecdotal evidence suggests they are particularly abundant.

Mermaid Reef and Commonwealth Waters surrounding Rowley Shoals

The Mermaid Reef and Commonwealth waters surrounding Rowley Shoals is defined as a KEF for its enhanced productivity and high species richness, that apply to both the benthic and pelagic habitats within the feature. The Rowley Shoals are a collection of three atoll reefs, Clerke, Imperieuse and Mermaid, which are located about 300 km northwest of Broome. This KEF encompasses Mermaid Reef Commonwealth Marine Reserve as well as waters from 3 nmi out to 6 nmi surrounding Clerke and Imperieuse reefs (DAWE, 2020a). Mermaid Reef lies 29 km north of Clerke and Imperieuse reefs and is totally submerged at high tide. Mermaid Reef falls under Commonwealth jurisdiction. Clerke and Imperieuse reefs constitute the Rowley Shoals Marine Park, which falls under WA Government jurisdiction (DAWE, 2020a).

Mermaid Reef and Commonwealth waters surrounding Rowley Shoals are regionally important in supporting high species richness, higher productivity and aggregations of marine life associated with the adjoining reefs themselves (Done *et al.*, 1994). The reefs provide a distinctive biophysical environment in the region as there are few offshore reefs in the northwest. They have steep and distinct reef slopes and associated fish communities. In evolutionary terms, the reefs may play a role in supplying coral and fish larvae to reefs further south via the southward flowing Indonesian Throughflow. Both coral communities and fish assemblages differ from similar habitats in eastern Australia (Done *et al.*, 1994).

Seringapatam Reef and Commonwealth Waters in the Scott Reef Complex

The Seringapatam reef and Commonwealth waters in the Scott reef complex are defined as a KEF as they support diverse aggregations of marine life, have high primary productivity relative to other parts of the region, are relatively pristine and have high species richness, which apply to both the benthic and pelagic habitats within the feature (DAWE, 2020a).

Scott and Seringapatam reefs are part of a series of submerged reef platforms that rise steeply from the sea floor between the 300–700 m contours on the northwest continental slope and lie in the Timor Province (Falkner *et al.*, 2009). Scott and Seringapatam reefs provide an important biophysical environment in the region as one of few offshore reefs in the northwest. The spatial boundary of this KEF includes both reefs plus the adjacent apron/fan features, and the canyon approximately 10 km to the west of Scott Reef. The southern edge of the KEF is defined by the state water boundary around Scott Reef (DAWE, 2020a).

As two of the few offshore reefs in the north-west, they provide an important biophysical environment in the region (DAWE, 2020a). The coral communities at Scott and Seringapatam reefs play a key role in maintaining the species richness and subsequent aggregations of marine life. Scott and Seringapatam reefs and the waters surrounding them attract aggregations of marine life including humpback whales and other cetacean species, whale sharks and several species of sea snake. Two species of marine turtle nest and forage during the summer months, and this KEF also provides foraging areas for various seabird species (DAWE, 2020a).

Wallaby Saddle

The Wallaby Saddle is defined as a KEF for its high productivity and aggregations of marine life. The Wallaby Saddle is an abyssal geomorphic feature covering an area of 7,880 km² of seafloor located on the upper continental slope at a depth of 4,000–4,700 m. The feature connects the north-west margin of the Wallaby Plateau with the margin of the Carnarvon Terrace. It is located within the Indian Ocean water mass and is thus differentiated from systems to the north that are dominated by transitional fronts or the Indonesian Throughflow. Little is known about the Wallaby Saddle; however, the area is considered one of enhanced productivity and low habitat diversity. Historical sperm whale aggregations may be attributable to higher productivity and aggregations of baitfish.

Albany Canyons Group and Adjacent Shelf Break

The Albany canyon group is immediately adjacent to and interacts with a large section of the continental shelf break (DAWE, 2020a) and is defined as a KEF for its high productivity, aggregations of marine life, and as a unique seafloor feature with ecological properties of regional significance. Both benthic and demersal habitats within the feature are of conservation value (DAWE, 2020a).

The Albany canyon group is immediately adjacent to, and interacts with, a large section of continental shelf break. The area is thought to be associated with small, periodic subsurface upwelling events that may drive localised regions of high productivity, contributing to the ecological functioning and integrity of this area (DAWE, 2020a).

The canyons are known to be a feeding area for the sperm whale and sites of orange roughy aggregations. Anecdotal evidence also indicates that this area supports fish aggregations that attract large predatory fish, sharks, and toothed, deep-diving whales such as sperm whale (DAWE, 2020a).

Ancient Coastline between 90 and 120 m Depth

The continental shelf of the South-West Marine Region contains several terraces and steps, reflecting a gradual increase in sea level across the shelf that occurred during the Holocene period. Some of these features occur as escarpments of varying elevation and distinctness, creating topographic complexity through the exposure of rocky substrates, that may facilitate small, localised upwellings, benthic biodiversity and enhanced biological productivity.

While the ancient coastline is present throughout the region, it is particularly evident in the western Great Australian Bight at a depth of 90-120 m. Parts of this ancient coastline may support some demersal fish species travelling across the continental shelf to the upper continental slope, thereby supporting ecological connectivity. The feature provides a complex habitat for a number of species including sponge communities of significant biodiversity and structural complexity.

Cape Mentelle Upwelling

The Cape Mentelle upwelling is defined as a KEF for its high productivity and aggregation soft marine life (DAWE, 2020a). It draws relatively nutrient-rich water from the base of the Leeuwin Current, up the continental slope and onto the inner continental shelf, where it results in phytoplankton blooms at the surface (DAWE, 2020a).

The phytoplankton blooms provide the basis for an extended food chain characterised by feeding aggregations of small pelagic fish, larger predatory fish, seabirds, dolphins and sharks. The Cape Mentelle upwelling has a disproportionate influence on the overall-nutrient poor nature of the region's water (DAWE, 2020a).

Commonwealth Marine Environment surrounding the Houtman Abrolhos Islands

The Commonwealth marine environment surrounding the Houtman Abrolhos Islands (and adjacent shelf break) KEF is defined for its high biodiversity and endemism in benthic and pelagic habitats. The Houtman Abrolhos Islands and surrounding reefs support a mix of temperate and tropical species, resulting from the

southward transport of species by the Leeuwin Current over thousands of years. The reefs are composed of 184 known species of corals that support in the region of 400 species of demersal fish, 492 known species of molluscs, 110 species of sponges, 172 species of echinoderms and 234 species of benthic algae. The Houtman Abrolhos Islands are the largest seabird breeding area in the eastern Indian Ocean, supporting more than one million breeding pairs. The Houtman Abrolhos Islands are the northern-most breeding site of the Australian sea lion.

Commonwealth Marine Environment within and adjacent to Geographe Bay

Geographe Bay is a large, shallow (< 30 m deep), sheltered bay that encompasses a wide curve of the Western Australian coastline extending from Cape Naturaliste to Bunbury. The Commonwealth marine environment within and adjacent to Geographe Bay is defined as a key ecological feature for its high productivity and aggregations of marine life, and high levels of biodiversity and endemism. These values apply to both the benthic and pelagic habitats within the feature. Largely based on information available on the extent of seagrass in Geographe Bay. The seaward boundary extends from commonwealth waters north of Cape Naturaliste (in about 40 m depth), easterly to the 30 m depth contour, then northeasterly along the 30 m contour before following a line towards the coastal water limit off Point Casuarina (the northern extent of Geographe Bay).

Commonwealth Marine Environment within and adjacent to West Coast Inshore Lagoons

This feature consists of a chain of inshore lagoons that extend along the WA coast from south of Mandurah to Kalbarri. The lagoons are formed by distinct ridges of north-south oriented limestone reef with extensive beds of macroalgae (principally *Ecklonia* spp.) and seagrass, and extend between 0-30 m water depth. The seagrass provides important habitat for many marine species, and epiphytes are the main food source in the lagoonal system. Although macroalgae and seagrass appear to be the primary source of production, it is believed that groundwater enrichment may supplement the supply of nutrients to the lagoons.

The lagoons are associated with high biodiversity and endemism, containing a mix of tropical, subtropical and temperate flora and fauna. Emergent reefs and small islands create a diverse topography, and the mix of sheltered and exposed seabeds form a complex mosaic of habitats. The inshore lagoons are important areas for the recruitment of the commercially and recreationally important western rock lobster, dhufish, pink snapper, breaksea cod, baldchin and blue gropers, abalone and many other reef species. Extensive schools of migratory fish visit the area annually, including herring, garfish, tailor and Australian salmon.

This feature is recognised as a habitat that is nationally or regionally important for high benthic productivity and for aggregations of marine life. Both benthic and pelagic habitats within the feature are of conservation value.

Naturaliste Plateau

The Naturaliste Plateau is defined as a KEF for its unique seafloor feature with ecological properties of regional significance (DAWE, 2020a). The Naturaliste Plateau is Australia's deepest temperate marginal plateau and occurs an area where numerous water bodies and currents converge. It is also the only seafloor feature in the region that interacts with the subtropical convergence front (DAWE, 2020a). Although there is very little known about the marine life of the plateau, it is speculated that the combination of its structural complexity, mixed water dynamics and relative isolation indicate that it supports deep-water communities with high species diversity and endemism (DAWE, 2020a).

The Plateau acts as an underwater 'biogeographical island' on the edge of the abyssal plain, providing habitat for fauna unique to these depths. The Plateau is also within a deep eddy field that is thought to be associated with high productivity and aggregations of marine life (DAWE, 2020a). Proximity to the nearby subtropical convergence front is thought to have a significant influence on the biodiversity of the Plateau (DAWE, 2020a).

Perth Canyon and Adjacent Shelf Break, and other West Coast Canyons

The Perth Canyon is defined as a KEF for its high biological productivity and aggregations of marine life and unique seafloor features with ecological properties of regional significance. The Perth Canyon is long, deep, narrow and steep-sided, cutting 4 km into the continental shelf; it is the largest canyon on the Australian margin. In the Perth Canyon, interactions between the canyon topography and the Leeuwin Current induce clockwise-rotating eddies that transport nutrients upwards in the water column from greater depths. Due to the canyon's depth and Leeuwin Current's barrier effect, this remains a subsurface upwelling (depths greater than 400 m),

which supports ecological complexity that is typically absent from canyon systems in other areas. This nutrient-rich cold water habitat attracts feeding aggregations of deep-diving mammals, such as pygmy blue whales and large predatory fish that feed on aggregations of small fish, krill and squid. The Perth Canyon also marks the southern boundary for numerous tropical species groups on the shelf, including sponges, corals, decapods and xanthid crabs.

Western Demersal Slope and Associated Fish Communities of the Central Western Province

The western continental slope provides important habitat for demersal fish communities, with a high level of diversity and endemism. Its diversity is attributed to the overlap of ancient and extensive Indo-west pacific and temperate Australasian fauna.

Records of 480 species of demersal fish that inhabit the slope have been described, and 31 of these are considered endemic to the bioregion. A diverse assemblage of demersal fish species below a depth of 400 m is dominated by relatively small benthic species such as grenadiers, dogfish and cucumber fish. Unlike other slope fish communities in Australia, many of these species display unique physical adaptations to feed on the sea floor (such as a mouth position adapted to bottom feeding), and many do not appear to migrate vertically in their daily feeding habits.

Western Rock Lobster

The Western Rock Lobster KEF is defined due to its presumed ecological role on the west coast continental shelf. The western rock lobster is the dominant large benthic invertebrate in the region and plays an important trophic role in many of the inshore ecosystems of the South-west Marine Region. The species is an important part of the food web on the inner shelf, particularly as juveniles are important prey items of a range of species including octopus, cuttlefish, baldchin groper, dhufish, pink snapper, wirrah cod, breaksea cod and Australian sea lions. The high biomass of western rock lobster, combined with its vulnerability to predation particularly during their seasonal moults in November-December, suggests that they are an important trophic pathway for a range of inshore species that prey upon juvenile lobsters.

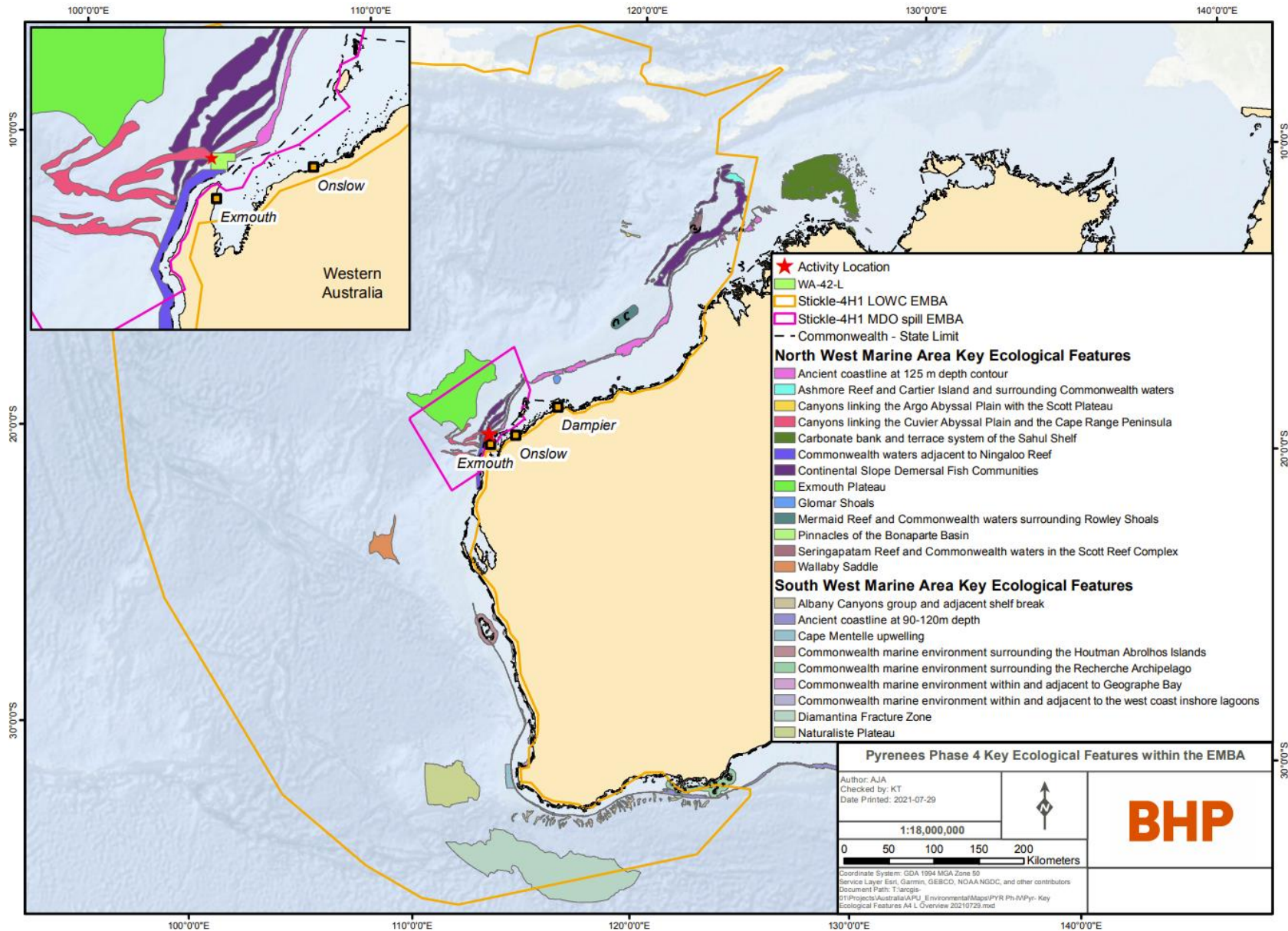


Figure 4-21: Key ecological features within the EMBA

4.11 Socio-Economic Values and Sensitivities

4.11.1 Cultural Heritage

Indigenous Heritage

Aboriginal sites are of immense cultural, scientific, educational and historic interest and provides an important connection between Aboriginal people and their present and future culture. The Indigenous peoples have ongoing relationship with coastal and marine environments and resources as part of cultural identity, health, wellbeing, and domestic and commercial economies (DEWHA, 2008a). Ongoing connections are demonstrated through fishing, hunting and the maintenance of maritime cultures and heritage through ritual, stories and application of traditional knowledge. Although direct use of deeper offshore waters is limited, direct cultural interest in decisions affecting the management of these waters exists.

Barrow Island, Montebello Islands, Exmouth, Ningaloo Reef, the Kimberley Coast, Eighty Mile Beach as well as the South West and the adjacent foreshores that are within the EMBA, have a long history of occupancy by Indigenous communities. A search through the Aboriginal Heritage Inquiry System (AHIS) determined that the coastal areas of the EMBA overlap with multiple registered Aboriginal Heritage Sites (DPLH, 2020). Aboriginal heritage sites in WA are protected under the *Aboriginal Heritage Act 1972*, whether or not they are registered with the Department of Planning, Lands and Heritage. While sea country is a recognised value, the registered site list contains only land-based sites. Areas that are covered by registered native title claims are likely to practice indigenous fishing techniques at various sections of the WA coastline.

Indigenous Protected Areas (IPA) are a component of the National Reserve System, which is the formally recognised parks, reserves and protected areas across Australia. IPAs are areas of land and sea country owned or managed by Indigenous groups, which are voluntarily managed as a protected area for biodiversity conservation through an agreement with the Australian Government. The following IPAs intersect the EMBA:

- The Karajarri IPA covers nearly 25,000 km² of land in the southern Kimberley. The IPA lies south of Broome and comprises extensive coastlines, tidal creeks and wetlands as well as arid country that stretches into the Great Sandy Desert (NIAA, 2020).
- The Nyangumarta Warrarn IPA extends across four areas, totalling 28,675 km²: Proposed Walyarta Conservation Reserve, Proposed Kujungurru Warrarn Conservation Reserve Area, the Great Sandy Desert and Eighty Mile Beach Marine Park (NIAA, 2020)

Underwater Cultural Heritage

The *Underwater Cultural Heritage Act 2018* protects Australia's underwater cultural heritage including shipwrecks, sunken aircraft and other types of underwater heritage. Under this Act, shipwrecks, sunken aircraft and their associated artefacts older than 75 years are protected. Shipwrecks dating pre-1900 are protected under the *Maritime Archaeology Act 1973*. There are numerous (>1,500) known shipwreck and historic (>75 years old) shipwreck (1189) and sunken aircraft sites listed to occur within Commonwealth waters offshore WA, as listed in the Australasian Underwater Cultural Heritage Database.

A search of the Underwater Cultural Heritage database was undertaken to identify any known shipwrecks protected under the *Underwater Cultural Heritage Act 2018*. There are no known historic shipwrecks within the operational area. The Australasian Underwater Cultural Heritage Database² identified numerous shipwrecks and 10 sunken aircraft sites within the moderate EMBA. Notable Underwater Cultural Heritage sites have been described further in Section 4.5 which describes Matters of National Environmental Significance and include:

- Batavia Shipwreck Site, south-west corner of the Morning Reef in the Wallabi group of the Houtman Abrolhos
- HMAS Sydney II and HSK Kormoran Shipwreck Sites (1941), Carnarvon

² Australasian Underwater Cultural Heritage Database on the Department of Agriculture, Water and the Environment website

In addition to the general protection provided to underwater heritage sites, the *Underwater Cultural Heritage Act 2018* also provides that an area containing protected underwater heritage may be declared to be a protected zone. These zones may be established for a number of reasons including conservation, management or public safety considerations. For example, sites may contain unexploded military ordnance or unstable structures; or require active management because the underwater heritage and its environment are particularly fragile or sensitive. Figure 4-22 shows Australian locations of Underwater Cultural Heritage Shipwreck Protected Zones. No Underwater Cultural Heritage Shipwreck Protected Zones overlap operational area, however the following occur within the moderate EMBA:

- HSK Kormoran and HMAS Sydney II (1941)
- Zuytdorp (1712)

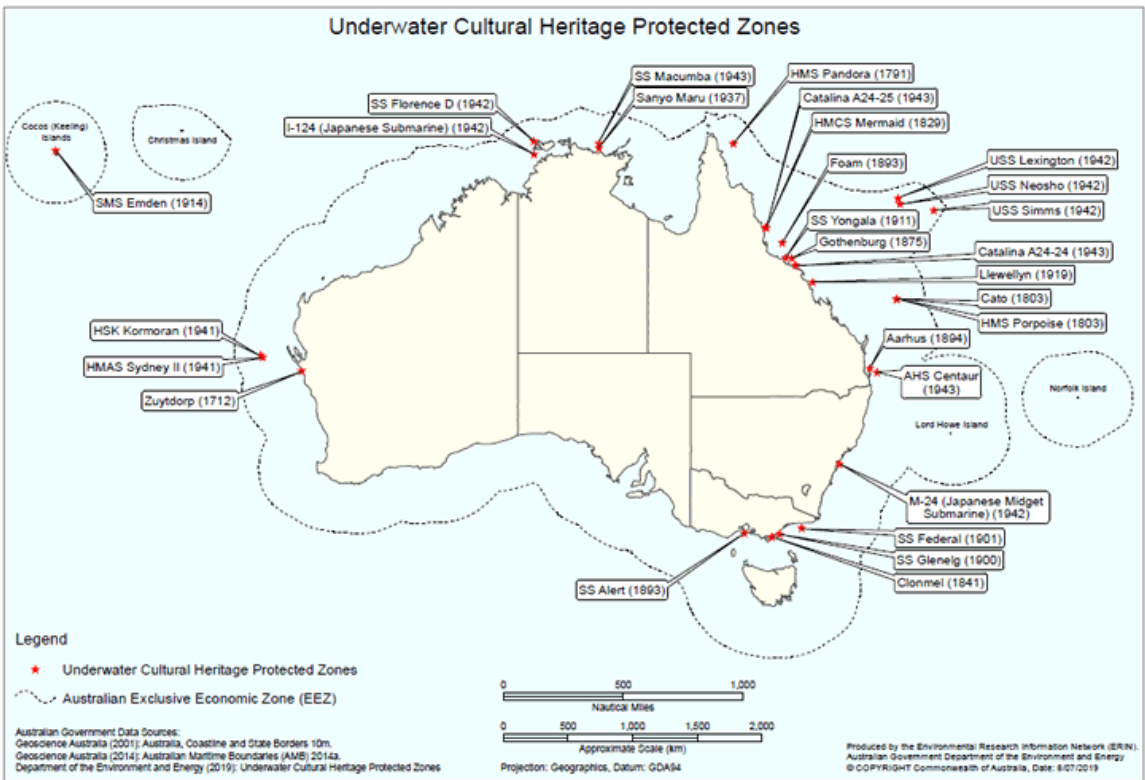


Figure 4-22: Underwater cultural heritage shipwreck protected zones

4.11.2 Australian Commercial Fisheries

A number of Commonwealth and State managed fisheries have boundaries that overlap with the operational area and wider EMBA (Figure 4-23 to Figure 4-24). Table 4-20 provides a summary description of the commercial fisheries and the potential for their operations to be affected by the petroleum activity based on their historic level of activity.

Table 4-20: Commonwealth and State managed fisheries within the EMBA

Fishery	Description	EMBA Presence			Relevant Events within Operational Area and wider EMBA
		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold	
Commonwealth Managed Fisheries					
North West Slope Trawl	Fishery operates off NW Australia from 114°E to 125°E, roughly between the 200 m isobath and the outer boundary of the Australian Fishing Zone. Predominantly a scampi fishery using demersal trawl gear with key target species being the Australian scampi. Primary landing ports are Darwin (NT) and Point Samson (WA). There were four active vessels in the 2017-18 fishing season (ABARES, 2019).	x	✓	✓	Fishery has boundaries that overlap the wider EMBA and therefore fishing vessels and activities could be affected from unplanned / emergency events.

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

Fishery	Description	EMBA Presence			Relevant Events within Operational Area and wider EMBA
		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold	
Western Deepwater Trawl	<p>Fishery operates off the coast of WA between 115°08'E (in the south) and 114°E (in the north) and closely aligns with the 200 m isobath. Effort in recent years has been localised in the area offshore and slightly south of Shark Bay. This demersal trawl fishery catches more than 50 species; deepwater bugs and ruby snapper made up around 50% of the whole catch in 2017-18 fishing season.</p> <p>Primary landing ports are Carnarvon and Fremantle (WA). There were three active vessels in the 2017-18 fishing season (ABARES, 2019).</p>	x	✓	✓	Fishery has boundaries that overlap the wider EMBA and therefore fishing vessels and activities could be affected from unplanned / emergency events.
Western Tuna and Billfish	<p>Fishery concentrates effort in WA waters south of Carnarvon and off South Australia. Main fishing gear is pelagic longline with key target species being bigeye and yellowfin tuna, with striped marlin and swordfish.</p>	✓	✓	✓	<p>No active commercial fishing in the operational area in recent years. Fisheries have boundaries that overlap the wider EMBA, although unlikely to be affected by unplanned / emergency events since most effort concentrated in South and SE Australia and/ or south WA.</p>
Western Skipjack Tuna	<p>Historically, most fishing effort has used purse seine gear (98%) and small amount using pole and line effort.</p> <p>There has been no fishing effort/catch in the fishery since the 2008-09 season, with effort concentrated off South Australia.</p>	✓	✓	✓	
Southern Bluefish Tuna	<p>Fishery spans the Australian Fishing Zone, although only active in waters offshore South and SE Australia, with most catch taken in the Great Australian Bight by purse seine vessels. Smaller amounts are taken from the longline fisheries mainly off SE Australia.</p> <p>Primary landing port is Port Lincoln (SA). There were 38 vessels (7x purse seine; 31x longline) active in 2017-18 fishing season.</p>	✓	✓	✓	

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

Fishery	Description	EMBA Presence			Relevant Events within Operational Area and wider EMBA
		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold	
Small Pelagic	Fishery extends from the Queensland/ NSW border, typically outside 3 nm, around southern Australia to a line at latitude 31° south (near Lancelin). The Fishery targets Australian sardine, blue mackerel, jack mackerel, and redbait using midwater trawl, purse seine and jigging and minor line methods.	x	✓	✓	Fishery has boundaries that overlap the wider EMBA and therefore fishing vessels and activities could be affected from unplanned / emergency events.
Southern and Eastern Scalefish and Shark	This fishery is a multisector, multigear and multispecies fishery, targeting a variety of fish and shark stocks. The management area covers almost half the area of the AFZ. The sector that overlaps the EMBA in the Great Australian Bight Trawl Sector, which had four active trawl vessels and one active seine vessel in the 2018-19 season. Effort included 12,421 trawl-hours and 451 shots.	x	✓	✓	
State Managed Fisheries					
Abrolhos Islands and Mid-West Trawl	The Abrolhos Islands and Mid West Trawl Managed Fishery is the second largest scallop fishery and catches vary widely depending on the strength of recruitment. This fishery was re-opened in April 2017 for the first time in five years (Kangas et al. 2019c).	x	✓	✓	Fishery has boundaries that overlap the wider EMBA and therefore fishing vessels and activities could be affected from unplanned / emergency events.
Aquaculture	For the 2016/2017 season, species produced in WA aquaculture include barramundi, marron, mussels, yabbies, silver perch, goldfish and koi carp, ornamental invertebrates, ornamental fish, rainbow trout, algae and pearls. In total, there were 238 productive licences (Gaughan et al. 2019).	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only, and therefore activities could be affected from unplanned / emergency events.

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

Fishery	Description	EMBA Presence			Relevant Events within Operational Area and wider EMBA
		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold	
Broome Prawn	Extremely low fishing effort occurred in 2017, with only one boat undertaking trial fishing to investigate whether catch rates were sufficient for commercial fishing. This resulted in negligible landings of western king prawns with no byproduct recorded (Kangas et al. 2019a).	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only, and therefore activities could be affected from unplanned / emergency events.
Kimberley Gillnet and Barramundi	The Kimberley Gillnet and Barramundi Fishery operates in the nearshore and estuarine zones of the North Coast Bioregion and extends from the WA/Northern Territory (NT) border (129°E) to the top end of Eighty Mile Beach, south of Broome (19°S). It encompasses the taking of any fish by gillnet in inshore waters and the taking of barramundi (<i>Lates calcarifer</i>) by any means. Commercial fishing is now prohibited between the southern boundary of the fishery (19°00' S) to north of Willie Creek (17°44' S). Fishing is also restricted to within 3 nmi of the high water mark for the remainder of the fishery (Newman et al., 2019b). During the 2017 season (February to November), four vessels fished, with at least 9 people directly employed (Newman et al., 2019b)	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only, and therefore activities could be affected from unplanned / emergency events.
Mackerel Managed	Fishery extends from the West Coast Bioregion to the WA/NT border. The key target species making up the majority of the catch are Spanish mackerel and broad-barred Spanish mackerel. Uses near-surface trolling gear from vessel in coastal areas around reefs, shoals and headlines. The majority of the catch is taken in the Kimberley area.	✓	✓	✓	Fishery has boundaries that overlap the wider EMBA only, and therefore activities could be affected from unplanned / emergency events.
Nickol Bay Prawn	The boundaries of this fishery are all the waters of the Indian Ocean and Nickol Bay between	x	✓	✓	Fishery has boundaries that overlap

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

Fishery	Description	EMBA Presence			Relevant Events within Operational Area and wider EMBA
		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold	
	116°45' E longitude and 120° E longitude on the landward side of the 200 m isobath. Primarily targets banana prawns with otter trawl methods along the western part of the NWS in coastal shallow waters (Kangas et al. 2019a). Target species are usually found in shallow, nearshore waters.				the wider EMBA only, and therefore activities could be affected from unplanned / emergency events.
North-Coast Shark	This fishery includes all WA waters off the north coast east of 114° 06 E longitude.	✓	✓	✓	This fishery is currently closed to protect the breeding grounds of the resource that support the two southern shark fisheries. No fishing effort since 2008/09.
Northern Demersal Scalefish	The permitted fishing methods in this fishery (Area 2 – offshore area) include handline, dropline and fish traps. The main species landed by this fishery in the Kimberley subregion are goldband snapper and red emperor (Newman et al. 2019c). Six vessels fished in the 2017 fishing season, and at least 20 people (3-4 crew per vessel) were directly employed (Newman et al. 2019c).	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only, and therefore activities could be affected from unplanned / emergency events.
Octopus Interim	This fishery in WA targets the octopus (<i>Octopus aff. tetricus</i>). The primary harvest method in the Octopus Interim Managed Fishery is a 'trigger trap'. In 2017, ~221 vessels caught octopus, although the vast majority of these landings were small (<100 kg) (Hart et al. 2019b).	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only, and therefore activities could be affected from unplanned / emergency events.
Pilbara Demersal Scale Fisheries (Line)	Permitted to operate anywhere within Pilbara waters, bounded by a line commencing at the	✓	✓	✓	Fishery has boundaries that overlap

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

Fishery	Description	EMBA Presence			Relevant Events within Operational Area and wider EMBA
		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold	
	intersection of 21°56' S latitude and the high water mark on the western side of the North West Cape on the mainland of WA; west along the parallel to the intersection of 21°56' S latitude and the boundary of the Australian Fishing Zone and north to longitude.				the operational area and wider EMBA. No active fishing in the operational area. Fishery activities could be affected from unplanned / emergency events.
Pilbara Demersal Scale Fisheries (Trawl and Trap)	The Trawl Managed Fishery operates in the waters north of latitude 21°35'S and between longitudes 114°9'36"E and 120°E. The fishery is seaward of the 50 m isobath and landward of the 200 m isobath. The Trap Managed Fishery lies north of latitude 21°44' S and between longitudes 114°9.6' E and 120°00'E on the landward side of a boundary approximating the 200 m isobath and seaward of a line generally following the 30 m isobath.	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only, and therefore activities could be affected from unplanned / emergency events.
Sea Cucumber	The fishery is permitted to operate throughout WA waters; however, it is primarily based in the northern half of the State from Exmouth Gulf to the NT border. The target species are sandfish and deepwater redfish that are hand-harvested principally by diving and a smaller amount by wading.	x	✓	✓	No active commercial fishing in the operational area. Due to the fishing method, activity is restricted to shallow coastal waters. Fishery has boundaries that overlap the wider EMBA and therefore activities could be affected from unplanned / emergency events.

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

Fishery	Description	EMBA Presence			Relevant Events within Operational Area and wider EMBA
		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold	
Marine Aquarium Fish Managed	This is a dive fishery operating all year throughout all State waters between NT and SA border. During 2017, 11 licences were active in the fishery out of the 12 licences (DPIRD, 2018).	✓	✓	✓	No active commercial fishing in the operational area. Due to the fishing method, activity is restricted to shallow coastal waters. Fishery has boundaries that overlap the wider EMBA and therefore activities could be affected from unplanned / emergency events.
Specimen Shell Managed	The fishery is based on the collection of individual shells for the purposes of display, collection, cataloguing, classification and sale. The main methods are by hand by a small group of divers operating from small boats in shallow coastal waters or by wading along coastal beaches below the high water mark. While the fishery covers the entire Western Australian coastline, there is some concentration of effort in areas adjacent to population centres such as Broome, Exmouth, Shark Bay, Geraldton, Perth, Mandurah, the Capes area and Albany. Fishery has 31 licences with a maximum of 2 divers allowed in the water per licence at any one time and specimens may only be collected by hand.	✓	✓	✓	No active commercial fishing in the operational area. Due to the fishing method, activity is restricted to shallow coastal waters. Fishery has boundaries that overlap the wider EMBA and therefore activities could be affected from unplanned / emergency events.
Pearl Oyster Managed	A quota-based, dive fishery, operating in shallow coastal waters along the North West Shelf. Oysters collected by drift diving or by hand. Target species is the Indo-Pacific, silver-lipped pearl oyster (<i>Pinctada maxima</i>).	x	✓	✓	No active commercial fishing in the operational area. Due to the fishing method,

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

Fishery	Description	EMBA Presence			Relevant Events within Operational Area and wider EMBA
		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold	
					activity is restricted to shallow coastal waters. Fishery has boundaries that overlap the wider EMBA and therefore activities could be affected from unplanned / emergency events.
Exmouth Gulf Prawn Managed	Operates in the sheltered waters of the Exmouth Gulf mainly in the western half of the Gulf with the south-eastern sided closed to trawling. Fishery uses twin gear otter trawls to target western king pro fishery uses twin gear otter trawls to target western king prawns (<i>Penaeus latisulcatus</i>), brown tiger prawns (<i>P. eculentus</i>), endeavour prawns (<i>Metapenaeus</i> spp.) and banana prawns (<i>P. merguensis</i>). The opening and closing dates of the fishery vary each year.	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only, and therefore activities could be affected from unplanned / emergency events.
Onslow Prawn Managed	This is an otter trawl fishery with opening and closing dates that vary from year to year. Different areas of the fishery have different seasons that target western king, brown tiger, endeavour and banana prawns. Fishery jurisdiction covers all WA waters below high water mark between Exmouth Prawn Fishery to the west and Nickol Bay Prawn Fishery to the east.	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only, and therefore activities could be affected from unplanned / emergency events.
West Coast Deep Sea Crustacean Managed	Targets crystal (snow) crabs, giant (king) crabs and champagne (spiny) crabs using baited pots operated in a long-line formation. The boundaries of this fishery include all shelf edge waters on seaward side of the 150 m isobath lying north of latitude 34°24' S (Cape	✓	✓	✓	Fishery has boundaries that overlap the operational area and wider EMBA. and therefore

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

Fishery	Description	EMBA Presence			Relevant Events within Operational Area and wider EMBA
		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold	
	Leeuwin) and west of the Northern Territory border on the seaward side of the 150 m isobath out to the extent of the Australian Fishing Zone.				activities could be affected from unplanned / emergency events.
Western Rock Lobster	Fishery operates along WA's coast between Shark Bay and Cape Leeuwin with northern boundary at 21° 44' S latitude. Targets the spiny lobster using baited pots.	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only and therefore activities could be affected from unplanned / emergency events.
Abalone Managed	Three types of abalone – Roe's, greenlip and brownlip – are harvested. Abalone divers operate from small fishery vessels (generally less than 9 m long). The main harvest method is a diver working off a 'hookah' (surface-supplied breathing apparatus) or using scuba equipment, using an abalone 'iron' to prise the shellfish off rocks.	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only and therefore activities could be affected from unplanned / emergency events.
Pilbara Crab	Small trap-based crab fishery targeting blue swimmer crabs in the Pilbara. Fishery jurisdiction is all of WA waters off the NW coast of WA north of 23° 34' S latitude and west of 120° 00' E longitude. Closed areas of the fishery include all waters north of 23° 34' S latitude and west of 115° 06.5' E latitude. The Pilbara Crab Managed Fishery targets blue swimmer crabs within inshore waters around Nickol Bay with hourglass traps. During 2017 five people were employed as skippers and crew on vessels fishing for blue swimmer crabs along the Pilbara coast (Johnston et al. 2019).	✓	✓	✓	Fishery has boundaries that overlap the operational area and wider EMBA. No active fishing in the operational area. Fishery activities could be affected from unplanned / emergency events.
SW Coast Salmon	Main target species are the WA salmon (<i>Arripis truttaceus</i>) and	✓	✓	✓	Fishery has boundaries

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

Fishery	Description	EMBA Presence			Relevant Events within Operational Area and wider EMBA
		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold	
	the Australian herring (<i>A. geogianus</i>). Located in the West Coast Bioregion, the fishery set beach seine nets from the shore using small boats. Fishers target salmon during the annual autumn salmon run in March/April when large schools form near shore and move around the coast to their spawning area on the lower west coast. Fishery includes WA waters out to the edge of the EEZ, with all fishing taking places in State waters.				that overlap the operational area and wider EMBA. No active fishing in the operational area. Fishery activities could be affected from unplanned / emergency events.
South Coast Estuarine Fishery & South Coast Salmon	Nearshore and estuarine finfish are targeted by beach-based fishers and boat-based fishers operating in shallow water. The main commercial methods are gill net, haul net and beach seine. Thirteen estuaries in the South Coast Bioregion are open to commercial fishing (Smith at al. 2019). In 2017, there were approximately 36 commercial fishers employed in the South Coast Estuarine Fishery and 12 commercial fishers in the South Coast Salmon Managed Fishery (Smith at al. 2019).	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only and therefore activities could be affected from unplanned / emergency events.
South Coast Purse Seine	The five species comprising the south coast small pelagic scalefish resource are pilchards (<i>Sardinops sagax</i>), yellowtail scad (<i>Trachurus novaezelandiae</i>), Australian anchovy <i>Engraulis australis</i>), scaly mackerel (<i>Sardinella lemuru</i>) and maray (<i>Etrumeus teres</i>). These fishers use purse seine gear in waters between Cape Leeuwin and the SA border (Norriss and Webster, 2019a). In the 2016/17 season there were 11 active vessels.	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only and therefore activities could be affected from unplanned / emergency events.
Gascoyne Demersal Scalefish	Targets snapper (<i>Pagrus auratus</i> , <i>Pristipomoides multidens</i>). A limited number of licensed vessels fish around the Ningaloo area (Gnaraloo Bay, Coral Bay, Tantabiddi and Exmouth) as well as Denham and Carnarvon. Fishery operates throughout the year with mechanised handlines.	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only and therefore activities could be

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Fishery	Description	EMBA Presence			Relevant Events within Operational Area and wider EMBA
		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold	
	Fishery operates between latitudes 23°07'30"S and 26°30'S excluding the inner waters of Shark Bay.				affected from unplanned / emergency events.
West Coast Demersal Gillnet and Demersal Longline (Inshore Kalbarri area)	Fishery use either gillnets or longlines to target sharks, but also a bycatch of demersal scalefish. Target demersal scale fish and sharks using gillnets and longlines. The offshore area extends south from 23°30'S to 115°30'E between the 250 m depth contour and the 200 nmi boundary of the Australian Fishing Zone. Inshore Kalbarri fishing area operates from 26°30'S to 28°S.	x	✓	✓	Portion of the inshore fishery (Kalbarri area) has boundaries that overlap the wider EMBA only and therefore activities could be affected from unplanned / emergency events.
Shark Bay Beach Seine & Mesh	Beach seine netting targets four species/groups: whiting (<i>Sillago schomburgkii</i> and <i>S. analis</i>), sea mullet (<i>Mugil cephalus</i>), tailor (<i>Pomatomus saltatrix</i>) and western yellowfin bream (<i>Acanthopagrus morrisoni</i>). In 2017, six vessels operated, employing around 12 fishers (Jackson et al. 2019b).	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only and therefore activities could be affected from unplanned / emergency events.
Shark Bay Crab (Zone 1)	Target species is the blue swimmer crab (<i>Portunus armatus</i>) using trap and trawl methods. Fishery is divided into 2 zones – Zone 1 Shark Bay operates out to the 150-m isobath excluding the inner waters of the gulfs. The 2016/17 season landed 273.5 tonnes.	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only and therefore activities could be affected from unplanned / emergency events.
Shark Bay Scallop and Prawn	Fishery operates in and adjacent to Shark Bay waters using otter trawl methods to target saucer scallop (<i>Ylistrum balloti</i>), western king and brown tiger prawns (<i>Penaeus</i>	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only and

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Fishery	Description	EMBA Presence			Relevant Events within Operational Area and wider EMBA
		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold	
	<i>latisulcatus</i> , <i>P. esculentus</i>) and other smaller variety prawns. The 2016/2017 season landed 169 tonnes (prawns) and 64 kg (scallops).				therefore activities could be affected from unplanned / emergency events.
South Coast Crustacean	The South Coast Crustacean Managed Fishery is a multi-species, effortcontrolled pot based fishery with catches of southern rock lobster (<i>Jasus edwardsii</i>) and western rock lobster (<i>Panulirus cygnus</i>) as well as deepsea crab species namely, giant crab (<i>Pseudocarcinus gigas</i>), crystal crab (<i>Chaceon albus</i>) and champagne crab (<i>Hypothalassia acerba</i>). The fishery is based on mobile vessels that employ a skipper and two or three crew and is managed through limited entry, input controls (including limiting the number of pots that can be used), size limits and seasonal closures (How and Orme, 2019b).	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only and therefore activities could be affected from unplanned / emergency events.
South-West & Southern Demersal Gillnet & Demersal Longline	The West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery operates between 26° and 33° S and the Southern Demersal Gillnet and Demersal Longline Managed Fishery operates from 33° S to the WA/SA border. Most fishers employ demersal gillnets to target mainly sharks with scalefish a byproduct. Demersal longline is also permitted. but is not widely used. Between 18 and 21 skippers and crew were employed during 2016-17 (Braccini and Blay, 2019). The level of effort is such that the gear is deployed infrequently over approximately 40% of the fisheries' areas.	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only and therefore activities could be affected from unplanned / emergency events.
South-West Trawl	The South West Trawl Managed Fishery is a multi-species trawl fishery that primarily targets scallops. Management is generally based on limited entry, gear controls and seasonal closures. Only one boat fished	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only and therefore

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Fishery	Description	EMBA Presence			Relevant Events within Operational Area and wider EMBA
		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold	
	in 2017 for a total of 41 boat days (Kangas et al. 2019c).				activities could be affected from unplanned / emergency events.
West Coast Deep Sea Crustacean	The West Coast Deep Sea Crustacean resource consists primarily of Crystal (snow) (<i>Chaceon albus</i>), Champagne (spiny) (<i>Hypothalassia acerba</i>) and Giant (king) (<i>Pseudocarcinus gigas</i>) crabs. The fishery extends northward from Augusta throughout WA waters on the seaward side of the 150 m isobath out to the extent of the EEZ. It is a 'pot' fishery that uses baited pots in a long-line formation in the shelf edge waters (>150 m) of the West Coast and Gascoyne Bioregions (How and Orme, 2019a). In 2017, catches were dominated by crystal crabs. This fishery is considered to have low social amenity, and there is no recreational fishery. There were six vessels operating in 2017 (How and Orme, 2019a). Catch effort is concentrated in areas south of Exmouth.	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only and therefore activities could be affected from unplanned / emergency events.
West Coast Demersal Scalefish Interim	The West Coast Demersal Scalefish resource comprises over 100 species in inshore (20-250 m) and offshore (>250 m) demersal habitats of the West Coast Bioregion. Access to the fishery is restricted to 59 Interim Managed Fishery Permit holders. Each of the five management areas is allocated a maximum number of fishing hours that can be used on an annual basis. Units are allocated to permits and provide entitlement in 'hours' of fishing time (WAFIC, 2020b). Forty-one vessels operated in 2017 (Fairclough and Walters, 2019).	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only and therefore activities could be affected from unplanned / emergency events.
West Coast Estuarine & West Coast (Beach Bait Fish Net)	Nearshore and estuarine finfish are targeted by beach-based fishers and boat-based fishers operating in shallow water. The main commercial methods are gill net, haul net and beach	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only and

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Fishery	Description	EMBA Presence			Relevant Events within Operational Area and wider EMBA
		Operational Area	Area potentially exposed to moderate hydrocarbon threshold	Area potentially exposed to low hydrocarbon threshold	
	seine. Four estuaries in the West Coast Bioregion are open to commercial fishing Smith and Grounds, 2019).				therefore activities could be affected from unplanned / emergency events.
West Coast Purse Seine	A total of six species can be taken by this fishery: the tropical sardine (scaly mackerel, <i>Sardinella lemuru</i>), pilchard (<i>Sardinops sagax</i>), Australian anchovy (<i>Engraulis australis</i>), yellowtail scad (<i>Trachurus novaezelandiae</i>), maray (<i>Etrumeus teres</i>) and Perth herring (<i>Nematalosa vlaminghi</i>). A small proportion of the catch is sold for human consumption while the vast majority is sold for bait, aquaculture feed or pet food (Norriss and Webster, 2019). In 2017 there were seven active vessels.	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only and therefore activities could be affected from unplanned / emergency events.
West Coast Rock Lobster	The West Coast Rock Lobster Managed Fishery targets the western rock lobster (<i>Panulirus cygnus</i>), on the west coast of WA between Shark Bay and Cape Leeuwin. Commercial and recreational catch rates have been maintained near their record-high levels. There were 234 commercial vessels operating in 2017 (de Lestang et al. 2019).	x	✓	✓	Fishery has boundaries that overlap the wider EMBA only and therefore activities could be affected from unplanned / emergency events.

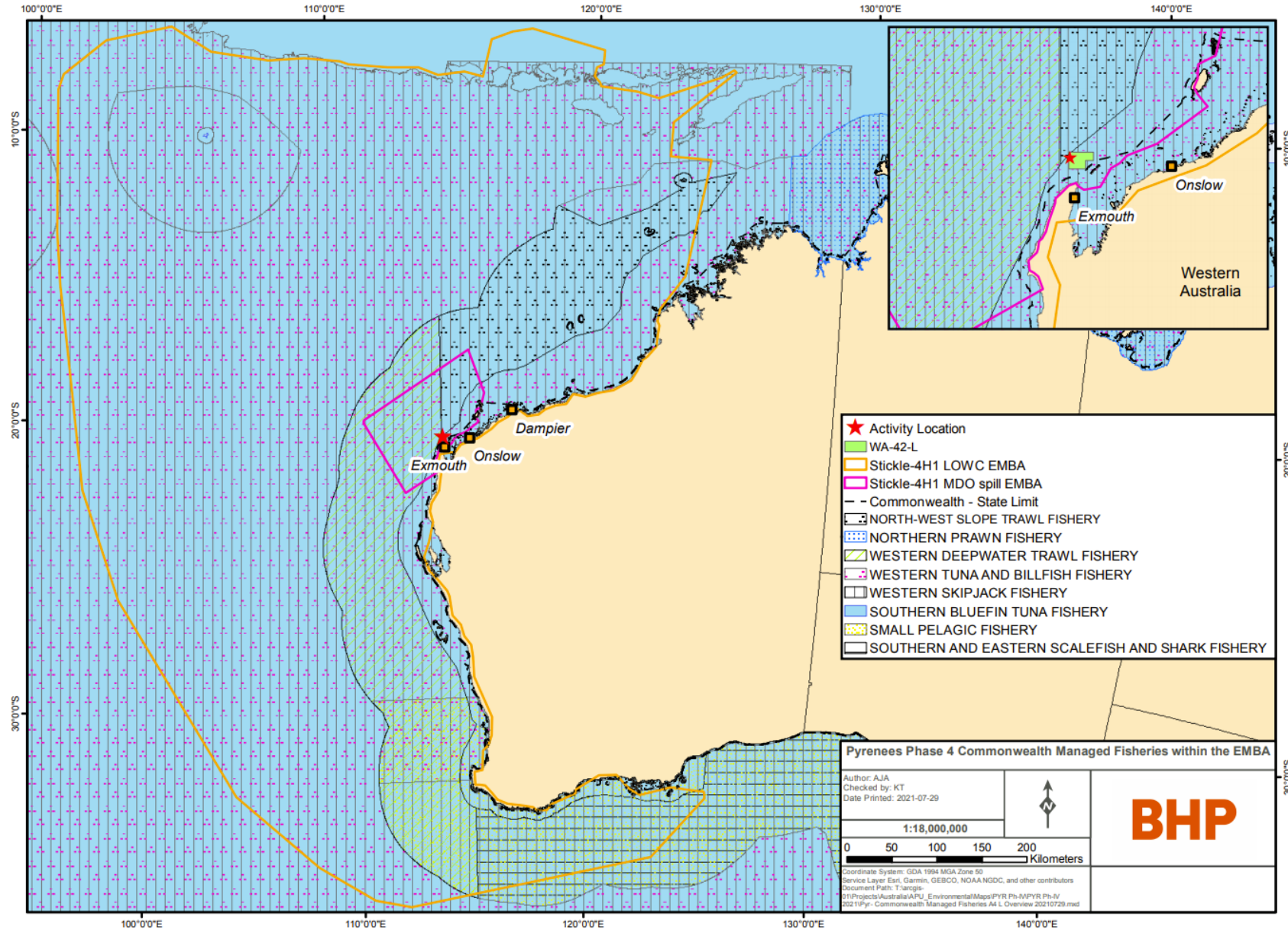


Figure 4-23: Commonwealth managed fisheries within the EMBA

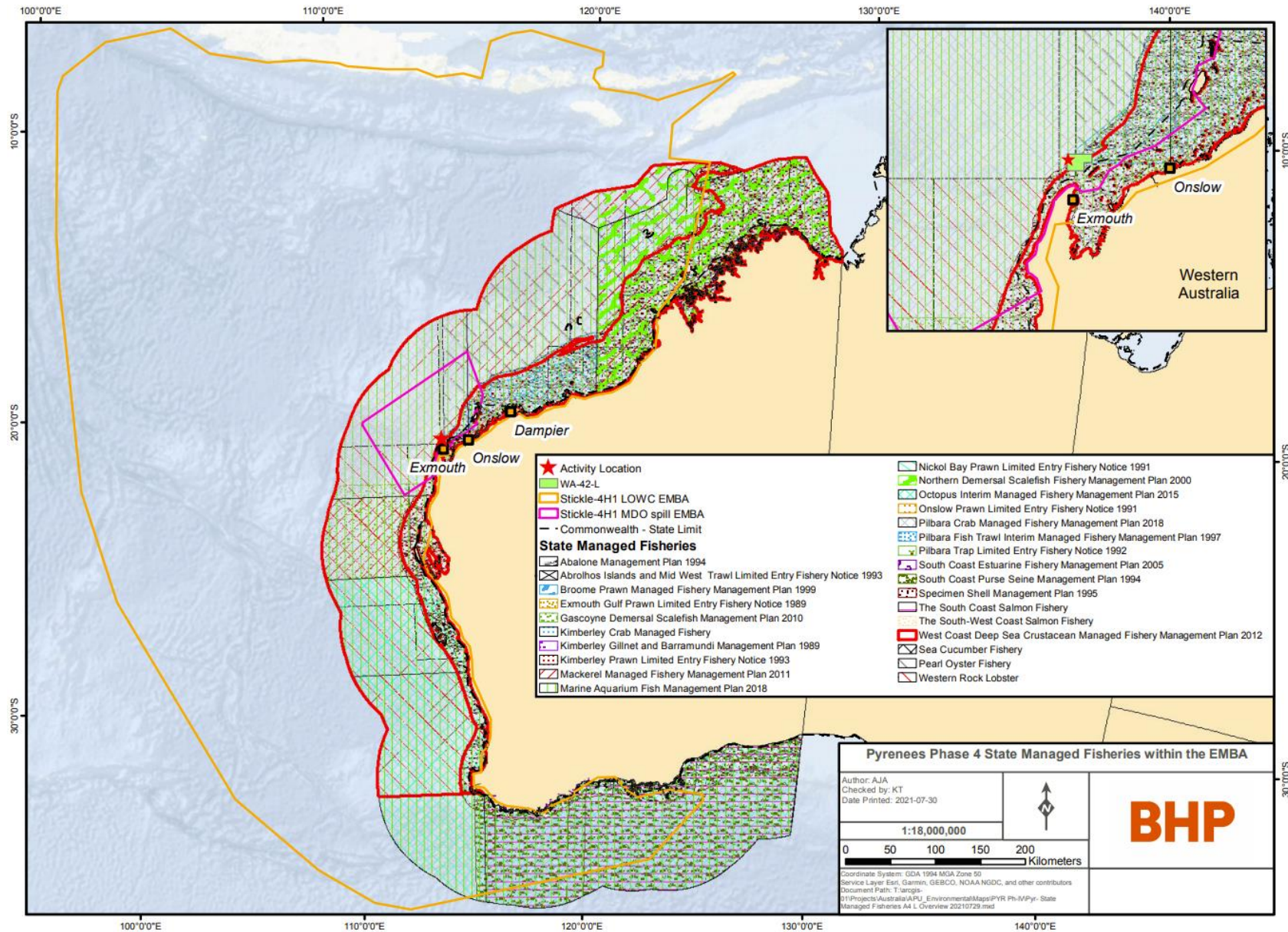


Figure 4-24: State managed fisheries within EMBA

4.11.3 Indonesian Commercial and Subsistence Fishing

Within the northern and north-western extent of the EMBA, a defined area where a Memorandum of Understanding (MoU) exists between the Australian and Indonesian Governments. The Agreement between the Government of Australia and the Government of the Republic of Indonesia Relating to Cooperation in Fisheries (1992 Fisheries Cooperation Agreement) provides the framework for fisheries and marine cooperation between Australia and Indonesia, and facilitates information exchange on research, management and technological developments, complementary management of shared stocks, training and technical exchanges, aquaculture development, trade promotion and cooperation to deter illegal fishing.

Cooperation under the Agreement today takes place under the auspices of the Working Group on Marine Affairs and Fisheries. Established in 2001, the Working Group on Marine Affairs and Fisheries is the primary bilateral forum to enhance collaboration across the spectrum of marine and fisheries issues relevant to the areas of the Arafura and Timor seas. The Working Group brings together the fisheries, environment and scientific research portfolios and agencies from both countries (DNP, 2014b).

The MoU Box (shown on Figure 4-25) is an area of Australian water in the Timor Sea where Indonesian traditional fishers, using traditional fishing methods only, are permitted to operate. Officially it is known as the Australia-Indonesia Memorandum of Understanding regarding the Operations of Indonesian Traditional Fishermen in Areas of the Australian Fishing Zone and Continental Shelf – 1974 (DNP, 2014b).

As part of negotiations to delineate seabed boundaries, Australia and Indonesia entered into the MoU which recognises the rights of access for traditional Indonesian fishers in shared waters to the north of Australia. This access was granted in recognition of the long history of traditional Indonesian fishing in the area. The MoU provides Australia with a tool to manage access to its waters while for Indonesia, it enables Indonesian traditional fishers to continue their customary practices and target species such as trepang, trochus, abalone and sponges. Guidelines under the MoU were agreed in 1989 in order to clarify access boundaries for traditional fishers and take into account the declaration of the 200 nmi fishing zones. Because of its approximate shape the MoU area became known as the MoU Box (DNP, 2014b).

The fishers focus their activities in and around the shallow water lagoons of Scott Reef primarily targeting trepang; and opportunistically gather trochus shells. They also catch fish largely for subsistence purposes although the average fish catch per lete-lete (traditional Indonesian fishing vessel) in 2008 increased to commercial volumes. Although deeper waters are more plentiful in trepang, deep diving is generally not undertaken by the fishers due to the MoU stipulation on the exclusive use of traditional equipment only (DNP, 2014b).

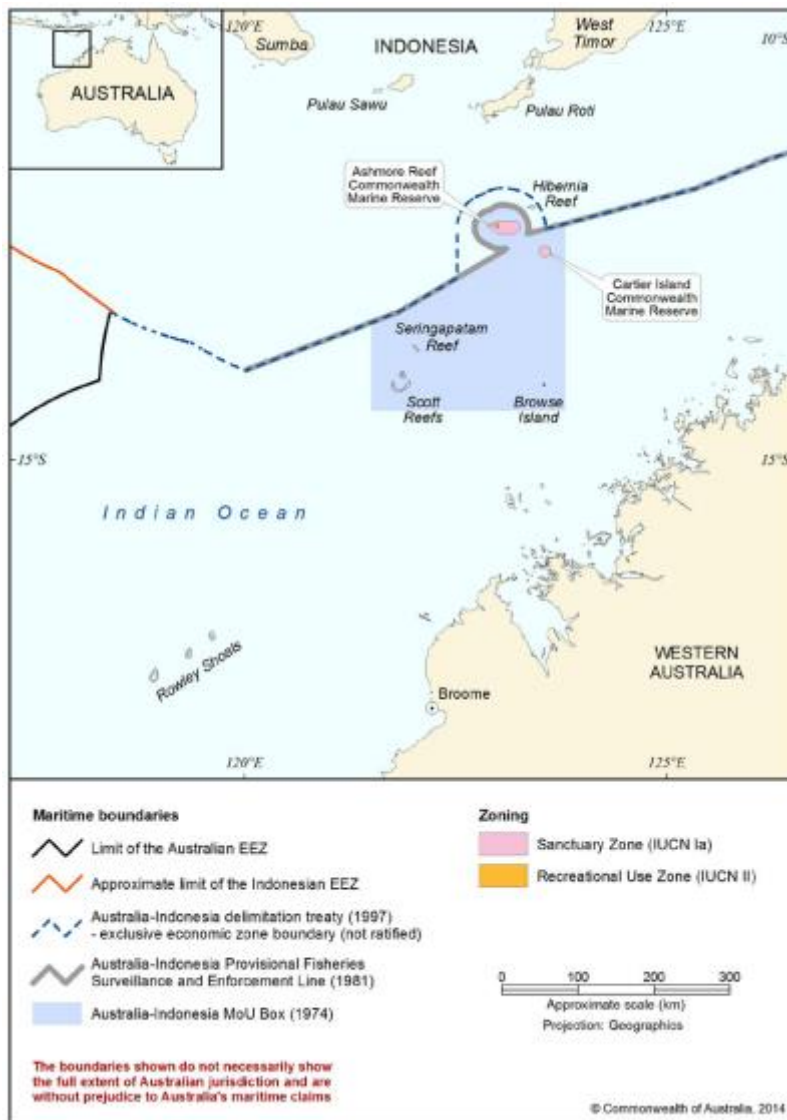


Figure 4-25 Australian - Indonesian Memorandum of Understanding (MoU)

4.11.4 Tourism and Recreation

Marine tourism and recreational activities tend to be concentrated in the vicinity of population centres along the WA coastline, including Broome, Dampier, Exmouth, Coral Bay, Shark Bay, Perth, Bunbury, Geraldton, Margaret River, Jurien Bay, Augusta and Albany, all of which are in the vicinity of the EMBA. Tourism contributes to State and local economies in terms of both income and employment. Popular water-based activities include fishing, swimming, snorkeling/diving, surfing/windsurfing/kiting, wildlife watching and boating.

The nearest population centres to operational area are the towns of Exmouth (~40 km) and Onslow (~100 km). Exmouth has become a significant tourist centre based in large part on the natural resources contained in the Cape Range National Park, Ningaloo Marine Park and adjacent inshore waters. Onslow is a coastal town offering easy access to tourists, vacationers and recreational fishers to the Mackerel Islands, a group of ten islands 22 km offshore.

Visitors partaking in tourism and recreational activities stay at the many coastal parks, camping grounds and caravan parks that the Ningaloo Marine Park has to offer such as at Jurabi, Mangrove Bay, Turquoise Bay and Yardie Creek. Popular tourist locations of interest include the many Sanctuary Zones along the Ningaloo coastline, such as Mangrove Bay, Jurabi Point, Turquoise Bay and Oyster Stacks, where visitors can enjoy bird watching opportunities at Mangrove Bay. The Turtle Centre at Jurabi is a popular tourist attraction and snorkelling is a popular activity for visitors in the numerous embayments such as at Turquoise Bay, and further

south at the popular coastal town of Coral Bay. The most popular offshore tourism activities are fishing, diving and whale shark spotting.

Peak tourism occurs from April to October with marine-based activities concentrated around infrastructure such as boat ramps and camping areas (Smallwood, 2009). Marine facilities, including boat launching ramps, jetties, marinas, etc., within the area are limited, with most located along the Exmouth Gulf side of the peninsula including:

- Point Murat naval supply jetty (restricted access);
- Bundegi – facilities include a concrete launching ramp, car park and public toilets; and
- Exmouth Marina – provides launching, mooring, fuelling and supply facilities for commercial fishing, charter fishing, and tourist and commercial/private vessels.

Boat ramps on the Ningaloo side are located at:

- Tantabiddi Creek – facilities include a concrete launching ramp, car park and public toilets; and
- Coral Bay – concrete launching ramp.

Recreational fisheries and charter boat operators are managed by the Western Australian Department of Primary Industries and Regional Development (DPRID). With an estimated 740,000 people fishing recreationally in WA, it makes a significant contribution to the economy and attracts vast numbers of visitors to the region each year. The Ningaloo Marine Park also provides high-quality fishing for species such as spangled emperor, Spanish mackerel and coral trout.

Within the Gascoyne Bioregion, recreational fishing activities make up a significant component of the tourist visits, with Ningaloo Marine Park and the Shark Bay World Heritage Area attracting thousands of tourists and fishers each year. The mix of tropical and temperate conditions in the bioregion reflects the range of fish species found, with in the region of 100 species of fish caught by recreational fishers. To the north of the bioregion, near Exmouth, tropical species such as emperors and mackerel dominate. Mangrove jack and mud crabs are popular target species in the extensive mangrove system in the Exmouth Gulf. The Ningaloo Marine Park also provides high-quality fishing for species such as spangled emperor, Spanish mackerel and coral trout. Farther south, there are temperate species such as western rock lobster, tailor, snapper (pink snapper) and mullet.

4.11.5 Defence Activities

The Naval Communication Station Harold E. Holt is located on the northwest coast of Australia, 6 km north of the town of Exmouth, WA. The town of Exmouth was built at the same time as the communications station to provide support to the base and to house dependent families of US Navy personnel (GDC, 2020).

The station provides very low frequency radio transmission to US Navy and Royal Australian Navy ships and submarines in the western Pacific Ocean and eastern Indian Ocean. With a transmission power of 1 megawatt, it is the most powerful transmission station in the southern hemisphere (GDC, 2020).

The Royal Australian Air Force Base Learmonth is located on the North West Cape, approximately 30 km south of Exmouth. It is one of the Air Force's three bare bases that can be used for exercises or operational requirements (GDC, 2020).

The operational area is within the North Western Exercise Area and military restricted airspace (R8541A) a designated defence exercise area which encompasses waters and airspace off the North West Cape (Figure 4-26). When activated by a 'Notice to Airmen', the restricted airspace can operate down to sea level.

4.11.6 Commercial Shipping

The Australian Maritime Safety Authority (AMSA) has established a network of shipping fairways off the north coast of Western Australia (AMSA, 2012). The shipping fairways are intended to reduce the risk of collision between transiting vessels and offshore infrastructure. The fairways are intended to direct large vessels such as bulk carriers and LNG ships trading to the major ports into pre-defined routes to keep them clear of existing and planned offshore infrastructure. Use of the new fairways is strongly recommended but not mandatory.

The operational area lies outside of these declared and charted shipping fairways (Figure 4-27). The nearest shipping route heading northeast is approximately 45 km from the operational area.

4.11.7 Oil and Gas Activities

Oil and gas activities in close proximity to the operational area include:

- BHP's Pyrenees Development (*Pyrenees Venture* FPSO) within WA-42-L (the same permit area as the Crosby and Stickle wells);
- Woodside's Vincent Development (*Maersk Ngujima-Yin* FPSO) in production licence WA-38-L, approximately 12 km from the operational area;
- Woodside has subsea gas injection, production and water injection wells are located in WA-28-L. WA-28-L lies to the Northwest of WA-42-L adjacent to WA-43-L approximately 15 km from the operational area. These wells may be subject to plug and abandonment activities as described within Woodside's Enfield Plug and Abandonment Environment Plan (Revision 1, September 2021);
- Santos' Ningaloo Vision Development (*Ningaloo Vision* FPSO) in production licence WA-35-L, approximately 15 km north of the operational area.

Other oil and gas activities in the region include production areas located on Barrow, Thevenard and Varanus Islands.

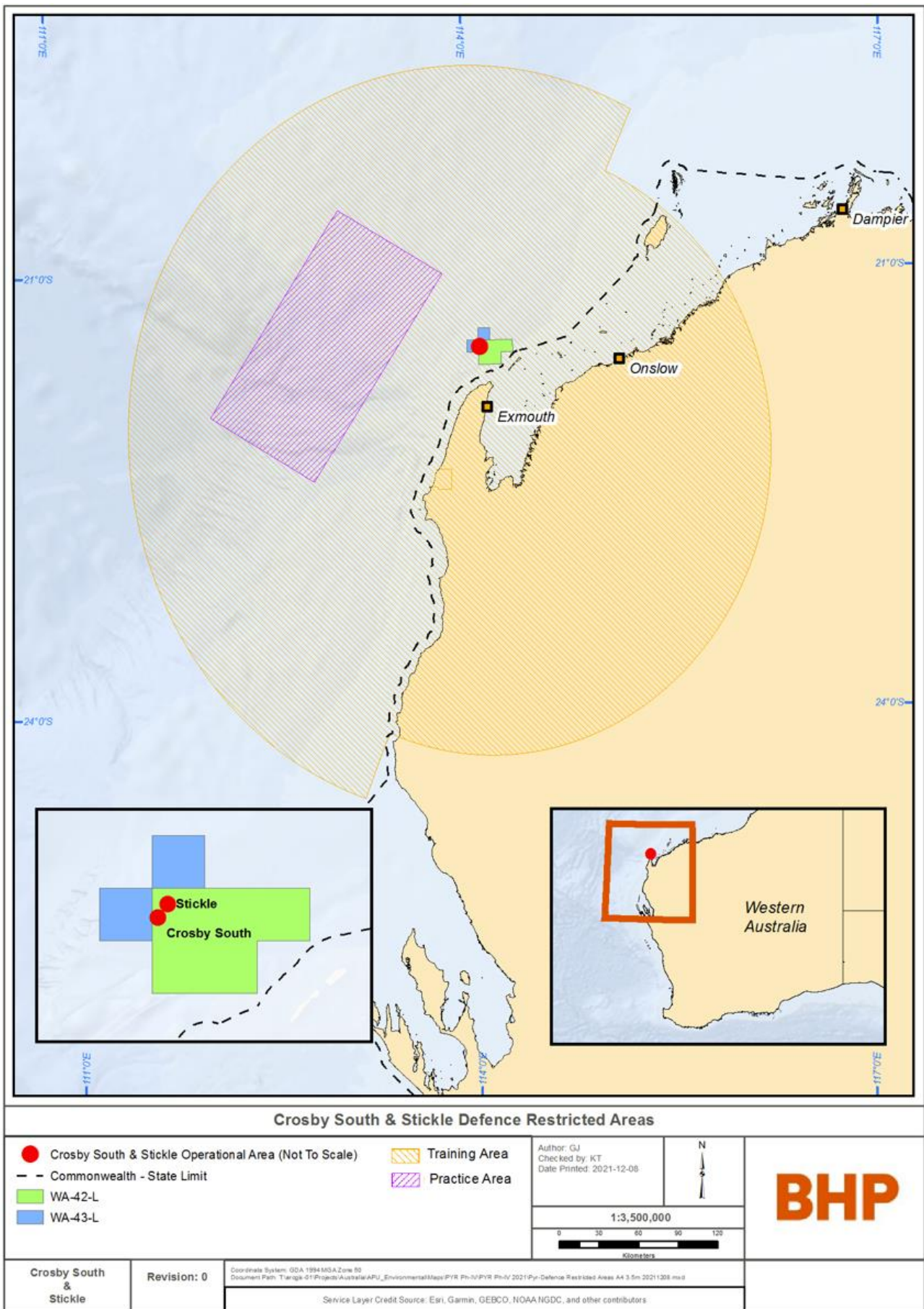


Figure 4-26: Defence activities within the region

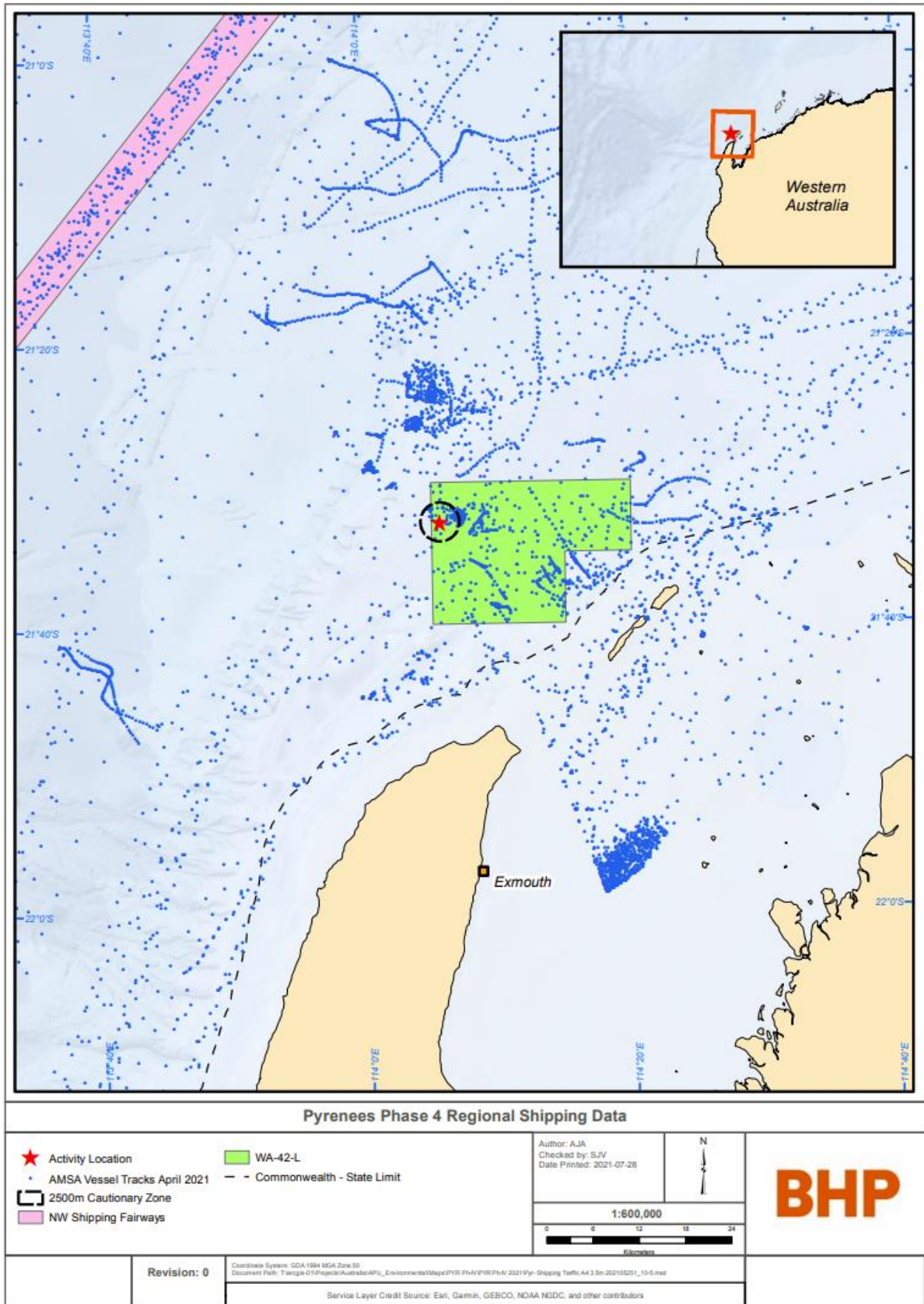


Figure 4-27: Vessel tracking data within the region (March – April 2021)

5 Stakeholder Consultation

In accordance with requirements of Regulations 11A and 14(9) of the Environment Regulations, BHP has consulted with relevant and interested stakeholders during the preparation of this EP.

BHP's approach to stakeholder consultation aims to demonstrate to relevant persons that the environmental impacts and risks of an activity are being appropriately managed. BHP is committed to ongoing engagement and consultation with stakeholders during all project stages.

BHP has consulted broadly with relevant stakeholders regarding this petroleum activity, including sharing information with stakeholders and responding directly to enquiries. Stakeholders were consulted regarding the activities covered in this EP via several forms of engagement commencing in July 2021, including:

- BHP's Pyrenees Phase 4 Infill Drilling Program Environment Plan Stakeholder Information Fact Sheet distributed to relevant stakeholders in July 2021;
- BHP's Pyrenees Phase 4 Infill Drilling Program Environment Plan Stakeholder Information Fact Sheet – Fishing Sector to stakeholders with commercial fishing interests in July 2021;
- Exmouth Community Reference Group (CRG) meetings held in August and November 2021; and
- Pyrenees Phase 4 Infill Drilling Program State Oil Spill Response Workshop held with Western Australian Department of Transport (WA DoT), Western Australian Department of Biodiversity, Conservation and Attractions (DBCA) and the Australian Marine Oil Spill Centre (AMOSOC) on 17 September 2021.

BHP has considered all stakeholder feedback and assessed the merits of responses received. The process adopted to assess any objections and claims is outlined in Section 5.1. A summary of BHP's responses is provided in Table 5-2.

BHP considers that consultation with relevant stakeholders has been adequate to inform the development of this EP. BHP has a process for ongoing stakeholder engagement and any concerns raised by stakeholders subsequent to the EP submission will be duly considered and addressed.

5.1 Stakeholder Engagement Process

5.2.1 Stakeholder Identification

Regulation 11A(1) of the Environment Regulations states that in the course of preparing an environment plan, or revision to an environment plan, the titleholder must consult with each of the following categories of relevant persons:

- (a) *each Department or agency of the Commonwealth to which the activities to be carried out under the environment plan, may be relevant;*
- (b) *each Department or agency of a State or the Northern Territory to which the activities to be carried out under the environment plan, or the revision of the environment plan, may be relevant;*
- (c) *the Department of the responsible State Minister, or the responsible Northern Territory Minister;*
- (d) *a person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the environment plan, or the revision of the environment plan;*
- (e) *any other person or organisation that the titleholder considers relevant.*

Relevant persons for the proposed activity were identified based on BHP's existing relationships and relevant persons identified in previous EP consultations in relation to the Pyrenees Development, together with desktop stakeholder identification and analysis. BHP has engaged with key stakeholders through the EP preparation including:

- Commonwealth and State departments and agencies;
- Local Government;
- Other petroleum operators;

- Commercial fishery licence holders and their representative associations within both Commonwealth and State managed fisheries that overlap the operational area;
- Adjacent titleholders; and
- Non-governmental organisations.

As part of BHP’s general stakeholder identification process, the Department of Primary Industries and Regional Development (DPIRD) current State of Fisheries Report [and FishCube data] was reviewed to understand catch effort, fishing method and water depths of those managed fisheries with boundaries that overlap the operational area, to determine if the fishery was to be considered a relevant stakeholder to be consulted. This assessment is included in Section 4.11.2 of this EP.

5.2.2 Community Consultation History

BHP has also consulted wider community interests for this EP, principally through the Exmouth CRG, which was established in 2004 to facilitate consultation in relation to BHP’s multiple assets offshore North West Cape, Western Australia. The CRG forum aims for proactive and regular interaction to promote open and inclusive communication with stakeholders with an interest in BHP’s current and planned activities. Current membership includes representatives with local government, Exmouth-based State and Commonwealth Government Departments, local industry, tourism, Indigenous and community interests.

Meetings are held regularly (typically quarterly) and participants are given an update summary of BHP’s current petroleum and upcoming activities and invited to raise any concerns or issues. Meeting agendas are prepared and circulated in advance of meetings, minutes are recorded, and feedback sought from stakeholders. The BHP Corporate Affairs toll-free 1800 number and email address are made available to stakeholders.

The latest Exmouth CRG meeting was held on 4 November 2021 and included an overview of BHP’s proposed Pyrenees activities. A copy of the presentation is provided in Appendix F.

5.2.3 Identified Stakeholders

Identified stakeholders and an assessment of their relevance under the Environment Regulations for the purposes of consultation for this petroleum activity are listed in Table 5-1.

Table 5-1: Stakeholders engaged with for the proposed activity

Stakeholder	Relevant to Activity	Rationale
Commonwealth Government Department or Agency		
Australian Border Force	Yes	Maintain the integrity of Australia’s internal borders including customs and immigration.
Australian Fisheries Management Authority (AFMA)	Yes	AFMA is the Commonwealth government agency responsible for the efficient management and sustainable use of Commonwealth fish resources from three nautical miles out to the extent of the Australian Fishing Zone.
Australian Hydrographic Office (AHO)	Yes	The AHO is Commonwealth government agency responsible for the publication and distribution of nautical charts and other information related for the safety of ships navigating in Australian waters including the distribution of Notice to Mariners.
Australian Maritime Safety Authority (AMSA)	Yes	AMSA is Australia’s national agency responsible for maritime safety and navigation and legislated responsibility

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Stakeholder	Relevant to Activity	Rationale
		for oil pollution response in Commonwealth waters.
Department of Agriculture, Water and the Environment (DAWE) – Fisheries	Yes	Department’s Fisheries Branch has primary policy responsibility for promoting the biological, economic and social sustainability of Australian fisheries. The DAWE (Fisheries) is the relevant agency where the activity has the potential to negatively impact fishing operations and/or fishing habitats in Commonwealth waters.
Department of Agriculture, Water and the Environment (DAWE) – Biosecurity (vessels, aircraft and personnel)	Yes	Department’s Biosecurity Branch has inspection and reporting requirements to ensure that all conveyances (vessels, installations and aircraft) arriving in Australian territory comply with international health regulations and that any biosecurity risk is managed.
Department of Defence (DoD)	Yes	The department is the responsible agency for the defence of Australia and its national interests. DoD is a relevant agency where the proposed activity may impact operational requirements; encroach on known training areas and/or restricted airspace, or when nautical products or other maritime safety information is required to be updated.
Department of Industry, Science, Energy and Resources	Yes	The department is responsible for consolidating the Government’s efforts to drive economic growth, productivity, and competitiveness by bringing together industry, energy, resources and science.
Director of National Parks (DNP)	Yes	The DNP is the statutory authority responsible for the administration and management of the Australian Marine Parks under the EPBC Act.
WA Government Department or Agency		
Department of Biodiversity, Conservation and Attractions (DBCA)	Yes	The department is a relevant State agency responsible for the management of State marine parks and reserves and protected marine fauna and flora, inclusive of potential oiled wildlife response.
Department of Mines, Industry Regulation and Safety (DMIRS)	Yes	Department responsible for the management of offshore petroleum in the adjacent State waters and is responsible for managed WA State fisheries. The operational area intersects with State managed fisheries.

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Stakeholder	Relevant to Activity	Rationale
Department of Primary Industries and Regional Development (DPIRD)	Yes	DPIRD is responsible for managed WA State fisheries. The operational area intersects with State managed fisheries.
Department of Transport (DoT)	Yes	The department is the control agency for marine pollution emergencies in State waters.
Ningaloo Coast World Heritage Advisory Committee (NCWHAC)	Yes	The NCWHAC provides advice to the Australian and Western Australian Governments on the protection, conservation and management of the values of the Ningaloo World Heritage Area.
Industry Representative Organisations		
Australian Petroleum Production and Exploration Association (APPEA)	Yes	APPEA is the peak national body representing Australia's oil and gas exploration and production industry.
Fishing Bodies / Industry Representative Organisations		
Australian Southern Bluefin Tuna Industry Association (ASBTIA)	Yes	ASBTIA is the peak body representing the Australian Southern Bluefin Tuna industry.
Commonwealth Fisheries Association (CFA)	Yes	Represents the interests of commercial fishing industry in Commonwealth-regulated fisheries.
Pearl Producers Association (PPA)	Yes	PPA is the peak industry representative body for the Australian pearl oyster (<i>Pinctada maxima</i>) pearling industry licensees in WA.
Recfishwest	Yes	Recfishwest is the peak body representing recreational fishers in WA.
Western Australian Fishing Industry Council (WAFIC)	Yes	WAFIC is the peak industry body representing the interests of the WA commercial fishing, pearling and aquaculture sector.
Commonwealth Fisheries		
North West Slope Trawl	No	Operational area lies within the boundary of the fishery.
Small Pelagic	No	Operational area lies within the boundary of the fishery.
Southern Bluefin Tuna	No	Fishery spans the Australian Fishing Zone around Australia, with boundaries that intercept the operational area; however fishing effort concentrated in South and SE Australian.
Western Skipjack Tuna	No	Fishery has boundaries that intercept the operational area; however there has been no fishing effort/ catch in the

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Stakeholder	Relevant to Activity	Rationale
		fishery since the 2008-09 season, with effort concentrated off South Australia.
Western Tuna and Billfish Fishery	No	Fishery has boundaries that intercept the operational area; however effort concentrated in WA waters south of Carnarvon and off South Australia.
Western Deepwater Trawl	No	Operational area lies within the boundary of the fishery.
State Fisheries		
<i>Commercial fisheries with boundaries overlapping or close to the planned petroleum operational area and with licence holders' activities or interests that may be affected by the planned petroleum activity.</i>		
Mackerel Managed Fishery – Pilbara (Area 2)	Yes	Based on a review of DPIRD current State of Fisheries Report, the fishery boundary overlaps the proposed operational area and is therefore potentially impacted by the activity.
Pilbara Demersal Scalefish Fishery: <ul style="list-style-type: none"> Pilbara Line Fishery 	Yes	Based on a review of DPIRD current State of Fisheries Report, the fishery boundary overlaps the proposed operational area and is therefore potentially impacted by the activity.
West Coast Deep Sea Crustacean Fishery	Yes	Based on a review of DPIRD current State of Fisheries Report, the fishery boundary overlaps the proposed operational area and is therefore potentially impacted by the activity.
<i>Commercial fisheries with boundaries overlapping or close to the planned petroleum operational area, but licence holders' activities or interests are not expected to be affected by the planned petroleum activity.</i>		
Marine Aquarium Fish Managed	No	Not affected by planned activities. Licence holders not consulted during the development of the EP; however, fishery's interest considered in the development of the EP. Licence holders to be informed in the event of an unplanned emergency oil pollution event.
Pilbara Developing Crab	No	
Sea Cucumber Managed	No	
SW Coast Salmon	No	
Specimen Shell Managed	No	
<i>Commercial fisheries with boundaries intercepting the wider EMBA (based on low exposure values for hydrocarbons), but do not overlap the proposed petroleum operational area.</i>		
Abalone Managed (Area 8)	No	Licence holders not consulted during the development of the EP; however, fishery's interest considered in the development of the EP. Licence holders to be informed in the event of an unplanned large scale emergency oil pollution event.
Exmouth Gulf Prawn Managed	No	
Gascoyne Demersal Scalefish	No	
Onslow Prawn Managed	No	
Pearl Oyster Managed	No	
Pilbara Demersal Scalefish Managed:	No	

Stakeholder	Relevant to Activity	Rationale
<ul style="list-style-type: none"> Pilbara Trap Pilbara Trawl 		
Shark Bay Crab Managed	No	
Shark Bay Scallop & Prawn	No	
West Coast Demersal Gillnet & Demersal Longline	No	
Western Rock Lobster (Zone B)	No	
Neighbouring Operators		
Santos	Yes	Adjacent Titleholder
Woodside Energy	Yes	Adjacent Titleholder
Other Stakeholders		
Cape Conservation Group	Yes	Exmouth-based community and volunteer conservation group with an interest in conservation of the North West Cape.
Exmouth Community Reference Group	Yes	Representatives from local government, Exmouth-based State and Commonwealth Government Departments, local industry, tourism, and organisations with Indigenous, conservation and community interests.
Exmouth Game Fishing Club	Yes	Recreational game and sport fishing club based in Exmouth. The Club is a member of the Exmouth CRG.
Australian Maritime Oil Spill Centre (AMOSC)	Yes	AMOSC operates the Australian oil industry's major oil spill response facility.

5.2.4 Stakeholder Consultation Activities

BHP's consultation for this EP included the wide distribution of a general Fact Sheet, a topic-specific Fact Sheet targeted at stakeholders with an interest in commercial fishing and follow up email correspondence. The information provided included the timing and duration of the activity, a summary of management measures for relevant impacts and risks, BHP's policies and experience, and contact details to facilitate providing feedback to BHP.

Recent stakeholder engagement and consultation activities informing this EP include:

- Email communication on 22 July 2021 to relevant stakeholders that detailed the information on the proposed activity and invited comment (refer Covering Email, Fact Sheet and Commercial Fishing Fact Sheet in Appendix F);
- Email and postal correspondence on 22 July 2021 to relevant commercial fishery licence holders and their representative organisations;
- Exmouth CRG meetings on 19 August and 4 November 2021;
- Oil spill response planning workshop held with DoT, DBCA and AMOSC on the 17 September 2021 in relation to response arrangements for State waters and lands consistent with DoT Offshore Petroleum Industry Guidance Note (IGN) – Marine Oil Pollution (MOP) Response and Consultation Arrangements;
- Consideration of all responses from stakeholders received prior to submission of the EP revision, providing additional information where requested.

All stakeholder engagement records are maintained by BHP Corporate Affairs.

5.2.5 Assessment of Stakeholder Objections and Claims

A summary of the stakeholder consultation undertaken for this EP, including responses received, BHP's assessment of all comments received and how each of the responses has been addressed in the EP is provided in Table 5-2. Full transcripts between BHP and stakeholders are provided in a confidential submission to NOPSEMA, including the response to any objections or claims provided by relevant Stakeholders.

Table 5-2: Stakeholder consultation summary

Organisation	Summary of Stakeholder and Titleholder Correspondence, and Any Objections and Claims Made	Assessment of Stakeholder Objections and Claims
Commonwealth Departments / Agencies		
Australian Border Force (ABF)	ABF was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021.	No response has been received by Australian Border Force at the time of submission of the EP. BHP will address any comments from this stakeholder should they arise in the future.
Australian Fisheries Management Authority (AFMA)	AFMA was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021. AFMA replied on 22 July 2021 with the following response: <ol style="list-style-type: none"> 1. Due to limited resources AFMA was unable to comment on individual proposals. 2. Consultation should be undertaken with all fishers who have entitlements to fish within the proposed area. 3. Engagement with fishers can be done through the relevant fishing industry associations or directly with fishers who hold entitlements in the area 4. AFMA provided advice on contact details for fishing industry associations and Commonwealth Concession holders, as well as the process to obtain individual licence holder details. 	BHP has consulted the representative organisations for Commonwealth fisheries that overlap the operational area. BHP considers it has addressed the stakeholder's feedback and no further consultation is required.
Australian Hydrographic Office (AHO)	AHO was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021. AHS replied on 22 July 2021 with the following response: <ol style="list-style-type: none"> 1. Please accept this email as acknowledgement that your email has been received by the AHO. The data you supplied will now be registered, assessed, prioritised and validated in preparation for updating our Navigational Charting products. These adhere to International and Australian Charting Specifications and standards. These standards may result in some data generalisation or filtering due to the scale of existing charts, proximity to other features, and the level of risk a reported feature presents to mariners. 	No action required, noting feedback provided by AMSA on 27 July 2021 requesting BHP to notify the AHO no less than four weeks before operations, with details relevant to the operations in order for the AHO promulgate the appropriate Notice to Mariners. BHP has addressed feedback through commitments provided in Section 7.3 and EPS 03. BHP considers it has addressed the stakeholder's feedback and no further consultation is required.
Australian Maritime Safety Authority (AMSA)	AMSA was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021. AMSA responded on 27 July 2021 providing the following advice: <ol style="list-style-type: none"> 1. Ensure timely and relevant Maritime Safety Information (MSI) is promulgated for the area and nature of your operations. To promulgate MSI, BHP should: <ol style="list-style-type: none"> a. Contact the Australian Hydrographic Office no less than four weeks before operations, with details relevant to the operations. The AHO will promulgate the appropriate Notice to Mariners (NTM), which will ensure other vessels receive information of your activities. b. Notify AMSA's Joint Rescue Coordination Centre (JRCC) by for promulgation of radio-navigation warnings at least 24-48 hours before operations commence. AMSA's JRCC will require the vessel details (including name, callsign and Maritime Mobile Service Identity (MMSI)), satellite communications details (including INMARSAT-C and satellite telephone numbers), area of operation, requested clearance from other vessels and any other information that may contribute to safety at sea. c. Notify JRCC when operations start and end. d. Provide updates to both the Australian Hydrographic Office and the JRCC on progress and, importantly, any changes to the intended operations. 2. Exhibit appropriate lights and shapes to reflect the nature of operations <ol style="list-style-type: none"> a. AMSA reminded vessels of their obligation to comply with the International Rules for Preventing Collisions at Sea (COLREGs), in particular, the use of appropriate lights and shapes to reflect the nature of your operations (e.g. restricted in the ability to manoeuvre). b. Vessels should ensure their navigation status is set correctly in the ship's AIS unit. 3. To obtain a vessel traffic plot showing Automatic Identification System (AIS) traffic data for your area of interest, please visit AMSA's spatial data gateway and Spatial@AMSA portal to download digital data sets and maps. 	BHP notes AMSA's feedback on Maritime Safety Information and will: <ol style="list-style-type: none"> a. Notify the AHO no less than four weeks before operations, with details relevant to the operations in order for the AHO promulgate the appropriate Notice to Mariners. b. Notify AMSA's Joint Rescue Coordination Centre (JRCC) at least 24-48 hours before operations commence, in order to promulgate radio-navigation warnings. c. Notify JRCC when operations start and end. d. Provide updates to AHO and the JRCC on any changes to intended operations. BHP notes AMSA's feedback the exhibition of appropriate lights and shapes and will: <ol style="list-style-type: none"> a. Comply with the International Rules for Preventing Collisions at Sea b. Ensure vessel navigation status is set correctly in the ship's AIS unit BHP has addressed feedback through commitments provided in Section 7.3,

Organisation	Summary of Stakeholder and Titleholder Correspondence, and Any Objections and Claims Made	Assessment of Stakeholder Objections and Claims
		Section 8.5, and EPS 01, EPS 02 and EPS 03. BHP considers it has addressed the stakeholder's feedback and no further consultation is required.
Department of Agriculture, Water and the Environment (DAWE) – Biosecurity (vessels, aircraft and personnel)	DAWE was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021.	No response has been received by DAWE at the time of submission of the EP. BHP has addressed matters relevant to DAWE's interests in: <ul style="list-style-type: none"> • Section 8.9 – Introduction of Invasive Marine Species; and • EPO 06: No introduction of invasive marine species; and • EPS 34 to 36 inclusive. No further consultation is required.
Department of Agriculture, Water and the Environment (DAWE) – Fisheries	DAWE was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021.	No response has been received by DAWE at the time of submission of the EP. BHP has addressed matters relevant to DAWE's interests through consultation with AFMA and relevant fishing associations operating in Commonwealth fisheries with boundaries that intercept the operational area (via invitation to comment). No further consultation is required.
Department of Defence (DoD)	DoD was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021. DoD responded on 23 August 2021 with the following response: <ol style="list-style-type: none"> 1. WA-42-L is located within the North West Exercise Area (NWX) and restricted airspace. 2. Offshore infrastructure may impact military flying training areas. The Civil Aviation Safety Authority has declared numerous Restricted and Danger Areas to protect military operations from any non-compatible aviation activities. These areas often extend down to the surface of the land or ocean, and any obstruction into these airspace volumes by tall sea-based structures may trigger the need for a training area amendment. Also, increased sea or air activity to/from the offshore areas may cause Defence to lose access to Defence Practice Areas or flying training areas that are located offshore. Coordination between all stakeholders is needed to ensure any competing needs are facilitated. If the military activity is unable to move to another area, it may result in the loss or diminished use of a military flying training area and adversely impact Defence capability. 3. Additionally, offshore infrastructure may impact the safety of air navigation due to the risk of collision with low-flying aircraft below 500 feet. The calculation of lowest safe flying altitudes depends on the height of obstructions within a certain area, however, accurate infrastructure height and location data is needed to treat potential risks. Notification of these risks to aviation can be achieved via release of a Notice to Airmen (NOTAM) and notification to Airservices Australia of the new Vertical Obstruction data. High velocity gas efflux or exhaust plumes may also cause turbulence for overflying aircraft. Refer to CASA Advisory Circular AC 139-05 v3.0 (casa.gov.au) for further information. 4. BHP is further advised that unexploded ordnance (UXO) may be present on and in the sea floor within the NWXA. BHP must, therefore, inform itself as to the risks associated with conducting activities in the area. Additionally, BHP is advised that: <ol style="list-style-type: none"> a. all activities in the area are conducted at its own risk; and b. the Commonwealth of Australia, represented by the Department of Defence, takes no responsibility for: <ol style="list-style-type: none"> i. reporting the location and type of UXO that may be in the areas; ii. identifying or removing any UXO from these areas; and iii. any loss or damage suffered or incurred by BHP or any third party arising out of, or directly related to, UXO in the area. 5. In order to ensure BHP activities do not conflict with Defence training, Defence requires a minimum of five weeks notification prior to the commencement of activities. Notification will need to be provided to Offshore.Petroleum@defence.gov.au. 6. Please ensure that any activities undertaken within Restricted Airspace comply with the relevant NOTAM restrictions. This project may also be required to promulgate a NOTAM for any temporary structure or need to establish a Danger Area to encompass any permanent rig. DoD provided contact details for the airspace controlling agency if restricted airspace is activated, as well as contact details for NOTAM enquiries. 7. Please ensure continued liaison with the Australian Hydrographic Service (AHS) for Notices to Mariners (NOTMAR), in particular ensure that the AHS is notified three weeks prior to the actual commencement of activities. DoD requested responses to the questions below regarding the proposed activities:	BHP notes DoD's feedback with respect to undertaking activities within the North West Exercise Area, as well as required notifications for Notices to Airmen and Notices to Mariners. BHP also notes DoD's advice with respect to the potential presence of unexploded ordnance (UXO). To this regard, BHP have conducted extensive site surveys from as early as 2005 over the area to support initial field development. These included bathymetry, side scan sonar and high-resolution sub-bottom profiling. Additionally, previous Pyrenees infill drilling campaigns have moored MODUs in line orientations/patterns/anchor locations to those proposed for this campaign with no evidence of UXO detected. BHP has addressed DoD's feedback through commitments provided in: <ul style="list-style-type: none"> • Section 7.3 – Physical Presence; and • EPS 01 to 03 inclusive; and • Section 7.4 – Benthic Habitat Disturbance; and • the 'site survey' component of EPS 07.1 within Table 9-2. BHP has responded to DoD's request for information and considers it has

Organisation	Summary of Stakeholder and Titleholder Correspondence, and Any Objections and Claims Made	Assessment of Stakeholder Objections and Claims
	<ol style="list-style-type: none"> 1. Can you please confirm that BHP will be providing safety notifications via Notices to Mariners and Airmen? 2. Will BHP be conducting high velocity gas efflux or exhaust plumes? 3. Will access to the production wells be via sea or air transport? <ol style="list-style-type: none"> a. If via air, how often will transit occur and from where? <p>BHP responded on 5 October 2021 with the following response: BHP noted the department's feedback on the potential for UXOs and confirmed that planned drilling activities would comprise re-entry into existing wells using existing infrastructure so there was no new "breaking ground" and potential for interaction with UXOs. In response the department's questions, BHP provided the following feedback:</p> <ol style="list-style-type: none"> 1. BHP can confirm that safety notifications via a Notice to Airmen (NOTAM) are routinely issued via our Aircraft Operator (CHC) for regional operations and will cover flights to and from the mobile offshore drilling unit (MODU) whilst on location in the Pyrenees Field for the duration of the proposed drilling activity. 2. BHP can confirm that there may be minor levels of cold venting of reservoir gases from the MODU intermittently during the course of the proposed drilling activity, however, this venting would be of a limited volume and no flaring operations from the MODU are proposed. There would be exhaust emissions associated with power generation of the MODU and routine vessel operations. 3. BHP can confirm that the MODU is serviced by both anchor handling tug support (AHTS) vessels (for the transport of bulk materials and supplies) and by helicopter for the transfer of personnel for the duration of the proposed drilling activity. 4. Crew changes via helicopter from Learmonth Airport will occur approximately 3-5 times per week. BHP can also confirm helicopter operations within the operational area are limited to helicopter take-off and landing on the helideck of the MODU. 	<p>addressed the stakeholder's feedback and no further consultation is required.</p>
<p>Department of Industry, Science, Energy and Resources (DISER)</p>	<p>DISER was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021.</p>	<p>No response has been received at the time of submission of the EP. BHP will address any comments from this stakeholder should they arise in the future.</p>
<p>State Government Departments</p>		
<p>Department of Biodiversity, Conservation and Attractions (DBCA)</p>	<p>DBCA was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021.</p> <p>DBCA responded on 22 July 2021 with the following response:</p> <ol style="list-style-type: none"> 1. Thank you for providing correspondence to the Department of Biodiversity, Conservation and Attractions' Environmental Management Branch (EMB). 2. Please note that this mailbox is checked on an intermittent basis, if your correspondence requires a response within a constrained timeframe please contact EMB administration. <p>DBCA responded on 4 August 2021 with the following response in relation to its responsibilities under the Conservation and Land Management Act 1984 and Biodiversity Conservation Act 2016:</p> <ol style="list-style-type: none"> 1. There are a number of ecologically important areas including marine parks and island conservation reserves located in the vicinity of the proposed operations, including the Ningaloo Marine Park and Muiron Islands Nature Reserve and Marine Management Area. Based on the information provided it appears that there is potential for these areas to be affected by BHP's operations if there is a substantial hydrocarbon release and subject to particular weather or other environmental conditions. Given the ecological importance of areas potentially affected by a hydrocarbon release, it is considered important that the baseline values and state of the potentially affected environment are appropriately understood and documented prior to any activities that pose a risk of impacting these areas. 2. DBCA would like to have confidence that BHP maintains appropriate baseline survey data on the important ecological values of these areas and any current contamination if present within the area of potential impact of spills (as identified through BHP's modelling). In addition to a desktop review and risk assessment, BHP should also maintain appropriate baseline abundance and distribution data for any threatened and specially protected marine fauna species in the area of potential impact, including information on the key habitats these species use for activities like foraging, breeding and aggregating. If baseline information is not available, BHP should thoroughly assess what baseline information is required commensurate with the level of risk associated with the activities, and identify suitable sources/methods to attain that information such that BHP can ensure that any impacts on ecological values and recovery of these values can be monitored and remediated. 3. DBCA undertakes monitoring in marine parks and reserves and publishes monitoring reports which are available on the department's website. However, BHP should be aware that this monitoring is targeted to inform DBCA's values and objectives relating to marine park management and is not necessarily suitable to provide all baseline information required for oil spill risk assessment and management planning. DBCA encourages BHP to ensure it attains all information required to implement a Before-After, Control-Impact (BACI) framework in planning its management response. This may include independently monitoring and collecting data where required or identifying other data sources. 4. In developing its Environment Plan, DBCA also recommends that BHP refer to the Commonwealth Department of Agriculture, Water and the Environment's National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds as a best-practice industry standard for managing potential impacts of light pollution on marine fauna (https://www.environment.gov.au/biodiversity/publications/national-light-pollution-guidelines-wildlife). 5. In the event of a hydrocarbon release, it is requested that BHP notify DBCA's Pilbara regional office as soon as practicable. Note however, that DBCA will not implement an oiled wildlife management response on behalf of a petroleum operator except as part of a whole of government response mandated by regulatory decision makers, and any advice or assistance from DBCA, at any scale, will occur on a full cost recovery basis. BHP should also commit to the monitoring and clean-up of any DBCA interests affected by an oil spill in consultation with DBCA. 6. The Department of Transport's (DoT) guidance regarding marine pollution (https://www.transport.wa.gov.au/marine/marine-pollution.asp), and the Offshore Petroleum Industry Guidance Note dated July 2020 titled Marine Oil Pollution: Response and Consultation Arrangements, provide information on the Western Australian emergency management 	<p>BHP notes DBCA's feedback with respect to potential impacts and risks to ecologically important areas, appropriateness of baseline data, oil spill monitoring, National Light Pollution Guidelines, oil spill notification and response arrangements (including monitoring and clean-up), and DoT 2020 MOP: Response & Consultation Arrangements.</p> <p>BHP has addressed DBCA's feedback through information & commitments provided in:</p> <ul style="list-style-type: none"> • EP s4 • EP s7.5 • EP s8.3 to s8.5 inclusive. • EP s10.5.3 • OPEP document • OPEP:BOD document • OSMBIP document <p>BHP has responded to DBCAs comments and considers it has addressed the stakeholder's feedback and no further consultation is required.</p> <p>The OPEP and associated documents shall be submitted to DBCA via DoT (as Controlling Agency in State jurisdiction) for review of spill response and monitoring arrangements, including OWR.</p>

Organisation	Summary of Stakeholder and Titleholder Correspondence, and Any Objections and Claims Made	Assessment of Stakeholder Objections and Claims
	<p>arrangements for marine oil pollution incidents in State waters, petroleum titleholders' obligations under those arrangements, and the DoT's expectations as the jurisdictional authority for such incidences.</p> <p>BHP responded on 20 August 2021 with the following:</p> <ol style="list-style-type: none"> 1. BHP confirmed that areas of ecological importance including the Ningaloo Marine Park and Muiron Islands Nature Reserve and Marine Management Area will not be affected by the planned activities. 2. BHP confirmed: <ol style="list-style-type: none"> a. It had considered the distribution data for all listed, threatened and migratory species in the area of potential hydrocarbon exposure, including information on the key habitats these species use for biologically important activities like foraging, breeding and aggregating. b. It had operated a number of facilities within the area North-West of Onslow since 1994 and had developed a resource atlas for the area that includes a shoreline assessment of environmental sensitivities. c. It had funded collection of extensive baseline datasets on benthic habitats in the Ningaloo Marine Park d. It had access to credible published scientific research, industry and research agency (government and university) study reports, including baseline and monitoring programs. 3. BHP noted DBCA's advice with respect to marine park and reserve monitoring programs not necessarily being suitable to provide all baseline information required for oil spill risk assessment and management planning. BHP confirmed it would implement an oil spill Operational and Scientific Monitoring Program (OSMP) applying available baseline data to the Before-After, Control-Impact (BACI) framework to inform an assessment of ecological impact in the event of a substantial hydrocarbon release with the potential to contact sensitive environmental receptors. 4. BHP confirmed it had considered the Commonwealth Department of Agriculture, Water and the Environment's National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds including the nominal buffer for potential lighting impacts. Additionally, BHP has considered information contained in relevant recovery plans, approved conservation advice and threat abatement plans. As such, our assessment has determined that lighting emissions from the proposed activity will be managed to ALARP and acceptable levels. 5. We note your expectations to be notified in the event of a hydrocarbon release and commit to notifying the DBCA Pilbara regional office on (08) 9182 2000 as soon as practicable of any hydrocarbon release that has the potential to impact State Marine Parks or has impacted wildlife in State waters. We also note your advice on cost recovery with respect to DBCA being involved in a whole of government response for oiled wildlife management. 6. The Department of Transport has been engaged with during the preparation of the EP as part of stakeholder consultation activities in line with its guidance note, given DoT's interests for management of marine pollution events in State Waters. 	
	<p>DBCA attended the Pyrenees Phase 4 Infill Drilling Program State Oil Spill Response Workshop held jointly with Western Australian Department of Transport (DoT), and the Australian Marine Oil Spill Centre (AMOSOC) on 17th September 2021. Whilst the workshop covered all consultation as outlined in the Department of Transport Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements (July 2020), the primary focus of DBCA engagement was oiled wildlife response (OWR) arrangements.</p> <p>Meeting outcomes in relation to OWR arrangements as agreed with DBCA were:</p> <ol style="list-style-type: none"> 1. Updates to the WAOWRP are yet to be finalised and will not be issued prior to submission of the BHP Pyrenees Phase 4 EP / OPEP to NOPSEMA; 2. Draft update to WAOWRP applies a high / medium / low risk profile to OWR rather than the current level 1 – 6 approach. BHP Pyrenees Phase 4 spill risk profile would likely be categorised as high-risk under the new approach; 3. A high-risk OWR strategy would likely require a minimum of 80 OW Responders; 4. AMOSC manages a database of trained / qualified OW Responders from industry that could be called upon to support a response. DBCA is aiming to create a database derived from licensed rehabilitators and regional veterinary staff which likewise will be available to industry once developed. 5. Each OWR Field Unit would require 5 trained OWR personnel with at least 1 of the 5 being a Veterinarian. The trained personnel would need to be supported by approximately 10 support personnel that would receive in-field training and work under the supervision of the trained personnel. 6. First-strike response priority would be to establish a 'Field OW Facility' (within approx. 24-48 hours) then followed by the establishment of 'Primary Care Facility'. Mobilisation of washing containers would be part of developing the PCF – less focus should be afforded to mobilising OWR containers as these are not an immediate requirement and will take time to transport and set-up with support services such as power and water. 7. The purpose of the Field Facility is early triage and field processing of oiled animals, and acting as a base for reconnaissance and rescue. Reconnaissance and rescue require at least 2 of the 5 trained OW responders in a field unit. Field processing and early triage would require at least 2 of the 5 trained OW Responders including the veterinarian. The purpose of the Primary Care Facility is stabilisation, cleaning and rehabilitation. A functional field facility takes priority and enables case-based decision-making as to the location and the need for a PCF. [The PCF shouldn't be considered as part of the early response in my view. Your field units will be able to do the early phases of OWR but won't be sufficient to set up or staff a PCF. That doesn't mean you can't do animal cleaning and rehab, but the idea is that you commit to good field OWF operations as a stop-gap to enable considered planning of the need for and location of a PCF]. 8. The establishment of 3x OWR Containers in WA within 4 days (96 hours) would constitute the base-case for a response for a LOWC event from the Pyrenees Field with additional field capability potentially scaled up after day-4 at the request of DBCA / DoT pending the results of in-field operational monitoring. [A PCF is a huge thing in terms of planning and infrastructure and you won't get three (or even a single fully functioning one) going in 4 days. You might get several washing containers functional but I can't see a scenario where you would want them in separate PCFs unless your spill was impacting an extremely long piece of shoreline, in which case we'd weigh up the costs and benefits of animal transport 	<p>BHP notes DBCA advice on State OWR arrangements and priorities.</p> <p>OWR capability arrangements are detailed within the OPEP: BOD Assessment document; and</p> <p>OWR response implementation arrangements consistent with the WAOWRP are detailed within the OPEP document.</p>

Organisation	Summary of Stakeholder and Titleholder Correspondence, and Any Objections and Claims Made	Assessment of Stakeholder Objections and Claims
	<p>vs the logistics of setting up entirely different facilities. A tacit assumption that creeps into planning is that if you hook up a washing container you have a functional facility for animal care, and I want people to be clear that it's not the case; the "bang for our buck" in terms of animal welfare and response is in the activities of those field units.]</p> <p>9. It is appropriate for BHP to present information consistent with the current version of the WAOWRP with an ongoing commitment to support an OWR response in accordance with the updated WAOWRP once published.</p>	
<p>Department of Mines, Industry Regulation and Safety (DMIRS)</p>	<p>DMIRS was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021.</p> <p>DMIRS responded on 9 August 2021 with the following response:</p> <ol style="list-style-type: none"> DMIRS acknowledges receipt of the information sent by BHP on 22 July 2021 relating to the Pyrenees Infill Drilling to be conducted in Commonwealth waters Production Licence WA-42-L. DMIRS notes that the proposed activity will be assessed under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 and regulated by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA). DMIRS has reviewed the notification and does not require any further information at this stage. Subsequently, please: <ol style="list-style-type: none"> provide pre-start notification confirming the start date of the proposed activity and a cessation notification to inform DMIRS upon completion of the activity ensure the environment plan includes information about the reporting of environmental incidents that could potentially impact on any land or water in State jurisdiction, including that any notifications or reports are to be sent to DMIRS [email address supplied]. <p>BHP responded on 23 August 2021 with the following response:</p> <ol style="list-style-type: none"> BHP acknowledged DMIRS feedback on the proposed Activity. BHP committed to providing notification prior to the start and upon completion of activities. BHP noted DMIRS did not require further information about the proposed Activity BHP confirmed the EP included a reporting protocol in the event of incidents that could potentially impact on any land or water in State jurisdiction. 	<p>BHP notes DMIRS request to be notified prior to the start and upon completion of activities and to be notified in the event of environmental incidents that could impact on land or water in State jurisdiction.</p> <p>BHP has addressed DMIRS's feedback through information & commitments provided in:</p> <ul style="list-style-type: none"> EP s10.5.1 & EPS 03 EP s10.5.3
<p>Department of Primary Industries and Regional Development (DPIRD)</p>	<p>DPIRD was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021.</p>	<p>No response has been received by DPIRD at the time of submission of the EP.</p> <p>No further consultation is required</p>
<p>Department of Transport (DoT)</p>	<p>DoT was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021.</p> <p>DoT responded on 22 July 2021 August 2021 with the following response:</p> <ol style="list-style-type: none"> Thank you for your email to the Maritime Environmental Emergency Response (MEER) Unit, Department of Transport. Please note that this mailbox is monitored during normal business hours (0800 – 1600hrs) only and will be actioned as soon as possible by the relevant officer. For emergencies (requiring an immediate response) regarding marine oil pollution, please contact the 24 hour duty officer on (08) 9480 9924 now. For further information on reporting marine oil pollution, please visit the following webpage: https://www.transport.wa.gov.au/imate/transport-marine-oil-pollution.asp <p>DoT further responded on 6 August 2021 with the following response:</p> <ol style="list-style-type: none"> If there is a risk of a spill impacting State waters from the activity, please ensure that the Department of Transport is consulted as outlined in the Department of Transport Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements (July 2020). <p>DoT hosted the Pyrenees Phase 4 Infill Drilling Program State Oil Spill Response Workshop held jointly with Western Australian Department of Biodiversity, Conservation and Attractions (DBCA), and the Australian Marine Oil Spill Centre (AMOSC) on 17th September 2021. BHP presented material covering all consultation requirements as outlined in the DoT Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements (July 2020).</p> <p>Meeting outcomes in relation to State spill response arrangements as agreed with DoT were:</p> <p>General:</p> <p>DoT confirmed:</p> <ul style="list-style-type: none"> BHP has supplied sufficient information to DoT (and DBCA) consistent with Appendix 6 of the DoT Offshore Petroleum Industry Guidance Note Marine Oil Pollution: Response and Consultation Arrangements (2020). BHP's commitment to support a DoT-controlled response in State jurisdiction with 200-500 skilled (these would need to be appropriately trained according to the need...shoreline, basic equipment...etc) Responders is an acceptable approach given the potential nature and scale of the worst-case discharge scenario from proposed drilling activities in the Pyrenees Field and the logistical constraints associated with supporting and managing a greater number of Responders. (This should be seen as an initial commitment, noting in a worst case scenario extending along much of the WA coastline with multiple Divisions there may be a much larger response required and a much larger commitment required of BHP) DoT provide in-principal endorsement of the approach to oil spill response in State jurisdiction as presented by BHP during the workshop, but will provide formal comment on the Pyrenees Phase 4 OPEP once supplied. DoT acknowledge that the Pyrenees Phase 4 OPEP would be simultaneously submitted to NOPSEMA and DoT, and BHP would consider DoT comments in subsequent document revisions. Subject to actual spill volume and trajectory, as confirmed by real-time operational monitoring, DoT provides in-principle endorsement of the approach to establish 5x 'Sectors' consistent with the existing Tactical Response Plans (TRPs) for the Ningaloo coast presented by BHP during the workshop. Each Sector would be led by a 'Sector Commander' with the role initially fulfilled by DoT personnel or AMOSC Core Group. Whilst initial response actions and first-strike Responders would be deployed asap following an emergency condition, as Control Agency in State jurisdiction, DoT apply a nominal 4 day (96 hour) response timeframe to have core response teams and equipment 'on the ground', with each Sector Unit fully operational by approximately day 8 to day 10. 	<p>BHP notes DoT advice on State spill response arrangements and capabilities.</p> <p>BHP notes the DoT advice for 'on-the-job' training of labour-hire personnel to appropriately fulfill response duties should a spill event occur and the potential to supplement initial responders if required (noting the proposed responder numbers would be considered appropriate for the initial Ningaloo Region response and scaled according to situational need).</p> <p>State capability arrangements are detailed within the BOD Assessment document; and</p> <p>Response implementation arrangements consistent with those agreed with DoT are detailed within the OPEP document.</p> <p>The OPEP and associated documents shall be submitted to DoT (as Controlling Agency in State jurisdiction) for review prior to undertaking the activity.</p>

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	<ul style="list-style-type: none"> In the event of an oil spill emergency with the potential to impact State jurisdiction, two separate IMTs would be established - one offshore lead by BHP and one State jurisdiction lead by DoT with the JSCC meeting 2x daily to strategically align response objectives and resourcing priorities. BHP would be the Lead IMT for the management of aviation services and other areas in accordance with the IGN. It would be prudent for each IMT to share a Forward Operating Base (potentially Harold E Holt Naval Communications Base, the Exmouth SES Offices or Learmonth RAAF Base). It would be appropriate for BHP to defer to DoT to establish response termination criteria as informed by operational and scientific monitoring in consultation with WA Chief Scientist. In consultation between DoT and WA Police Department, interstate and/or international responders may be admitted under certain circumstances pending Covid-19 restrictions and the potential to isolate discreet work groups. 																												
	<p>DoT was provided with the following documents for review on 14 December 2021:</p> <ul style="list-style-type: none"> BHP Pyrenees Phase 4 Infill Drilling Program Oil Pollution Emergency Plan (Rev 0) (BHPB-04PY-N950-0022); BHP Pyrenees Phase 4 OPEP: Basis of Design and Field Capability Assessment (Rev 0) (BHPB-04PY-N950-0002); BHP APU Incident Management Team (IMT) Capability Assessment Report (Rev 0) (AOHSE-ER-0071); and BHP Pyrenees Field: Operational and Scientific Monitoring Bridging Implementation Plan (Rev 0) (BHPB-04PY-N950-0023) <p>DoT provided the comments on 14 January 2022 and BHP subsequently responded to comments on 9 February 2022:</p> <table border="1" data-bbox="409 688 2279 1942"> <thead> <tr> <th data-bbox="409 688 460 720"></th> <th data-bbox="460 688 1397 720">DoT MEER Comment</th> <th data-bbox="1397 688 2279 720">BHP Response to Comment</th> </tr> </thead> <tbody> <tr> <td data-bbox="409 720 460 863">1</td> <td data-bbox="460 720 1397 863">The Pyrenees Phase 4 Infill Drilling Program Oil Pollution Emergency Plan (OPEP) makes reference to the Department of Transport's (DoT) Marine Safety General Manager as being the Hazard Management Agency (HMA). 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Under moderate wind speeds of 5 m/s, approximately 12% of the surface slick is predicted to evaporate after 5 days, with ~8% dispersed to the water column and the remaining 80% persisting as floating oil. High wind speeds of 10 m/s are predicted to disperse the oil more rapidly, with ~60% entrained to the water column after 5 days, ~15% evaporated and ~25% remaining on the surface. 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The First Strike Plan covers the first 24 hours of activity during the initial response phase.</p> <p>Section 6.10 of Rev 1 of the OPEP has been amended to include agreement of 'end point criteria' with the Controlling Agency.</p> <p>Section 7.2.11 (Shoreline Protection) of Rev 1 of the OPEP: Basis of Design and Field Capability Assessment (Appendix B of the Pyrenees Phase 4 Infill Drilling Program OPEP) has been amended to include WA DoT notification of a spill event and the potential mobilisation of resources if there is a potential for a spill to impact</p>
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	<p>9 Section 6.10 states that the Termination Criteria for Shoreline Clean-up response is 'When acceptable levels of cleanliness (endpoint criteria) have been met and signed off consistent with National Plan Response, Assessment and Termination of Cleaning for Oil Contaminated Foreshores (NP-GUI-025) (2015).' This needs to include detail around the fact that end-point criteria would need to be agreed with the Controlling Agency.</p>	<p>Section 6.10 of Rev 1 of the Pyrenees Phase 4 Infill Drilling Program OPEP has been amended to include agreement of 'end point criteria' with the Controlling Agency: 'When acceptable levels of cleanliness (endpoint criteria), as agreed with Controlling Agency, have been met and signed off consistent with National Plan Response, Assessment and Termination of Cleaning for Oil Contaminated Foreshores (NP-GUI-025) (2015).'</p>	<p>State waters and lands. Likewise corresponding Environmental Performance Standards (EPSs) have also been updated throughout the document.</p>
<p>10 Please provide some more details on the procedures for preparation of the Incident Action Plan.</p>	<p>The overarching incident management process for the BHP Petroleum Australia is described within the BHP Incident Management Plan (AOHSE-ER-0001). The Incident Action Planning (IAP) process is described in detail within this document and is consistent with the Incident Command System (ICS) management system including the Planning 'P' Cycle.</p> <p>The following text has been extracted from the BHP Incident Management Plan for DoT information:</p> <p>An Incident Briefing Document (ICS-201) acts as the Incident Action Plan (IAP) for the initial response and is used & updated until Planning prepares the first incident IAP. The Incident Briefing Document is approved by the Incident Commander and establishes a permanent record of the initial response to the incident. Data can be inputted from the IMT status boards to provide a concise written report.</p> <p>**The Incident Briefing Document may be sent to the EMT and appropriate government agencies so shall be approved by the Incident Commander before issuance.**</p> <p>For an extended response an IAP is prepared for the next operational period and is approved by the Incident Commander.</p> <p>The IAP consists of several forms based on the Incident Command System (ICS). The forms required will depend on the event being managed but is likely to include the following:</p> <ul style="list-style-type: none"> - ICS 201: Incident Briefing Document - ICS 202: Incident Objectives - ICS 207: Org Structure in a diagram format - ICS 204: Assignment List - ICS 206: Medical Plan - ICS 208: Safety plan - ICS 215: Operational Planning Worksheet - ICS 232: Resources at Risk <p>ICS forms are located on EMQNet.</p>		
<p>11 Is there a specific communications/media plan?</p>	<p>BHP do not have a specific communications / media plan. However, during an incident response, it would be the responsibility of the Public Information Officer within the IMT (refer Figure 2-2 and Table 2-2 of the APU IMT Capability Assessment Report) to manage media and stakeholder communications. The IMT Public Information Officer is further supported by the BHP Corporate Affairs Crisis Communication function.</p>		
<p>12 Appendix A, Section 3.1.1 states that 'Once in the role IMT members are required to participate in regular desktop exercises and major exercises as described above.' Please clarify what this is referring to in regards to major exercises.</p>	<p>Section 10.6.8 of the Pyrenees Phase 4 Infill Drilling Program Environment Plan (BHPB-04PY-N950-0021) describes three styles of exercise utilised to test response arrangements as:</p> <ul style="list-style-type: none"> • Notification Exercise; • Desktop / Discussion Exercise (DISCEX) in the form of a workshop; and • Major / Functional Exercise in the form of a scenario-based simulation (No actual deployment of equipment) <p>Further, BHP has committed to conduct a major / functional exercise at least 1 month prior to the commencement of drilling activities based upon a WCD (LOWC) scenario within the Pyrenees Field.</p>		
<p>13 Appendix B, Section 7.2.11 makes reference to mobilising first strike crews for a spill event that has the potential to impact State lands. We request notification of spills and potential mobilisation of resources if there is the potential for a spill to impact State waters.</p>	<p>Section 7.2.11 (Shoreline Protection) of Rev 1 of the Pyrenees Phase 4 OPEP: Basis of Design and Field Capability Assessment (Appendix B of the Pyrenees Phase 4 Infill Drilling Program OPEP) has been amended to include WA DoT notification of a spill event and the potential mobilisation of resources if there is a potential for a spill to impact State waters and lands. Likewise corresponding Environmental Performance Standards (EPSs) have also been updated throughout the document.</p>		

Organisation	Summary of Stakeholder and Titleholder Correspondence, and Any Objections and Claims Made	Assessment of Stakeholder Objections and Claims
	<p>DoT responded on 16 February 2022: DoT requested further clarification around the response to question 4 regarding shortest arrival time of oil accumulation above the moderate threshold (100g/m²) of 0.9 days on Muiron Islands and the shortest arrival times for surface oiling (at a moderate threshold (10 g/m²)) from a potential crude release to enter State waters of 1.1-1.8 days (26-43 hours) for waters surrounding Muiron Islands and Ningaloo State Marine Park respectively.</p> <p>BHP responded on 22 February 2022: It is possible for shoreline oiling at 100 g/m² concentration to occur without surface oil in the near-shore waters exceeding 10 g/m² given oil becomes concentrated when it is stranded on a shoreline. When considering a surface slick with a certain mass, the width of that slick may be relatively wide (tens or hundreds of metres in width). When it becomes stranded on a shoreline, the oil is concentrated onto a narrow shoreline (a few metres in width), so even without changing the mass, the concentration (mass per area) increases because the area has decreased.</p> <p>In the model, surface concentrations are calculated by dividing the mass of oil in a cell by the full cell area (width times height of the cell), whereas for shoreline concentrations, the shoreline area is defined in the model as a 2 m wide strip with length equal to the diagonal of the cell. The modelled shoreline areas are therefore several orders of magnitude smaller than the adjacent ocean cells. Therefore, it is possible to see shoreline accumulation at 100 g/m² even when the surface oil concentration is below 10 g/m². This explains the scenario predicted by the modelling whereby shoreline contact at 100 g/m² contact is predicted to occur at Muiron Islands as early as 0.9-1.7 days, while contact by surface oil above 10 g/m² is not predicted until 1.1-1.8 days.</p> <p>DoT responded on 28 February 2022: DoT thanked BHP for responding to all of the Department's questions and confirmed that the Department had no further comments.</p>	<p>BHP notes DoT request for clarification and responded on 22 February 2022. No further actions required.</p> <p>All comments closed and no further actions required.</p>
	<p>Shoreline Clean-up Assessment Technique (SCAT): DoT advised:</p> <ul style="list-style-type: none"> DoT would initially deploy a Rapid Assessment Team from DoT Exmouth Office upon notification of an emergency oil spill event. Initial assessment team would supply visual monitoring information to DoT IC. DoT have 3x SCAT field kits in WA with the closest available in Karratha approx. 6 hours drive from Exmouth Gulf. Given the remote location and potentially inaccessible coastline, drone technology would be an appropriate method of conducting SCAT. Priority should be given to evaluation of shoreline at moderate (approx. 100 g/m²) loadings rather than lower thresholds. <p>Shoreline Protection & Deflection: DoT advised:</p> <ul style="list-style-type: none"> DoT have 3x inshore booming kits in WA with the closest available in Karratha approx. 6 hours drive from Exmouth Gulf. DoT expectation is that BHP would initially supply an additional 5x inshore booming kits for deployment to TRP locations (pending operational monitoring results). <p>Shoreline Clean-up: DoT advised:</p> <ul style="list-style-type: none"> An appropriate 'bulking factor' for the calculation of potential oil contaminated shoreline waste would be 10x the volume of the oil stranded on the shoreline. This bulking factor is consistent with AMSA guidance. DoT have 3x shoreline clean-up kits (trailers with equipment) each of which can supply resources for approximately 25 response personnel (depending on location, logistics, access etc.). Shoreline clean-up kit resources can be resupplied as required after the initial response. DoT expectation is that BHP would initially supply an additional 5x shoreline clean-up kits for deployment to TRP locations (pending operational monitoring results). 	<p>As above.</p>
<p>Director of National Parks (DNP)</p>	<p>DNP was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021. DNP responded on 17 September 2021 with the following response :</p> <ol style="list-style-type: none"> Based on the information sheet provided, DNP noted that the planned activities do not overlap any Australian Marine Parks. DNP stated that the Crosby-3H1 well and Stickle-4H1 well were near Ningaloo Marine Park and Gascoyne Marine Park, as such, activities undertaken may affect the values present in these Marine Parks. Based on the map provided, DNP noted that the following Key Ecological Features (KEF) are present in the operational area: <ul style="list-style-type: none"> - Continental Slope Demersal Fish Communities - Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula - Commonwealth waters adjacent to Ningaloo Reef - Ancient coastline at 125m depth contour. <p>DNP advised that these KEFs were identified values of the Gascoyne and Ningaloo Marine Parks and activities that could affect these features should be factored into risk assessments.</p> DNP noted that the information sheet also outlined that the EP was being written to allow the activity to occur at any time of year. DNP advised that there are species of marine fauna which use these areas for activities such as foraging and migration, and that these types of marine fauna were identified values of the Gascoyne and Ningaloo Marine Parks and activities that could affect these species should be factored into risk assessments. <p>Noting the values present within and adjacent to the proposed operational area, we make the following claims and objections:</p> <p>DNP claims and objections</p> <ol style="list-style-type: none"> Detailed consideration given to the: 	<p>BHP notes DNP's comments in relation to AMPs and KEFs. BHP notes DNP's objections and claims relating to potential impacts to marine turtles, marine mammals and whale sharks and engagement with the Gnulli people. BHP notes DNP's advice on Marine Park values and N.W. MP Management Plan 2018, and DNP 24-hr emergency contact details. BHP has described the values in DNP's feedback in:</p> <ul style="list-style-type: none"> EP s4.6 'Marine Mammals' EP s4.7 'Marine Reptiles' EP s4.8 'Fish, Shark & Rays' EP s4.10.1 'AMPs' EP s4.10.3 'KEFs' EP s4.11.1 'Cultural Heritage'

Organisation	Summary of Stakeholder and Titleholder Correspondence, and Any Objections and Claims Made	Assessment of Stakeholder Objections and Claims
	<ul style="list-style-type: none"> - impacts upon the flatback, green, loggerhead and hawksbill turtles which are present in the title area and display inter-nesting behaviour - impacts upon the whale shark, humpback whale and pygmy blue whale which are present and include migration and foraging, particularly given that activities are planned to occur at any time during the year. <p>5. DNP noted that there may also be cultural values present and requested advice from BHP on whether it intended to engage with the Gnulli people, who have responsibilities for sea country in the Gascoyne Marine Park. DNP advised that the Yamatji Aboriginal Corporation was the Native Title Representative Body for the Yamatji region.</p> <p>Guidance Information</p> <p>6. DNP advised that NOPSEMA had worked closely with Parks Australia to develop and publish a guidance note that outlines what titleholders need to consider and evaluate in the preparation of Environment Plans. In preparing the EP, Australian marine parks and their representativeness should be considered. In the context of the management plan objectives and values, the EP should:</p> <ul style="list-style-type: none"> - identify and manage all impacts and risks on Australian Marine Park values (including ecosystem values) to an acceptable level and has considered all options to avoid or reduce them to as low as reasonably practicable. - clearly demonstrate that the activity will not be inconsistent with the management plan. <p>7. DNP provided a link to the North-west Marine Parks Network Management Plan 2018 (management plan) which provides information on values for Gascoyne Marine Park and the Australian Marine Parks Science Atlas which provides further information on marine park values.</p> <p>Emergency response</p> <p>8. DNP provided contact details for the 24 hour Marine Compliance Duty Officer and its expectations for notification in the event of a marine pollution incident which occurs within or is likely to impact on a marine park.</p> <p>BHP responded on 16 November 2021 with the following response:</p> <ol style="list-style-type: none"> 1. BHP confirmed that planned activities do not overlap any Australian Marine Parks, but based on the proximity of the operational area to the Ningaloo Marine Park (13 km) and the Gascoyne Marine Park (16 km), the EP will consider potential risks and impacts from planned activities to the values present in the Marine Parks. 2. BHP noted DNP feedback on the Key Ecological Features. The operational area is defined as a 2 km radius around each of the two well centres. BHP has undertaken EPBC Act protected matters searches of the operational area along with interrogation of the National Conservation Values Atlas. The results confirm that only one KEF overlaps with the operational area: <ul style="list-style-type: none"> - Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula. 3. BHP confirmed that the EP will consider potential risks and impacts to the KEF from the proposed activities as well as the marine fauna that use the KEF for activities such as foraging and migration. <p>DNP claims and objections</p> <p>4. With respect to DNP's claims and objections, BHP confirms consideration in the Environment Plan has been given to:</p> <ul style="list-style-type: none"> - Potential impacts and risks to the flatback, green, loggerhead and hawksbill turtles, including potential impacts to biologically important behaviour and to any habitat critical to the survival of a species. - Potential impacts and risks to the whale shark, humpback whale and pygmy blue whale, including potential impacts to biologically important behaviour. - Potential impacts and risks to other Threatened and Migratory species which may occur or have habitat that may be present. <p>5. BHP noted that while there are no registered Indigenous sites within the operational area it has provided information about planned activities to the Yamatji Marlpa Aboriginal Corporation on behalf of the Nganhurra Thanardi Aboriginal Corporation, which is the Prescribed Body Corporate for native title matters in the northern part of the Gnulli native title determination (including North West Cape).</p> <p>Guidance information</p> <p>6. BHP confirmed that the Environment Plan has been developed consistent with NOPSEMA's Guidance Note on Petroleum Activities and Australian Marine Parks (NOPSEMA, 2020).</p> <p>7. BHP noted references provided by DNP on its consultation expectations and considerations for proponents in developing Environment Plans.</p> <p>Emergency response</p> <p>8. BHP noted DNP's expectations for notification in the event of a marine pollution incident that occurs within a marine park or is likely to impact on a marine park.</p>	<p>BHP has evaluated the potential impacts and risks on the values identified by DNP within EP s7 & s8.</p> <p>BHP has addressed DNP's feedback in relation to emergency response notification in EP s10.5.3.</p> <p>BHP has responded to DNP's objections and claims and considers it has addressed the stakeholder's feedback and no further consultation is required.</p>
Other Operators		
Santos	Santos was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021.	No response has been received from Santos at the time of submission of the EP. BHP will address any comments from this stakeholder should they arise in the future.
Woodside Energy	Woodside Energy was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021.	No response has been received from Woodside Energy at the time of submission of the EP.

Organisation	Summary of Stakeholder and Titleholder Correspondence, and Any Objections and Claims Made	Assessment of Stakeholder Objections and Claims
<p>BHP will address any comments from this stakeholder should they arise in the future.</p>		
<p>Fishing Bodies / Industry Representative Organisations</p>		
<p>Australian Southern Bluefin Tuna Industry Association (ASBTIA)</p>	<p>ASBTIA was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021.</p>	<p>No response has been received from ASBTIA at the time of submission of the EP. BHP will address any comments from this stakeholder should they arise in the future.</p>
<p>Commonwealth Fisheries Association (CFA)</p>	<p>CFA was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021.</p>	<p>No response has been received from CFA at the time of submission of the EP. BHP will address any comments from this stakeholder should they arise in the future.</p>
<p>Pearl Producers Association (PPA)</p>	<p>PPA was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021.</p>	<p>No response has been received from PPA at the time of submission of the EP. BHP will address any comments from this stakeholder should they arise in the future.</p>
<p>Recfishwest</p>	<p>Recfishwest was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021. Recfishwest responded on 28 July 2021 with the following response: 1. Please direct future emails of this nature to [name and contact details supplied] who will be the primary contact for consultation on such matters going forward BHP forwarded on 29 July 2021 its original email and Fact Sheet to the new contact provided by Recfishwest.</p>	<p>No response has been received from Recfishwest at the time of submission of the EP. BHP will address any comments from this stakeholder should they arise in the future.</p>
<p>Western Australian Fishing Industry Council (WAFIC)</p>	<p>WAFIC was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021. WAFIC responded on 22 August 2021 with the following response: 1. In the Oil Pollution Emergency plan can BHP confirm they have the following: a. Communication strategy that considers the commercial fishing industry in the event of a spill event b. Support to the commercial fishing industry with regards to traceability of fish products to manage tainting risks, if required. c. Financial assistance to the commercial fishing industry in the event of a spill event. BHP responded on 26 August 2021 with the following response: 1. BHP has considered the commercial fishing industry in the planning and development of management measures in the unlikely event of a marine pollution incident, including notifications and ongoing communications with Government agencies, commercial fishing licence holders and their representative organisations. 2. An Operational and Scientific Monitoring Program will form part of the Oil Pollution Emergency Plan, with specific reference to hydrocarbon monitoring of representative commercial and recreational fishing species. 3. BHP will engage with stakeholders who consider themselves affected in the event of a marine pollution event, with a view to resolving grievances or claims in a prompt manner. 4. BHP shall engage with potentially affected commercial fishing licence holders and their representative organisations in the event of a marine pollution incident, and where post spill scientific monitoring indicates a potential for oil tainting of commercial fish species.</p>	<p>BHP has responded to WAFIC's request for information and considers it has addressed the stakeholder's feedback and no further consultation is required.</p>
<p>Commercial Fisheries – State Managed</p>		
<p>Western Australian Fisheries: - Mackerel Managed - Pilbara Demersale Scale (Line) Fishery - West Coast Deep Sea Crustacean</p>	<p>Licence holders were emailed and provided with hard copies (by post) of the Pyrenees Infill Drilling Environment Plan Fact Sheet (Fishing Sector focused) and cover letter from 22-23 July 2021.</p>	<p>No response has been received from State managed fishery licence holders at the time of submission of the EP. BHP will address any comments from this stakeholder should they arise in the future.</p>
<p>Other Groups / Organisations</p>		
<p>Cape Conservation Group</p>	<p>Cape Conservation Group was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021 by way of consultation to the Exmouth CRG. The Cape Conservation Group was also represented at the CRG meetings on 19 August and 4 November 2021.</p>	<p>No response has been received from CCG at the time of submission of the EP. BHP will address any comments from this stakeholder should they arise in the future.</p>

Organisation	Summary of Stakeholder and Titleholder Correspondence, and Any Objections and Claims Made	Assessment of Stakeholder Objections and Claims
Exmouth CRG	<p>The Exmouth CRG was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021.</p> <p>A presentation about the proposed Activity was made to the CRG on 19 August 2021 along with an update to the CRG on 4 November 2021.</p>	<p>No issues or concerns raised by CRG members.</p> <p>BHP will address any comments from this stakeholder should they arise in the future.</p>
Exmouth Game Fishing Club	<p>WAFIC was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021 by way of consultation to the Exmouth CRG.</p>	<p>No response has been received from EGFC at the time of submission of the EP.</p> <p>BHP will address any comments from this stakeholder should they arise in the future.</p>
Australian Maritime Oil Spill Centre (AMOSOC)	<p>AMOSOC was provided the Pyrenees Infill Drilling Environment Plan Fact Sheet by email on 22 July 2021.</p> <p>AMOSOC was also in attendance at the Pyrenees Phase 4 Infill Drilling Program State Oil Spill Response Workshop held jointly with Western Australian Department of Biodiversity, and Conservation and Attractions (DBCA) on 17th September 2021. AMOSOC was also included within subsequent communications with both the DoT and DBCA following the workshop.</p>	<p>No concerns were raised by AMOSOC during the workshop.</p> <p>The OPEP and associated documents are consistent with the AMOSPlan.</p> <p>The OPEP and associated documents shall be supplied to AMOSOC prior to undertaking the activity.</p>

5.2 Ongoing Consultation

Stakeholder consultation will be ongoing and BHP will work with stakeholders to address any future concerns if they arise throughout the validity of this EP. Should any new stakeholders be identified, they will be added to the stakeholder database and included in all future correspondence as required.

BHP's commitments to ongoing consultation include:

- Providing pre-start, end of activity notifications and activity updates as requested requested by relevant stakeholders;
- Regular Exmouth CRG meetings;
- Responding in a timely manner to all stakeholder and community contact regarding the proposed Pyrenees Phase 4 infill drilling activities;
- Stakeholders who raise objections and claims following EP submission will be responded to directly, and should any concerns raised have not already been addressed in the EP, these will be assessed in the same manner as all risks identified by BHP; and
- In the event of a marine pollution incident, and where post spill scientific monitoring indicates a potential for oil tainting of commercial fish species, BHP shall engage with potentially affected commercial fishing licence holders and their representative organisations.

6 Environmental Risk Management Framework

BHP has established a risk management governance framework with supporting processes and performance requirements that provide an overarching and consistent approach for the identification, assessment, and management of risks. BHP policies have been formulated to comply with the intent of the Risk Management Policy and be consistent with the AS/ISO 31000-2018 Risk Management Principles and Guidance.

An integrated impact and risk assessment process was utilised to identify the most appropriate control measures to ensure each impact and risk is reduced to ALARP and an acceptable level (Figure 6-1). This process includes the incorporation of stakeholder consultation, regulatory requirements, industry good practice and environmental monitoring data on the relevant environmental impacts and risks.

6.1 Evaluation of Impacts and Risks

A formal impact and risk assessment was completed for each environmental aspect and source of risk for the petroleum activity described in Section 3 using the Environmental Impact Identification (ENVID) workshop process. The primary objective of the impact and risk assessment was to develop an understanding of the impact and risk, demonstrate its reduction to ALARP and demonstrate its acceptability to BHP. It provided definition on the decisions made during the ENVID process, considering the detailed impact assessment for the sources of hazard, the controls chosen to reduce or prevent the impact or risk and why some controls were not chosen. This also involved consideration of the sources of risk, their positive and negative consequences, and the likelihood that those consequences may occur.

The ENVID assessment was conducted as a workshop with a range of personnel from different disciplines including Subsea and Production Engineering, Drilling and Completions, Risk and HSE. Decisions made within the ENVID included:

- Confirmation of the sources of hazard identified;
- Allocation of likelihood rating for an unplanned source of hazard;
- Severity rating for all sources of hazard;
- The decision context (Type A, B or C) and a determination as to whether they are higher-order or lower-order impacts and risks;
- Identification of management controls and their acceptance through an ALARP process based upon the decision context; and
- Final acceptability of the impact or risk to BHP using the acceptability criteria.

The outcome of the assessment process illustrated in Figure 6-1 is displayed in Sections 7 and 7.3 using a series of summary tables, detailed impact and risk descriptions, and impact and risk conclusions. All environmental aspects and their respective sources of hazard are as follows:

- Overview of the source of risk;
- Environmental impact assessment;
- Demonstration of ALARP; and
- Demonstration of acceptability.

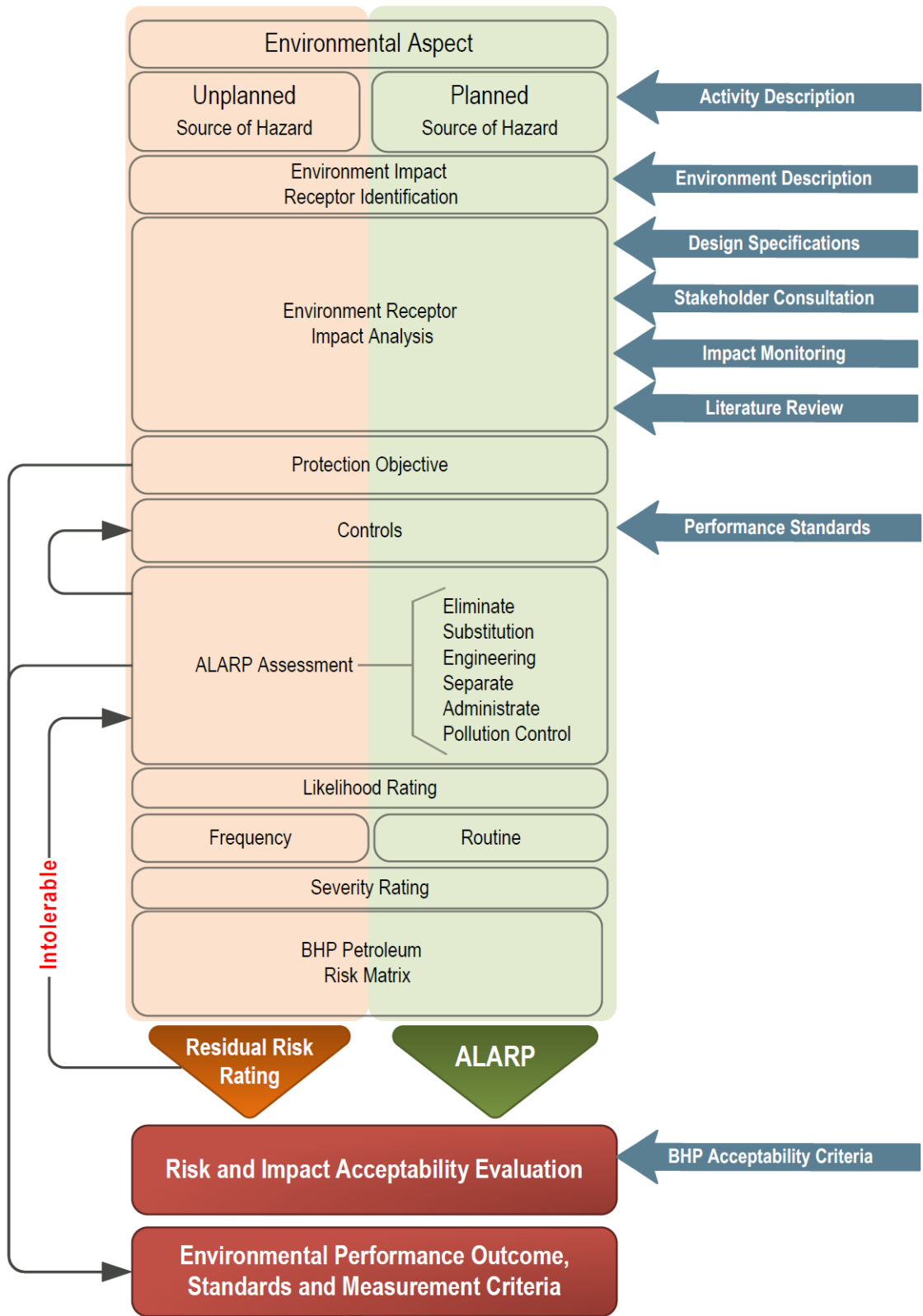


Figure 6-1: Environment Plan integrated impact and risk assessment

6.1.1 Decision Context

Consistent with the UKOOA Framework for Risk Related Decision Support (Oil & Gas UK, 2014), BHP has applied a series of decision criteria to determine whether impacts and risks created during the *Pyrenees Phase 4 Infill Drilling Program* constitute 'lower-order' or 'higher-order' impacts and risks and subsequently how each are managed to ALARP and acceptable levels. This approach implies a level of proportionality wherein the principles of decision-making applied to each particular hazard are proportionate to acceptability of environmental risk of that hazard.

BHP considers lower-order (or 'Type A') impacts or risks as those that:

- are well understood;
- are derived from standard, non-complex, or routine operations familiar to BHP;
- there are clearly defined regulatory, corporate or industry (good practice) controls to manage the impact or risk;
- there are no concerns or objects from relevant Stakeholders;
- the 'severity level' for planned operations (impacts) and unplanned events (risks) does not exceed '2' based upon BHP severity level definition (Table 6-2); and
- the 'likelihood' for unplanned events is either 'unlikely' or 'highly unlikely' based upon the BHP likelihood definitions (Table 6-3).

BHP considers higher-order (or 'Type B') impacts or risks as those that:

- are not well understood or there is some uncertainty;
- are derived from complex operations not routinely undertaken by BHP;
- regulatory, corporate or industry (good practice) controls require additional definition or validation;
- there have been some concerns or objections raised by relevant Stakeholders;
- the 'severity level' for planned operations (impacts) and unplanned events (risks) is '3' based upon BHP severity level definition (Table 6-2); and/or
- the 'likelihood' for unplanned events is considered 'probable' to 'highly likely' based upon the BHP likelihood definitions (Table 6-3).

BHP considers highest-order (or 'Type C') impacts or risks as those that:

- are not understood or there is a high degree of uncertainty;
- are derived from operations not previously undertaken by BHP;
- corporate or industry (good practice) controls either do not exist or are insufficient to manage impacts or risks;
- there have been multiple concerns or objections raised by relevant Stakeholders and/or lobby groups;
- the 'severity level' for planned operations (impacts) and unplanned events (risks) is equal to or exceeds '4' based upon BHP severity level definition (Table 6-2); and
- the 'likelihood' for unplanned events is considered 'probable' to 'highly likely' based upon the BHP likelihood definitions (Table 6-3).

The decision-making principles described above are consistent with the precautionary principle (as defined in the EPBC Act) and provide assurance that the environmental impacts and risks are reduced to ALARP and of an acceptable level.

6.1.2 Environmental Impact and Risk Assessment

The environmental impacts were based on the environmental receptors identified in Section 4 with the impact descriptions developed in an initial screening process that identified the specific receptor that may be impacted. Further quantitative or qualitative definition of the impact was then completed to ensure an understanding of the impact (planned or unplanned) to confirm that the severity of the risk and impact was correctly assigned during the evaluation process.

6.1.3 Planned Activity Impact Assessment

All planned activities were assessed as being a routine impact and defined as such in the ENVID. The description and degree of impact formed the basis for the severity rating applied with a quantitative assessment of impact conducted where possible to ensure the impact was well understood and clearly categorised on the severity table. Where this was not possible, a robust qualitative assessment was completed and the severity rating assigned during the ENVID process in accordance with the BHP HSE Risk Matrix, which is consistent with the BHP Our Requirements Risk Management Severity Table (Table 6-2) taking into account any of the mitigative controls assigned. Where relevant, the potential for cumulative impacts or potential impacts to the values of World Heritage Properties from planned activities has also been evaluated. Given routine operations are planned, and impacts are mitigated via the application of control measures, likelihood or residual risk ratings were not applied.

6.1.4 Unplanned Event Risk Assessment

Risk ranking of unplanned events is the product of the consequence of an event (severity) and the likelihood of that event occurring.

Likelihood and potential severity ratings were assigned in accordance with the BHP Risk Matrix (Table 6-1), which allowed the risk of individual events to be categorised in a methodical and structured process. This was completed based upon judgement by the ENVID assessment team with detailed potential impact descriptions used to ensure a robust and comprehensive decision.

The likelihood rating is based on the frequency of the source of hazard actually occurring with all preventative controls taken into consideration (Table 6-3).

The potential severity rating was determined based on the potential impact that may occur once the source of hazard had occurred considering the application of mitigative controls in place to reduce the impact.

6.1.5 Spill Response Strategy Implementation Impact and Risk Assessment

A description of potential impacts and risks associated with the implementation of spill response strategies is detailed within the *Pyrenees Phase 4 Basis of Design and Field Capability Assessment* (BHPB-04PY-N950-0002). This qualitative assessment informs the operational Spill Impact Mitigation Assessment (SIMA) processes and IAP development during and emergency oil spill response.

Table 6-1: BHP risk matrix used for rating planned activities and unplanned events

Likelihood	Severity Level				
	1	2	3	4	5
Highly Likely	30	90	300	900	3000
Likely	10	30	100	300	1000
Probable	3	9	30	90	300
Unlikely	1	3	10	30	100
Highly Unlikely	0.3	0.9	3	9	30

Table 6-2: BHP severity level definitions for environmental and community

Severity Level	Descriptor	Severity Factor
5	Severe impact to the environment and where recovery of ecosystem function takes 10 years or more; or Severe impact on community lasting more than 12 months or a substantiated human rights violation impacting 6 or more people	1000
4	Serious impact to the environment, where recovery of ecosystem function takes between 3 and up to 10 years; or Serious impact on community lasting 6-12 months or a substantiated human rights violation impacting 1-5 persons	300
3	Substantial impact to the environment, where recovery of ecosystem function takes between 1 and up to 3 years; or Substantial impact on community lasting 2-6 months	100
2	Measurable but limited impact to the environment, where recovery of ecosystem function takes less than 1 year; or Measurable but limited community impact lasting less than one month	30
1	Minor, temporary impact to the environment, where the ecosystem recovers with little intervention; or Minor, temporary community impact that recovers with little intervention	10

Table 6-3: BHP likelihood definitions

Uncertainty	Frequency	Likelihood factor
Highly Likely	Likely to occur within a 1 year period.	3
Likely	Likely to occur within a 1 - 5 year period.	1
Probable	Likely to occur within a 5 - 20 year period.	0.3
Unlikely	Likely to occur within a 20 - 50 year period.	0.1
Highly Unlikely	Not likely to occur within a 50 year period.	0.03

6.2 Demonstration of ALARP

Regulation 10A(b) of the Environment Regulations requires demonstration that the environmental impacts and risks of the activity will be reduced to as low as reasonably practicable (ALARP).

6.2.1 Planned Activity and Unplanned Event ALARP Evaluation

This section details the process for demonstrating ALARP for both planned routine operations and unplanned events.

Demonstrating ALARP for lower-order ('Type A') impacts or risks

When an impact or risk has been evaluated as 'lower-order' based upon the Decision Context detailed in Section 6.1.1, and identified regulatory, corporate and/or industry good practice controls are implemented, BHP considers the impact or risk to be managed to ALARP and no further detailed engineering evaluation of controls is required. The application of feasible and readily implementable alternate, additional, or improved controls may be adopted opportunistically when demonstrated to further reduce potential environmental impacts or risks.

Demonstrating ALARP for higher-order ('Type B') impacts or risks

When an impact or risk has been evaluated as higher-order based upon the Decision Context detailed in Section 6.1.1, in addition to relevant regulatory, corporate and/or industry good practice controls being implemented, alternate, additional or improved controls should be proposed and evaluated according to their feasibility, reasonableness, and practicability to implement to further reduce the potential for impacts and risks associated with the activity. BHP apply a cost benefit analysis when evaluating additional controls and apply those that are both feasible and where the cost (safety / time / effort / financial) are not grossly disproportionate to the potential reduction in environmental impact or risk afforded by the control.

Demonstrating ALARP for highest-order ('Type C') impacts or risks

When an impact or risk has been evaluated as highest-order based upon the Decision Context detailed in Section 6.1.1, alternate, additional or improved controls over and above relevant regulatory, corporate and/or industry good practice must be proposed and evaluated based upon a precautionary approach, ensuring any and all feasible controls that have the potential to reduce environmental impacts and risks are implemented, when safe to do so and irrespective of the additional effort, time or financial cost associated with the implementation of the control.

Hierarching of Controls and Emissions Reduction Hierarchy

When evaluating additional controls for 'Type B' and 'Type C' impacts and risks associated with each aspect of the activity with the exception of atmospheric emissions, BHP applied the hierarchy of controls as defined below and illustrated in Figure 6-2:

- Eliminate – Remove the source preventing the impact, i.e. eliminate the hazard;
- Substitution – Replace the source preventing the impact;
- Engineering – Introduce engineering controls to prevent or control the source having an impact;
- Separate – Separate the source from the receptor preventing impact;
- Administrate – Procedures, competency and training implemented to minimise the source causing an impact;
- Pollution Control – Implement a pollution control system to reduce the impact;
- Contingency Planning – Mitigate control reducing the impact; and
- Monitoring – Program or system used to monitor the impact over time.

The general preference is to accept controls that are ranked in the Tier 1 categories of Eliminate, Substitute, Engineering and Separate as these controls provide a preventive means of reducing the likelihood of the hazard occurring over and above Tier 2 controls.

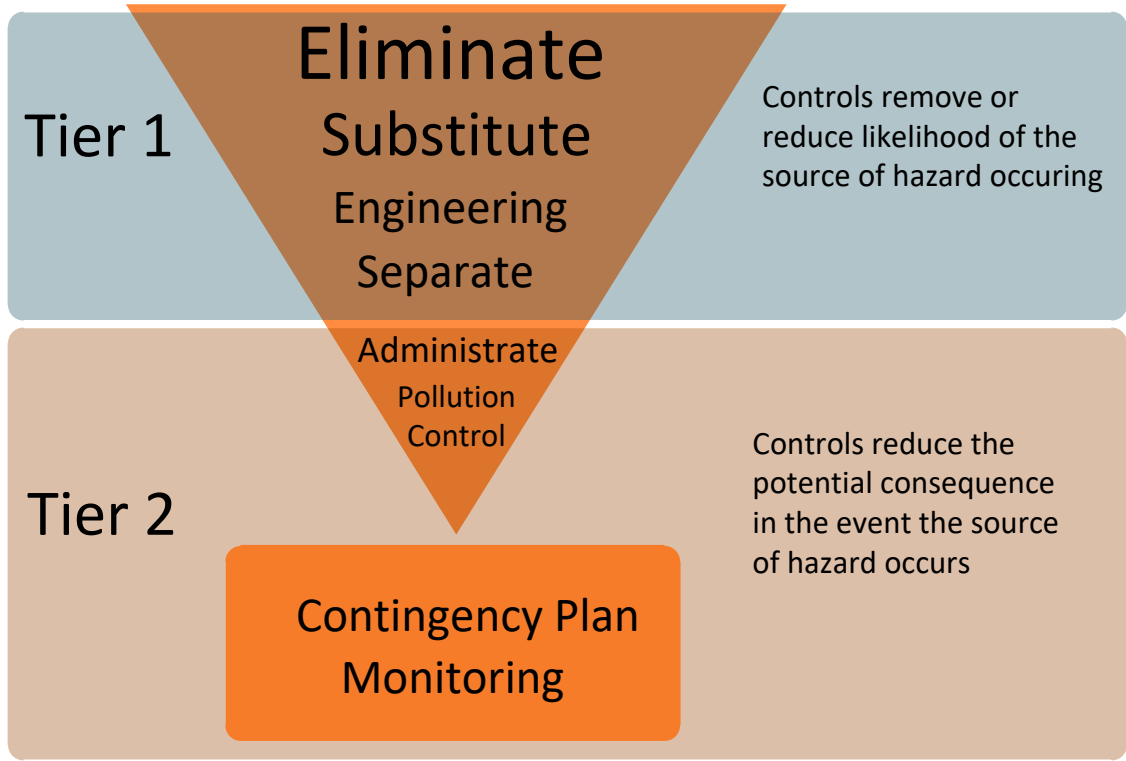


Figure 6-2: Hierarchy of control framework

For the evaluation of control measures to reduce atmospheric emissions associated with the activity to ALARP, BHP applied the emissions reduction hierarchy as detailed below:

- Avoid – Remove the use of emissions sources, i.e. eliminate the hazard;
- Reduce – Limit the amount of emissions generated during the activity, i.e., reduce overall emissions;
- Offset – Purchase carbon credits via accredited scheme proportional to the emissions produced;
- Substitute – Replace sources of emissions for lower emissions technology and/or renewable energy;
- Monitor – Program or system used to monitor emission types / volumes to inform reporting and/or feedback to reduction targets; and
- Advocacy – Actively promote controls that avoid or reduce emissions to both internal and external stakeholders with the aim of influencing the adoption of new or improved technologies and the adoption of reduction targets.

6.2.2 Spill Response Strategy Effectiveness and ALARP evaluation

This section provides detailed ALARP assessment of the adequacy of resourcing available to support the identified suitable response spill strategies detailed within the *Pyrenees Phase 4 OPEP: Basis of Design and Field Capability Assessment* (BHPB-04PY-N950-0002). In developing the environmental performance standards that apply to each response strategy, BHP has considered the level of performance that is reasonable to achieve for each control measures and the ‘effectiveness’ of the control measures.

The effectiveness of the control measures is assessed considering the following criteria and follows the definitions in NOPSEMA’s Control Measures and Performance Standards Guidance Note (NOPSEMA, 2012), with ranking provided in Table 6-4:

- Availability: the status of availability to BHP;
- Functionality: a measure of functional performance;
- Reliability: the probability that the control will function correctly;
- Survivability: the potential of the control measure to survive an incident;
- Independence / Compatibility: the degree of reliance on other systems and/ or controls, in order to perform its function.

Table 6-4: Criteria for ranking spill response effectiveness

Evaluation Criteria	Spill Response Effectiveness Ranking	
	Low	High
Availability	BHP does not have equipment/ resources on standby, or contracts, arrangements, and/ or MoU’s in place for the provision of equipment/ resources. BHP has internal processes and procedures in place to expedite timely provision of equipment/ resources.	BHP has equipment/ resources on standby, and/ or contracts, arrangements, or MoU’s in place for the provision of equipment/ resources.
Functionality	Implementation of the control measure does not greatly reduce the risk/ impact.	Implementation of the control measure has material difference in reducing the risk/ impact.
Reliability	The control measure is not reliable (e.g. has not been tried and tested in Australian waters) and/ or low assurance can be given to its success rate / effectiveness.	The control measure is reliable (e.g. has been tried and tested in Australian waters) and / or high assurance can be given to its success rate / effectiveness.
Survivability	Control measure has a low operating timeframe and will need to be replaced regularly throughout its operation period in order to maintain its effectiveness.	Control measure has a high operating timeframe and will not need to be replaced regularly throughout its operation period in order to maintain its effectiveness.
Independence/ Compatibility	Control measure is reliant on other control measures being in place and / or the control measure is not compatible with other control measures in place.	Control measure is not dependent on other control measures being in place and / or control measure can be implemented in unison with other control measures.

Each control was then evaluated taking into consideration the environmental benefit gained from implementation compared with its practicability (i.e. control effectiveness, cost, response capacity and implementation time) to determine if the control was either:

- Accept and implement; or
- Reject.

This traffic light system is used in the ALARP demonstration tables where the ‘do nothing’ option is rejected, along with a scalable option that generally involves mobilising spill response resources and equipment to site and on standby either within the Pyrenees Field, or located in Dampier or Exmouth. Accepted controls in all the ALARP demonstration tables indicate those that would be implemented as part of the response.

Applying principles similar to those presented within the UKOOA Framework for Risk Related Decision Support (Oil & Gas UK, 2014), as described in Section 6.1.1 of this EP, BHP has adopted the follow criteria for the determination of spill response strategy preparedness that present a lower-order risk compared to those that present a higher-order risk.

- A spill response strategy is determined to present a lower-order risk where all controls have been ranked as ‘high’ according to the criteria for ranking spill response effectiveness (Table 6-4) and

additional controls would unlikely reduce potential environmental impacts and risks further. As such, BHP considered 'Type A' spill response strategies to be managed to ALARP;

- A spill response strategy is determined to present a higher-order risk where one or more controls have been ranked as 'low' according to the criteria for ranking spill response effectiveness (Table 6-4) and additional controls would likely reduce potential environmental impacts and risks further. As such, alternate, additional or improved controls should be proposed in an attempt to increase their effectiveness ranking to 'high'. Where improved controls have been identified but are not readily available, and improvement plan has been developed to meet the oil spill response need prior to undertaking the activity.

BHP's ALARP assessment for resourcing for each spill response strategy is presented within *Pyrenees Phase 4 Basis of Design and Field Capability Assessment* (BHPB-04PY-N950-0002)

6.3 Demonstration of Acceptability

Regulation 10A(c) of the OPGGS (Environment) Regulations 2009 requires demonstration that the environmental impacts and risks of the activity will be of an acceptable (tolerable) level.

The demonstration of acceptability is completed independently of the ALARP evaluation as described above. However, as with the demonstration of ALARP, the demonstration of acceptability detailed below applies the decision-making principles described in Section 6.1.1 ensuring consistency with the precautionary principle when considering the acceptable levels of impact and risk caused by the activity.

Demonstrating acceptability for lower-order ('Type A') impacts or risks

When an impact or risk has been evaluated as 'lower-order' based upon the Decision Context detailed in Section 6.1.1, and identified regulatory, corporate and/or industry good practice controls consistent with relevant actions prescribed in listed species recovery plans, conservation advice and threat abatement plans (Table 4-12) are implemented, and the application of these controls clearly indicate the aspect-specific Environmental Performance Outcomes (EPOs) can be achieved, BHP considers the impact or risk to be managed to an acceptable level.

Demonstrating acceptability for higher-order ('Type B') impacts or risks

When an impact or risk has been evaluated as 'higher-order' based upon the Decision Context detailed in Section 6.1.1, acceptability of the impact or risk is evaluated based upon the following criteria:

- relevant regulatory, corporate and/or industry good practice controls have been identified and implemented (including consideration of relevant actions prescribed in recovery plans and approved conservation advice);
- the activity does not contravene any relevant Plan of Management for a World Heritage place, National Heritage place or Ramsar wetland identified within the EMBA;
- any alternate, additional, or improved controls adopted via the detailed engineering risk assessment have been/will be implemented to manage potential impacts and risks to ALARP;
- there are either no objections or claims made by relevant stakeholders for the aspect of the activity being assessed, or any objections or claims received from relevant Stakeholders are assessed for merit and controls adopted to address the objections or claims where merited;
- where industry good practice cannot be adopted, professional judgement made by subject matter experts used to evaluate acceptability of potential environmental impact or risk based upon adoption of alternate, additional, or improved controls identified during detailed engineering risk assessment;
- Consideration of relevant actions prescribed in listed species recovery plans, conservation advice and threat abatement plans (Table 4-12) have informed the development of control measures;
- Relevant principles of Ecologically Sustainable Development (ESD) (as defined within Section 3A of the EPBC Act) are considered with respect to:

- The 'Integration Principle' in the context of stakeholder engagement and the adoption of suitable controls where reasonably practicable;
- The 'Intergenerational Principle' in the context of considering how the activity may affect the health, diversity and productivity of the environment for future generations;
- The 'Biodiversity Principle' in the context of mitigating potential impacts and risks to matters of National Environmental Significance (MNES);
- For relevant aspects, such as oil pollution emergency response and remediation, the 'Valuation Principle' in the context of bearing the costs associated with the activity; and
- the application of adopted controls clearly indicate the aspect-specific Environmental Performance Outcomes (EPOs) can be achieved.

Demonstrating acceptability for highest-order ('Type C') impacts or risks

When an impact or risk has been evaluated as 'highest-order' based upon the Decision Context detailed in Section 6.1.1, the potential environmental impact or risk can only be deemed acceptable once the criteria for 'Type B' demonstration of acceptability detailed above has been met and:

- any alternate, additional, or improved controls adopted via the implementation of a precautionary approach (consistent with the 'Precautionary Principle' as defined within Section 3A of the EPBC Act) can demonstrate residual impacts have been lowered such that a severity level of '4' becomes 'unlikely' and / or the severity level of '5' becomes 'highly unlikely' based upon the BHP Risk Matrix (Table 6-1).

6.4 Environmental Performance Outcomes, Environmental Performance Standards and Measurement Criteria

Regulation 10A(d) of the Environment Regulations requires the EP provides appropriate environmental performance outcomes (EPOs), environmental performance standards (EPSs) and measurement criteria.

An objective of the EP is to ensure that all activities are carried out in accordance with appropriate EPSs thus ensuring EPOs are achieved. This requires (among other things) that appropriate measurement criteria for demonstrating that the EPSs have been met as defined within the EP.

Establishing outcomes and standards is a process that considers legal requirements, environmental risks (described in risk assessment presented Section 7 and Section 8) control measures (Section 7 and Section 8), and the views of interested parties (Section 5). The resulting outcomes and standards must be measurable where practicable and consistent with BHP Our Requirements.

6.4.1 Environmental Performance Outcomes

EPOs were developed during the ENVID process to ensure protection of the environment from the impact or risk and to ensure ongoing performance and measurability of the controls. All environmental impacts and risks are required to have at least one associated environmental performance outcome. These were developed using the below criteria:

- Specific to the source of hazard;
- Indicate what level of performance is required (e.g. 'No' impact, 'limited to...', or 'reduced to...');
- Contain a statement of measurable performance (where applicable);
- Consistent with legislative and HSE requirements; and
- Are achievable provided the proposed control measures and associated Environmental Performance Standards (EPSs) are implemented and effective.

Table 6-5 details the EPOs developed for the *Pyrenees Phase 4 Infill Drilling Program*, both in relation to planned activities and unplanned events.

Table 6-5: Pyrenees infill drilling environmental performance outcomes

EPO #	EPO Description	Relevant Aspect
EPO 01	No unplanned vessel interactions (including collision) or interference with defence activities	Physical Presence
EPO 02	Benthic habitat and biota disturbance limited to operational area	Benthic Habitat Disturbance
EPO 03	No physical and/or observable biologically significant behavioural disturbance on protected species (including breeding, foraging, resting or migration)	Light Emissions Noise Emissions Marine Fauna Interactions
EPO 04	Planned atmospheric emissions limited to those necessary to undertake the activity and maintain well integrity.	Atmospheric Emissions
EPO 05	Impacts to water quality from planned discharges reduced to ALARP	Routine & Non-Routine Discharges
EPO 06	No unplanned release of solid waste or objects to the marine environment	Waste Management Unplanned Discharge - Solids
EPO 07	No introduction of invasive marine species	Introduction of Invasive Marine Species
EPO 08	No accidental release of chemicals or hydrocarbons to the marine environment	Unplanned Discharges – Chemicals & Minor Hydrocarbon Spills Hydrocarbon Release – Loss of Flowline Inventory Hydrocarbon Release – Vessel Collision Hydrocarbon Release – Loss of Well Control

6.4.2 Environmental Performance Standards

An EPS is a statement of performance required of a control measure (a system, an item of equipment, a procedure or functional responsibility (person)), which is used as a basis for managing environmental impact and risk, for the duration of the activity.

There is a specific link between the EPOs, the EPSs and control measures; each EPO has one or more standards defining the performance requirement that needs to be met by a control measure to meet the EPO.

EPSs detailed within this EP are specific, measurable, and achievable.

6.4.3 Environmental Measurement Criteria

Measurement criteria have been assigned for each EPS as a means of validating that each EPO and EPS will be / has been met throughout the duration of the activity, thus continually reducing environmental impacts and risks to ALARP and acceptable levels.

All measurement criteria are designed to be inspected or audited via compliance assurance activities and enable a traceable record of performance to be maintained.

EPOs, EPSs and Measurement Criteria both in relation to planned activities and unplanned events (and prevention of unplanned events) have been consolidated in the Environmental Performance Section 9 of this EP.

EPOs, EPSs and Measurement Criteria relating to oil spill response preparedness are detailed within the *Pyrenees Phase 4 OPEP: Basis of Design and Field Capability Assessment* (BHPB-04PY-N950-0002).

EPOs, EPSs and Measurement Criteria relating to IMT capability and competency are detailed within the *APU Incident Management Team (IMT) Capability Assessment* (AOHSE-ER-0071).

EPOs, EPSs and Measurements Criteria for the effectiveness of the of response strategy implementation are detailed within the *Pyrenees Phase 4 Oil Pollution Emergency Plan* (OPEP) (BHPB-04PY-N950-0022).

7 Environmental Impact Assessment: Planned Activities

This Section of the EP presents the environmental impact and risk assessment for the planned petroleum activity described in Section 3 based on the Environmental Risk Management Framework described in Section 6.

7.1 Impact Assessment and Evaluation

The purpose of this Section is to address the requirements of Regulations 13(5) and 13(6) by providing an assessment and evaluation of all the identified impacts associated with the petroleum activity and associated control measures that will be applied to reduce the impacts to ALARP and an acceptable level.

The environmental aspects and sources of impacts identified during the ENVID process were divided into planned activities (i.e. routine operations) and unplanned (i.e. incidents) events. This Section presents the impact assessed for the planned activities identified for the petroleum activity. Section 8 presents the risk assessment for the unplanned events. Table 7-1 provides a summary of the impact analysis for the aspects associated with the planned activities. The following sub-sections provide a comprehensive impact assessment for each of the planned activities, and subsequent control measures to be implemented to reduce the impacts to ALARP and acceptable levels.

Table 7-1: Summary of the environmental impact analysis for planned activities

EP Section	Aspect	Value Potentially at Risk / Impact									Risk Assessment & Evaluation			
		Environmental						Socio-Economic			Severity Factor	Likelihood Factor	Residual Risk	Acceptability
Planned Activities	Marine Sediment	Water Quality	Air Quality	Ecosystems / Habitat	Marine Species	Marine Protected Areas	Key Ecological Features	Commercial Fisheries	Shipping Activities	Tourism and Recreation				
7.3	Physical presence													
	Timing of the activity and location of the MODU and AHTS vessels within the operational area					x		x	x					
	Presence of subsea infrastructure and mooring equipment							x	x					
7.4	Benthic disturbance													
	Running and retrieving of mooring equipment				x		x							
	Anchoring of AHTS vessels				x		x							
	Drill fluids, cuttings & cement displacement to seabed	x			x									
	ROV operations				x									
	Dropped objects				x									
7.5	Light emissions													
	MODU & support vessel operations within operational area				x	x	x							
7.6	Noise emissions													
	MODU operations within operational area					x								
	Vessel operations within operational area					x								

EP Section	Aspect	Value Potentially at Risk / Impact										Risk Assessment & Evaluation			
		Environmental					Socio-Economic								
Planned Activities		Marine Sediment	Water Quality	Air Quality	Ecosystems / Habitat	Marine Species	Marine Protected Areas	Key Ecological Features	Commercial Fisheries	Shipping Activities	Tourism and Recreation	Severity Factor	Likelihood Factor	Residual Risk	Acceptability
7.7	Routine and non-routine atmospheric emissions														
	MODU & support vessel operation			x								10	N/A	-	Tolerable
	Venting / flaring of hydrocarbon gas			x								10	N/A	-	Tolerable
7.8	Routine and non-routine discharges														
	Routine discharges from MODU and vessels: <ul style="list-style-type: none"> Sewage Grey water Desalination brine Cooling water Deck drainage Bilge water Putrescible (food) waste BOP control fluid 		x									10	N/A	-	Tolerable
	Drill cuttings discharge – surface		x									10	N/A	-	Tolerable
	Drill fluids discharge – surface		x									10	N/A	-	Tolerable
	Cement discharge – surface		x									10	N/A	-	Tolerable
7.9	Waste management														
	Waste generated by miscellaneous MODU & vessel operations: <ul style="list-style-type: none"> General (non-hazardous) waste Hazardous waste 											10	N/A	-	Tolerable

7.2 Environmental Impacts and Risks Excluded from the Scope of the Environment Plan

Several environmental impacts and risks were considered during the ENVID as not applicable within or outside of the operational area and hence were not considered to be within the scope of this Environment Plan.

7.2.1 Physical Presence – Interference with Tourism and Recreational Related Third Parties

No tourism or recreational activities are expected in the permit area given its remote location, lack of natural subsea features and water depth. Impacts and risks from the physical presence of the MODU and AHTS vessels to tourism or recreational activities were therefore considered non-credible.

7.2.2 Transit of the AHTS Vessels and Helicopters

This EP covers impacts and risks associated with the AHTS vessels whilst within the operational area. During transit to and from the operational area, the vessels will be governed by the relevant marine legislation.

Helicopter operations within the operational area are limited to helicopter take-off and landing on the helideck with no unnecessary or prolonged flight patterns that would impact marine mammals within the vicinity of the operational area. Helicopters transiting to and from the operational area will be governed by relevant aviation legislation.

7.3 Physical Presence

7.3.1 Summary of Risk Assessment and Evaluation

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Decision Context	Acceptability
Physical presence	Presence of the MODU and AHTS vessels and timing of the activity.	Interference with or displacement of other marine users (e.g. defence activities, commercial shipping, commercial fishing and/ or other third party vessels).	10	N/A	-	Type A Low Order Impact	Tolerable

7.3.2 Source of Risk

In order to undertake the proposed drilling activities, the MODU will be moored above each well location within the operational area. The drilling activities will be short in duration, with the MODU expected to be on location in the production licence area for approximately 3-4 months, contingent on weather conditions or unforeseen circumstances. The MODU will be continually operating 24-hours a day, seven days a week for the duration of the activity. AHTS vessels will be transiting to and from the operational area multiple times per week for the duration of the activity, generally one vessel is stationed within the Field to service the MODU as required and to prevent unauthorised interacts between the MODU and other marine users.

The physical presence of the MODU and AHTS vessels in the operational area has the potential to cause interference with defence activities or displacement of other marine users, including commercial shipping and commercial fishing. The operational area lies within a cautionary area associated with the Pyrenees Development (refer to Figure 3-1). In addition, a temporary 500 m Rig Safety Exclusion Zone (RSEZ) and 2 km cautionary zone around the MODU will be established for the duration of the activity.

7.3.3 Environmental Impact Assessment

Interference with Defence Activities

The proposed activity is short in duration and within the existing Pyrenees Development cautionary area already registered with the Australian Hydrographic Office (AHO). The potential impact associated with interference with defence activities is considered to be low.

Interference with Commercial Shipping

There are no recognised shipping routes in or near the operational area, with the nearest shipping fairway designated by AMSA located over 57 km to the northwest (Figure 4-27). Analysis of shipping traffic data indicates that commercial vessels do use the general area, with most vessels associated with the oil and gas industry. The use of the shipping fairways is strongly recommended by AMSA, but is not mandatory and the International Regulations for Preventing Collisions at Sea 1972 applies to all vessels navigating within or outside the shipping fairways.

The proposed activities are short in duration and the potential for disruption to other marine users is expected to be limited to temporary displacement of vessels should there be a requirement to make any slight modification to their course. The potential impact associated with interference with commercial shipping is considered to be low.

Displacement of Commercial Fishing

Three Commonwealth managed fisheries and six State managed fisheries have boundaries that overlap the operational area (Section 4.11.2). Potential impacts to commercial fisheries are a temporary loss of access to fishing grounds when the MODU is moored in the operational area, which could potentially result in reduced catches.

An analysis of the current fishery closures, depth range of activity, historical fishing effort data, fishing methods (Table 4-20) and consultation feedback (Section 4) revealed that there is a low potential for active commercial fisheries in the operational area. The area affected (500 m RSEZ around the MODU) represents only a very small area available to commercial fishing activities. The potential impact is predicted to be low as a result of the exclusion of commercial fishing activity from a relatively small area and for a very short duration (approximately 3-4 months).

There are no identified impacts to any values of any World Heritage Properties associated with physical presence within the operational area.

There are no identified cumulative impacts associated with physical presence within the operational area.

7.3.4 Control Measures

The clearly defined regulatory, corporate and industry (good practice) controls accepted by BHP to manage the impacts associated with the physical presence of the MODU and AHTS vessels are detailed below:

Table 7-2: Physical presence – control measures

Control Measure	Source of Requirement / Good Practice
Navigation Equipment	Navigation Act 2012; International Convention of the Safety of Life at Sea (SOLAS) Marine Order Part 30: Prevention of Collisions, Issue 8 Marine Order 21, Issue 8 (Safety of Navigation and Emergency Procedures)
Automatic Identification System (AIS)	Navigation Act 2012; International Convention of the Safety of Life at Sea (SOLAS): Regulation 19-1 of Chapter V of SOLAS.
Notice to Mariners and AUSCOAST warning	Navigation Act 2012; International Convention of the Safety of Life at Sea (SOLAS)

Control Measure	Source of Requirement / Good Practice
Stakeholder Communication	OPGGS(E) Regs (11A) BHP WA APU Community Stakeholder Management Plan BHP APU Community Concerns, Inquiries and Complaints Procedure (WA) (AOEA-CR-0003)
Rig Safety Exclusion Zone	MODU Safety Case BHP Petroleum HSE Standard (PET-HSE00-HX-STD-00001)
Training & Competency	AMSA Marine Order Part 3: Seagoing Qualifications
SIMOPs Plan	BHP Petroleum HSE Standard (PET-HSE00-HX-STD-00001): SIMOPS Plan <i>Pyrenees Venture</i> FPSO.
Additional Opportunistic Controls	
None identified	-

7.3.5 Demonstration of ALARP

The physical presence of the MODU and AHTS vessels for the duration of the *Pyrenees Phase 4 Infill Drilling Program* is considered a ‘Type A’ (lower order) impact based upon the Decision Context described in Section 6.1.1 of this EP. Given the limited nature and scale of potential disturbance from physical presence, and given the controls detailed above are consistent with both regulatory requirements and industry good practice, BHP considers the impact has been managed to ALARP and no further detailed engineering evaluation of alternate, additional or improved controls is required.

7.3.6 Demonstration of Acceptability

BHP is satisfied that when the accepted controls detailed above are implemented the environmental performance outcome (EPO) of “No unplanned vessel interactions (including collision)” will be met, therefore BHP considers the impact to be managed to an acceptable level. Additionally, consideration of actions prescribed in listed species recovery plans, conservation advice and threat abatement plans (Table 4-12) have been assessed, with none specifically relevant to the physical presence of the MODU and AHTS vessels within the operational area. Other aspects of the activity relevant to these plans and advices are detailed within subsequent sections of this EP.

The Department of Defence (DoD) has requested BHP notify DoD of the commencement of activities – BHP has addressed this request in the form of an EPS (refer Section 9.1). No concerns or objections regarding the physical presence of the MODU or AHTS vessels have been raised by relevant stakeholders.

7.4 Benthic Habitat Disturbance

7.4.1 Summary of Risk Assessment and Evaluation

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Decision Context	Acceptability
Benthic habitat disturbance	Transponder & anchor placement within 2 km of well centre	Benthic habitat and biota disturbance	10	N/A	-	Type A Low Order Impact	Tolerable
	Placement of MODU mooring equipment potentially resulting in disturbance of unexploded ordnance (UXO)		10	0.03	0.3	Type A Low Order Risk	Tolerable

7.4.2 Source of Risk

Benthic habitat disturbance will occur during the infill drilling program as a result of the temporary anchoring of the MODU, setting transponders with clump weights on the seabed and ROV operations.

Transponder clump weights may be placed on the seabed to inform anchor positioning (if required). Between 8 and 12 clump weights with an approximate footprint of 1 m² may be deployed on the seabed within 2 km of each well centre.

Anchors and chains from semi-submersible MODUs come into contact with the seabed during the deployment and removal of the MODU. The Diamond Ocean Apex semi-submersible MODU contracted to undertake the activity can be moored with up to 12 anchors, which can be laid at a distance of up to approximately 2 km from the MODU. No mooring occurs within the Ningaloo Marine Park or the Muiron Islands Marine Management Area. The anchors and catenary of the chain are expected to occupy a total area of approximately 210 m² each (conservatively allowing for large anchors of 60 m² for anchor contact plus 300 m x 0.5 m for catenary contact).

The anchors are laid and retrieved by a support vessel, which carries the anchors to position and deploys them directly on the seabed. If the anchors are dragged accidentally during laying or retrieval, a larger localised area may be temporarily disturbed around the anchor locations. Anchor mooring analyses and procedures are in place prior to, and during anchor mobilisation and retrieval activities to ensure that it is undertaken in a safe manner. Also, anchors are tension tested after installation and prior to the commencement of well operations to minimise the potential for the MODU to drag off location (for example, during inclement weather).

When not undertaking support activities, supply vessels generally maintain station keeping via dynamic positioning (DP) when in Field.

Based upon the setting of up to 12 transponders and corresponding large anchors, the total area of benthic disturbance around each well centre equates to 0.002532 km².

7.4.3 Environmental Impact Assessment

Area of potential benthic disturbance

The cumulative area that will be affected by drilling activities over two well centres is estimated to be less than 0.0051 km². The severity of potential impact to benthic communities is affected by density of biota, sensitivity of biota to disturbance and recovery potential of benthic communities. The seabed fauna throughout the operational area is considered to be sparse and comprised predominantly of crustaceans and polychaetes. These species are considered to have low sensitivity to physical disturbance compared to, for example, sponges or octocorals, and generally display high recovery following physical disturbance. The area of similar depth range (between 10 – 500 m) within the North West Province bioregion is estimated to be 5,645 km² (Baker *et al.*, 2008); therefore the cumulative area of disturbance is an extremely small portion of similar habitat (<0.0000001%) and the environmental impact is considered to be insignificant.

During stakeholder consultation as part of development of the EP, the Department of Defence (DoD) provided general advice on the potential for UXO to be present within the operational area (refer to **Table 5-2**), however BHP have conducted extensive site surveys from as early as 2005 over the area to support initial field development. These included bathymetry, side scan sonar and high-resolution sub-bottom profiling. Additionally, previous Pyrenees infill drilling campaigns have moored MODUs in line orientations/patterns/anchor locations to those proposed for this campaign with no evidence of UXO detected, therefore BHP consider the risk of benthic disturbance cause by the disturbance of a UXO as highly unlikely with only minor potential consequence to benthic to limited numbers of assemblages.

There are no identified impacts to any values of any World Heritage Properties identified within the operational area.

There are no identified cumulative impacts associated with benthic habitat disturbance given the intention to place mooring equipment on previously disturbed benthos and re-enter existing well centres.

7.4.4 Control Measures

The clearly defined regulatory, corporate and industry (good practice) controls accepted by BHP to manage the impacts associated with benthic habitat disturbance are detailed below:

Table 7-3: Benthic habitat disturbance – control measures

Control Measure	Source of Requirement / Good Practice
Rig Mooring & Positioning Plan	API RP 2SK – mooring analysis; ISO 19901-7:2013 – mooring tensioning; EPBC 2005/2034 condition 1 (b)ii; OPGGS Act (Section 572); and Department of Defence (DoD) engagement
Additional Opportunistic Controls	
Dynamic positioning of MODU	Not Applicable – The Pyrenees Field is too shallow (~200 m) for the use of a DP MODU.

7.4.5 Demonstration of ALARP

The benthic habitat disturbance created by the placement of mooring equipment within the operational area during the *Pyrenees Phase 4 Infill Drilling Program* is considered a ‘Type A’ (lower order) impact based upon the Decision Context described in Section 6.1.1 of this EP. Given the limited (temporary) nature and scale (<0.0000001% or similar regional habitat) of potential benthic habitat disturbance caused by the proposed activity, and given the controls detailed above are consistent with both regulatory requirements (including EPBC 2005/2034 condition 1 (b)ii) and industry good practice, BHP considers the impact has been managed to ALARP and no further detailed engineering evaluation of alternate, additional or improved controls is

required. However, a single opportunistic control has also been accepted to further reduce potential impacts and risks from the activity.

7.4.6 Demonstration of Acceptability

BHP is satisfied that when the accepted controls are implemented the environmental performance outcome (EPO) of “Benthic habitat and biota disturbance limited to operational area” will be met, therefore BHP considers the impact to be managed to an acceptable level. Additionally, consideration of actions prescribed in listed species recovery plans, conservation advice and threat abatement plans (Table 4-12) have been assessed, with none specifically relevant to benthic disturbance within the operational area. Other aspects of the activity relevant to these plans and advices are detailed within subsequent sections of this EP.

No concerns or objections regarding benthic habitat disturbance have been raised by relevant stakeholders.

7.5 Light Emissions

7.5.1 Summary of Risk Assessment and Evaluation

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Decision Context	Acceptability
Light emissions	Artificial light onboard MODU and AHTS vessels	Light emissions (light spill/ glow) from external lighting causing behavioural alterations in protected species including displacement from foraging areas and potential to affect the values of the Ningaloo World Heritage Property.	10	N/A	-	Type A Low Order Impact	Tolerable
	Light generated from contingent flaring via MODU flare boom	Short-duration (<1hr) light spill / glow causing behavioural alterations in protected species including displacement from foraging areas and potential to affect the values of the Ningaloo World Heritage Property.					

7.5.2 Source of Risk

During the activity, artificial lighting on the MODU and AHTS vessels will be required on a 24-hour basis. This safety and navigational lighting on the MODU and AHTS vessels will generate light glow and direct illumination of surrounding surface waters. Most external lighting aboard both the MODU and AHTS vessels is directed towards working areas such as the main decks, although spot lighting may also be used on an as-needed basis. Lighting is required for safety and navigational purposes, and cannot be eliminated.

External lighting for deck operations typically consist of bright white (metal halide, halogen, fluorescent) lights. Lighting is designed to ensure adequate illumination for safe working conditions. Typical light intensity values are 5 to 10 lux for walkways, 50 lux for working areas and approximately 100 lux for high intensity light areas. Light intensity diminishes with inverse of distance squared ($I_{received} = I/r^2$). Figure 7-1 presents a simple calculation of diminishment of received light with distance assuming 100 lamps on the MODU and/or AHTS vessel of low, medium and high intensity each acting additively. It can be seen that light received is diminished to about the equivalent of light that would be received from a full moon within about 200 m from the light source and to that of a moonless clear night within about 1,500 m for low intensity lights and 3,000 m for high intensity lights.

In the event that small volumes (approx. 30 m³ per well) of reservoir gas are flared during well re-entry and / re-completion, light emissions may be produced from the flare-boom aboard the MODU. Flaring of these volumes would short-duration (likely taking several minutes to complete the operation) and contingent if reservoir gas cannot be bull-headed back to formation. Light emissions would be more pronounced if flaring is undertaken at night.

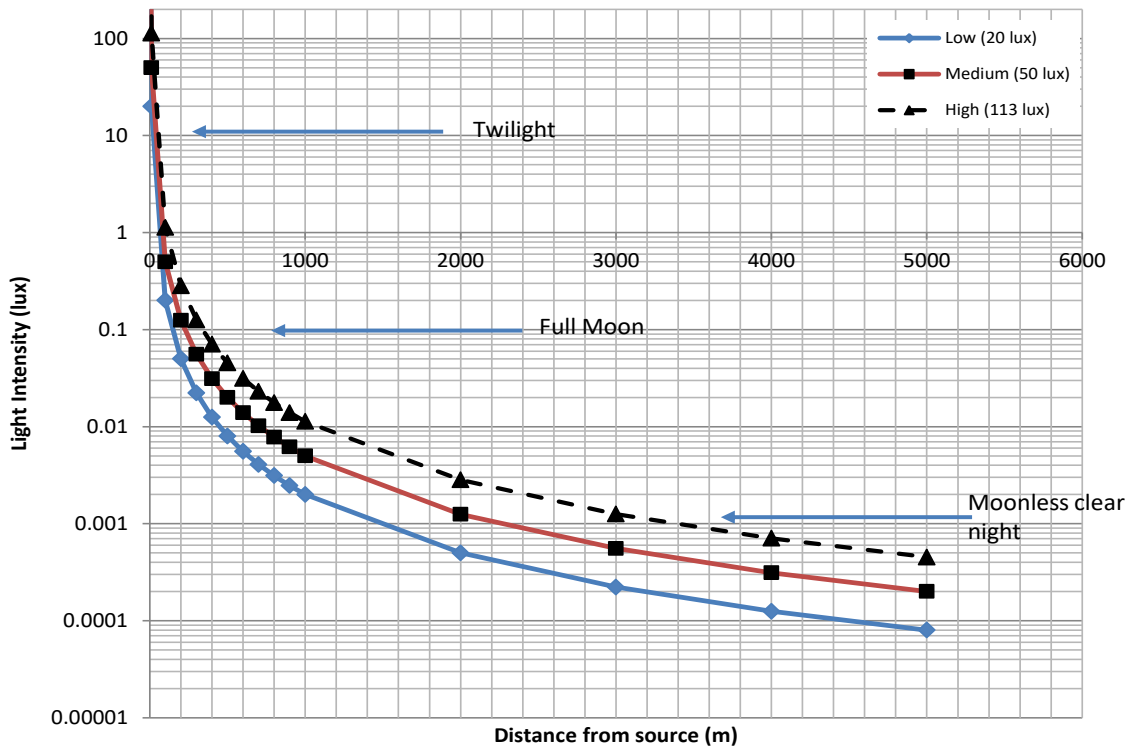


Figure 7-1: Diminishment of light with distance from source assuming 100 lamps of low, medium and high intensity

7.5.3 Environmental Impact Assessment

Artificial lighting has the potential to affect marine fauna that use visual cues for orientation, navigation, or other purposes, resulting in behavioural responses that can alter foraging and breeding activity. The species with greatest sensitivity to light are marine turtles, seabirds and fish.

Potential impacts to marine fauna from artificial lighting may include:

- Disorientation, or attraction or repulsion to the light;
- Disruption to natural behaviour patterns and cycles; and
- Indirect impacts such as increased predation risks through attraction of predators.

These potential impacts are dependent on:

- Wavelength and intensity of the lighting, and the extent to which the light spills into important wildlife habitat (e.g. foraging, breeding and nesting);
- The timing of light spill relative to the timing of habitat use by marine fauna sensitive to lighting effects; and
- The physiological sensitivity and resilience of the fauna populations that are at risk of potential effects.

Fish and Zooplankton

Fish and zooplankton may be directly or indirectly attracted to light. Experiments using light traps have found that some fish and zooplankton species are attracted to light sources (Meekan *et al.*, 2001), with traps drawing catches from up to 90 m (Milicich *et al.*, 1992). Lindquist *et al.* (2005) concluded from a study that light fields

around oil and gas activities resulted in an enhanced abundance of clupeids (herring and sardines) and engraulids (anchovies), both of which are known to be highly photopositive.

The concentration of organisms attracted to light results in an increase in food source for predatory species and marine predators are known to aggregate at the edges of artificial light halos. Shaw *et al.* (2002), in a similar light study, noted that juvenile tunas (Scombridae) and jacks (Carangidae), which are highly predatory, may have been preying upon concentrations of zooplankton attracted to the light fields around oil and gas activities. This could potentially lead to increase predation rates compared to unlit areas.

Light spill from MODU and AHTS vessels onto the surrounding surface waters, particularly during night-time activities, is likely to result in aggregations of zooplankton and fish around the light source as they are attracted to the light and increased food availability. However, the operational area does not contain any significant feeding, breeding or aggregation areas for important fish species. The potential for increased predation activity is unlikely to result in a significant impact on the plankton or fish communities. As such, effects are expected to be highly localised with no discernible consequences at the population level.

Seabirds and Migratory Shorebirds

Studies conducted between 1992 and 2002 in the North Sea confirmed that artificial light was the reason that seabirds were attracted to and accumulated around illuminated offshore infrastructure (Marquenie *et al.*, 2008) and that lighting can attract seabirds from large catchment areas (Wiese *et al.*, 2001). Availability of roosting refuge at sea and increased food availability may be the most important reasons why seabirds are attracted to offshore oil and gas infrastructure (Wiese *et al.*, 2001). Either seabirds may either be attracted by the light source itself or indirectly as structures in deep water environments tend to attract marine life at all trophic levels, creating food sources and shelter for seabirds (Surman, 2002; Wiese *et al.*, 2001). The light from vessels may also provide enhanced capability for seabirds to forage at night (Burke *et al.*, 2005). Studies in the North Sea indicate that migratory birds are attracted to lights on offshore platforms when travelling within a radius of 3–5 km from the light source (Marquenie *et al.*, 2008). Beyond this distance, it is assumed that light source strength were not sufficient to attract birds away from their preferred migration route.

Negative potential impacts to seabirds and migratory shorebirds attracted by artificial lighting can include disorientation causing collision, entrapment, stranding, grounding and interference with navigation (being drawn off course from usual migration routes) (DoEE, 2020). These behavioural responses may cause injury and/ or death. Seabird mortalities from collisions have been found to be correlated to conditions of poor visibility (cloud, fog or rain) and proximity to nearby seabird colonies (Black, 2005).

During the proposed activities, it is possible a small number of seabirds and migratory shorebirds may be attracted to the MODU and / or AHTS vessels, including the migratory wedge-tailed shearwater (for which a foraging BIA overlaps the operational area). However, this is not expected to result in impacts to birds beyond a temporary change in behaviour, and with no discernible consequences at the population level.

Marine Turtles

The attraction of marine turtles to light has been well documented. Adult marine turtles may avoid nesting on beaches that are brightly light (Witherington, 1992; Price *et al.*, 2018) and adult and hatchling turtles can be disorientated and unable to find the ocean in the presence of direct light or sky glow (Witherington, 1992; Lorne & Salmon, 2007; Thums *et al.*, 2016; Price *et al.*, 2018).

Hatchlings

On emerging from the nests on natal beaches, hatchlings use visual cues to head towards the sea. Under natural conditions, turtles predominantly hatch at night and use light cues to orient away from elevated, darker, landward silhouettes and orient toward the open, lower, brighter horizon above the sea surface (Salmon *et al.*, 1992). Artificial lighting on beaches is strongly attractive to hatchlings and disrupts their orientation on the shore in two ways. The hatchlings may crawl towards the lights ('misorientation') or they may be incapable of crawling in any direction ('disorientation') (Lorne & Salmon, 2007). As a result, the hatchlings may crawl for hours without reaching the sea, in increasing energy expenditure and become exhausted and dehydrated. A prolonged beach crawl also increases their exposure to predators (Witherington & Martin, 2003).

While the detrimental effects caused by light pollution during the journey of hatchlings from the nest to the water's edge are well recognised, the impact of artificial light on their behaviour once they reach the water is

unknown. Once hatchlings enter the sea, they swim to offshore waters, orientating using wave direction and an internal magnetic compass (Lohmann & Lohmann, 1992; Salmon & Wyneken, 1994). However, artificial light has been shown to affect their in-water swimming behaviour (Thums *et al.*, 2016). If light pollution disrupts the orientation and swimming behaviour of hatchlings, it can cause them to linger or become disorientated in the near shore environment, increasing the chances of mortality from predators.

The operational area overlaps inter-nesting habitat critical to the survival of flatback turtles, which is also a BIA (refer to Section 4.5.8). The potential effect of turtle hatchlings being attracted to the MODU and/or AHTS vessels is mitigated by the distance from nesting beaches (over 20 km from the Muiron Islands; and 27 km from North West Cape), which means that light generated within the operational area would not be visible from ground level at any of the known turtle nesting beaches. Disorientation of hatchling turtles in response to artificial lighting from the MODU and AHTS vessels is therefore considered not credible.

Adults

Spending most of their lives in the ocean, adult females nest above the high-tide mark on sandy tropical and subtropical beaches, predominantly at night (Witherington & Martin, 2003). They rely on visual cues to select nesting beaches and orient on land. Artificial lighting on or near beaches has been shown to disrupt nesting behaviour. Lighting may affect the location where turtles emerge onto the beach, the success of nest construction, whether the nesting attempts are abandoned, and even the directness of paths as adult females return to the sea (Witherington & Martin, 2003). Beaches with artificial light, such as coastal urban development, and lighted piers and roadways typically have lower density of nesting females than dark beaches (Salmon, 2003; Witherington & Martin, 2003). However, many do nest on light shores and in doing so, the lives of their hatchlings are at risk, as discussed previously.

Five marine turtle species were identified as potentially occurring in the operational area (previous Table 4-11). The operational area overlaps inter-nesting habitat critical to the survival of flatback turtles, which is also a BIA (refer to Section 4.5.8). It is possible that individual turtles may be encountered traversing the operational area during the proposed activity, however considering the water depths of the operational area (nearly 200 m), and distance to nesting beaches (over 20 km from the Muiron Islands; and 27 km from North West Cape), large numbers of inter-nesting adults are not expected. Localised behavioural impacts to individual foraging marine turtles from light emissions generated during the activity are considered negligible, with no impact predicted at a community or population level.

Species Recovery Plans, Conservation Management Plans and Approved Conservation Advice

BHP has considered information contained in recovery plans, approved conservation advice and threat abatement plans (refer to previous Table 4-12). This includes the Recovery Plan for Marine Turtles in Australia (DoEE, 2017) as well as the more recently published National Light Pollution Guidelines (DoEE, 2020).

The overarching objective of the Recovery Plan for Marine Turtles in Australia is to reduce detrimental impacts on Australian populations of marine turtles and hence promote their recovery in the wild. All six species of marine turtle that occur in Australian waters are listed as threatened under the EPBC Act. Marine turtles are long-lived, slow to mature and are subject to a number of threats. Light pollution is identified as a high-risk threat in the Recovery Plan for Marine Turtles because artificial light can disrupt critical behaviours such as adult nesting and hatchling orientation following their emergence from nests, sea-finding and dispersal and can reduce the reproductive viability of turtle stocks. Minimising light pollution such that artificial light within or adjacent to habitat critical to the survival of marine turtles is managed such that marine turtles are not displaced from these habitats (DoEE, 2017).

The operational area intercepts an inter-nesting BIA and inter-nesting habitat critical to the survival of flatback turtles (all waters within a 60 km radius of nesting areas on Thevenard Island, the Muiron Islands and Pilbara coast). The operational area is too distant from nesting beaches to disrupt nesting behaviour of adult turtles or sea-finding behaviour in hatchlings. The nearest nesting habitat (the Muiron Islands) to the operational area is >20 km southeast. As such, impacts to adults and hatchlings are not predicted.

Potential Impacts from Light to the Values of the Ningaloo World Heritage Property

The values of the Ningaloo World Heritage Property are detailed in Section 4.5.2.

There are no anticipated impacts from light emissions on the following values of the Ningaloo World Heritage Property:

- Landscapes and seascapes of the property are comprised of mostly intact and large-scale marine and terrestrial environments;
- The lush and colourful underwater scenery provides a stark and spectacular contrast with the arid and rugged land;
- Benthic invertebrate species such as corals, sponges, and echinoderms; and
- Mass coral spawning events and seasonal upwelling.

Given the temporary nature of the proposed activity, the diminishment of light within distance from the source and the seasonal and transient nature of whale shark aggregations and migrating whales (including endangered blue whales), potential impacts may include temporary and nuisance disturbance to individuals or aggregations of whale sharks or cetaceans, with no anticipated community or population level impacts anticipated.

The evaluation for fish and zooplankton, marine turtle species (including green turtle nesting, internesting and foraging habitat), and seabirds and migratory shorebirds is presented above – all of which represent values of the Ningaloo World Heritage Property. Whilst the operational area is located approximately 13 km from the Ningaloo World Heritage Property, the potential impacts from light emissions to the values of the property (as described above) are considered minor and temporary in nature and the aspect of the activity is not inconsistent with the protection of conservation of these values, nor are they contrary to any relevant species recovery plans, approved conservation plans and threat abatement plans for the conservation of any protected species that are also considered values of the property (See Table 4-12).

Potential Cumulative Light Impacts

Commercial Shipping

As described in Section 4.11.6 the operational area lies outside of declared and charted shipping fairways (Figure 4-27). The nearest shipping route heading northeast is approximately 45 km from the operational area. Therefore, no cumulative light emission impacts are predicted for the activity.

Oil and Gas

As described in Section 4.11.7, there are a number of oil and gas facilities within Commonwealth waters in the of the Exmouth Sub-basin, namely:

- Woodside's Vincent Development (*Maersk Ngujima-Yin* FPSO) in production licence WA-38-L, approximately 12 km from the operational area;
- Santos' Ningaloo Vision Development (*Ningaloo Vision* FPSO) in production licence WA-35-L, approximately 15 km north of the operational area; and
- Woodside's subsea gas injection, production and water injection wells located in WA-28-L approximately 15 km from the operational area.

In the instance when field activities are undertaken simultaneously, which is highly unlikely given the intermittent nature of these activities, there is a potential for light generated from one activity to be evident within the field of a separate activity. However, given the distance apart from these facilities, the diminishment of light intensity with distance (as presented within Figure 7-1), and the distance of these facilities from mainland locations i.e., greater than the 20 km buffer as a nominal distance at which artificial light impacts should be considered with respect to marine turtle hatchlings emerging from nesting beaches as presented within the National Light Pollution Guidelines for Wildlife (DoEE, 2020), no cumulative impacts on shorelines from light emissions are anticipated.

Field SIMOPS

BHP's Pyrenees Development (*Pyrenees Venture* FPSO) within WA-42-L (the same permit area as the Crosby and Stickle wells).

As described in Section 3.9.10 of the Pyrenees Facility Operations Environment Plan (PYHSE-E-0001), the Pyrenees Facility lighting is designed to ensure adequate illumination on the facility for safe working conditions and navigation. Typical light intensity values are 5 to 10 lux for walkways, 50 lux for working areas and approximately 100 lux for high intensity light areas. Light intensity diminishes with inverse of distance squared ($I_{received} = I/r^2$). As can be seen from the **Figure 7-1**, light received is diminished to near equivalent levels of light that would be received from a full moon within about 200 m from the Pyrenees Facility and to that of a moonless clear night at 1,500 m for low intensity lights and 3,000 m for high intensity lights.

Whilst the operational area of the Pyrenees Phase 4 Infill Drilling activity is above two well centres, both located approximately 2 km from the *Pyrenees Venture* FPSO, due the diminishment of light with distance from source it would be expected, even by assuming both facilities are using high intensity lighting, that light intensity at the intersect between the two facilities would be an order of degree less than the light intensity from a full moon. Given the distance of these facilities from mainland locations i.e., greater than the 20 km buffer as a nominal distance at which artificial light impacts should be considered with respect to marine turtle hatchlings emerging from nesting beaches as presented within the National Light Pollution Guidelines for Wildlife (DoEE, 2020), no cumulative impacts on shorelines from light emissions are anticipated.

7.5.4 Control Measures

BHP maintains controls to comply with *Navigation Act 2012*; International Convention of the Safety of Life at Sea (SOLAS), Marine Order Part 30: Prevention of Collisions, Issue 8, and BHP Petroleum HSE Standard (PET-HSE00-HX-STD-00001) all requiring minimum lighting to maintain safe operations.

7.5.5 Demonstration of ALARP

Light emissions generated during the *Pyrenees Phase 4 Infill Drilling Program* are considered a ‘Type A’ (lower order) impact based upon the Decision Context described in Section 6.1.1 of this EP and are not considered to present a cumulative impact when considered in the context of other offshore activities. However, given the operational area intersects a flatback turtle inter-nesting BIA, a wedge-tailed shearwater breeding and foraging BIA and proximity of the operational area to turtle nesting beaches (Muiron Islands, Ningaloo coast and North West Cape) and seabird breeding sites (North West Cape), a detailed engineering assessment has been undertaken to consider alternative, additional and/or improved control measures to minimise light impacts to marine fauna (Table 7-4). The analysis has considered measures detailed within the National Light Pollution Guidelines for Wildlife (DoEE, 2020) and is based upon both feasibility and cost (safety / time / effort / financial), with those controls considered feasible and reasonably practicable to implement being adopted, and those considered not feasible or not reasonably practicable to implement rejected. The assessment applies the hierarchy of controls as illustrated in Figure 6-2.

Table 7-4: Detailed engineering assessment – light emissions

Hierarchy of Control	Control Measure	Accept/Reject	Reason
Eliminate	Do not undertake the night-time operations.	Reject	Limiting the activity to day-time hours would potentially reduce overall light spill / glow from offshore facilities and subsequently reduce the potential for adverse impacts to seabirds and nesting turtles, however minimum lighting would still be required for safe operations and navigation to mitigate the potential for vessel collision. Additionally, by limiting night-time operations, the overall duration of the activity would double, with a corresponding increase in the potential impacts from other aspects of the activity such as atmospheric and noise emissions, waste generation, vessel collision risk, etc. The financial cost associated with doubling the duration of the activity would be significant, given the hire rates of both the MODU and AHTS vessels. Given minimum lighting requirements for crew safety and navigational lighting, the high financial cost to introduce this control, the short duration of the activity with limited overlap to the

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Hierarchy of Control	Control Measure	Accept/Reject	Reason
			wedge-tailed shearwater breeding period, and the operational area being outside the nominal 20 km buffer to nesting beaches detailed within the National Light Pollution Guidelines for Wildlife (DoEE, 2020), BHP considers the potential benefit to be grossly disproportionate to the cost of implementation.
Substitute	Alternate lighting types aboard the MODU and AHTS vessels	Reject	<p>By reducing the colour, intensity and frequency of lighting would potentially reduce the potential for adverse impacts to seabirds and nesting turtles.</p> <p>The adoption of this control would incur a significant cost given the MODU and vessels are not scheduled for dry-dock until after the proposed activity. Also, navigation lighting colour and intensity must comply with relevant navigation requirements.</p> <p>Given minimum lighting requirements for crew safety and colour-specific navigational lighting requirements, the high financial cost to introduce this control, the short duration of the activity with limited overlap to the wedge-tailed shearwater breeding period, and the operational area being outside the nominal 20 km buffer to nesting beaches detailed within the National Light Pollution Guidelines for Wildlife (DoEE, 2020), BHP considers the potential benefit to be grossly disproportionate to the cost of implementation.</p>
Engineer	Automatic off switches on outdoor lighting	Reject	<p>There is a potential to reduce overall light spill / glow from deck areas and subsequently reduce the potential for adverse impacts to seabirds and nesting turtles by implementing these controls. By virtue of the MODU design, crew rest areas are internal to reduce potential light ingress for night-shift workers, thereby also having the effect of limiting light spill from the MODU. The re-engineering of lighting systems aboard both the MODU and AHTS vessels would be limited to light sources not critical to safe operations.</p> <p>This would have limited effect given the need for navigation and safety lighting. Painting reflective surfaces would incur significant cost, especially given the MODU would be mobilised from an existing offshore location and is not scheduled for dry-dock until after this activity. Likewise, block-out blinds would be expensive to retrofit, and impair visual line-of-sight for Supervisors monitoring safety-critical operations. Given minimum lighting requirements for crew safety and navigational lighting, the high financial cost to introduce these controls, the short duration of the activity with limited overlap to the wedge-tailed shearwater breeding period, and the operational area being outside the nominal 20 km buffer to nesting beaches detailed within the National Light Pollution Guidelines for Wildlife (DoEE, 2020), BHP considers the potential benefit to be grossly disproportionate to the cost of implementation.</p>
	Repaint reflective surfaces aboard the MODU and AHTS vessels	Reject	
	Block-out blinds on all windows / portholes aboard the MODU and AHTS vessels	Reject	
Separate	Avoid periods of fauna sensitivity (e.g. turtle nesting, wedge-tailed shearwater breeding period Aug-April)	Reject	<p>There is a potential to reduce the potential for adverse impacts to seabirds and nesting/hatching marine turtles.</p> <p>The scheduling of activities is subject to MODU and vessel availability and contracting arrangements. The cost associated with maintaining a MODU and AHTS vessels on standby for a potentially extended period would incur a significant project cost. The potential impact to nesting turtles is considered low given the and the operational area being outside the nominal 20 km buffer to nesting beaches detailed within the National Light Pollution Guidelines for Wildlife. The proposed activity is also short-duration (approximately 3-4 months) with limited overlap with wedge-tailed shearwater breeding period. Therefore, the cost of implementing this control would be considered grossly disproportionate to any minor benefit gained and is not considered reasonable.</p>

Hierarchy of Control	Control Measure	Accept/Reject	Reason
Administrative	Lighting Management Plan	Reject	Given there are no reasonable or practical controls identified to further limit the light spill / glow from the operational area, potential impacts from lighting emissions would be limited in nature and scale in relation to seabirds and nesting/hatching turtles and the operational area is outside the nominal 20 km buffer to nesting beaches detailed within the National Light Pollution Guidelines for Wildlife (DoEE, 2020), it is not considered reasonable to develop a project-specific Lighting Management Plan.

7.5.6 Demonstration of Acceptability

Whilst light emissions generated during the Pyrenees Phase 4 Infill Drilling Program are considered a ‘Type A’ (lower order) impact based upon the Decision Context described in Section 6.1.1 of this EP, a more detailed demonstration of acceptability has been provided consistent with that of a ‘Type B’ potential impact.

Lighting of the MODU and AHTS vessels complies with the *Navigation Act 2012*; International Convention of the Safety of Life at Sea (SOLAS), and Marine Order Part 30: Prevention of Collisions, Issue 8, all requiring minimum lighting to maintain safe operations. Whilst there are no specific regulatory requirements for reducing light emissions from offshore facilities, the light reduction controls as detailed within the National Light Pollution Guidelines for Wildlife (DoEE, 2020) have been considered during the detailed ALARP evaluation presented above. Consideration of actions prescribed in listed species recovery plans, conservation advice and threat abatement plans (Table 4-12) have been assessed and potential impacts and risks are not inconsistent with:

- Recovery Plan for Marine Turtles in Australia 2017-2027;
- National Light Pollution Guidelines for Wildlife 2020; or
- WA EPA environmental assessment guideline for protecting marine turtles from light impacts (EPA, 2010).

There are no approved conservation advice, listing advice or recovery plans for the wedge-tailed shearwater.

Offshore light emissions generated whilst undertaking the activity do not contravene any Plan of Management for a World Heritage place (including Ningaloo WHA), National Heritage place or Ramsar wetland identified within the EMBA.

The detailed ALARP evaluation for light emissions has been conducted with no reasonable and practicable alternate, additional, or improved controls identified.

There have been no objections or claims raised by relevant stakeholders in relation to offshore light emissions generated whilst undertaking the activity.

Relevant principles of Ecologically Sustainable Development (ESD) (as defined within Section 3A of the EPBC Act) have been considered with respect to potential impacts from light emissions generated whilst undertaking the proposed activity with the following determination:

- The ‘Integration Principle’ has not been compromised given there have been no objections or claims raised by relevant stakeholders regarding offshore lighting emissions;
- The ‘Intergenerational Principle’ has not been compromised given there are no identified health, diversity and productivity impacts that may affect the environment for future generations associated with the short-duration, localised and limited intensity of lighting emissions outside of the operational area;
- The ‘Biodiversity Principle’ has not been compromised given matters of National Environmental Significance (MNES) have been considered as part of the environmental impact evaluation and any potential impact is limited to the potential nuisance disturbance of individuals with no significant impacts identified at a population or species level;

- The 'Valuation Principle' is not considered relevant given there are no identified costs associated with offshore lighting emissions generated whilst undertaking the activity; and
- The 'Precautionary Principle' is not considered relevant to the potential impacts and risks associated with offshore lighting emissions given there are no 'threats of serious or irreversible harm' as detailed within EPBC Act (Section 391).

BHP is satisfied that routine light emissions from the MODU and/or AHTS vessels and the short duration of the activity (approximately 3-4 months) represent a low residual risk that is broadly acceptable. Therefore, with the proposed level of lighting generated during the activity, BHP is satisfied that the environmental performance outcome (EPO) of "No physical and/or observable biologically significant behavioural disturbance on protected species (including breeding, foraging, resting or migration)" will be met, therefore BHP considers the impact to be managed to an acceptable level.

7.6 Noise Emissions

7.6.1 Summary of Risk Assessment and Evaluation

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Decision Context	Acceptability
Noise emissions	Generation of underwater noise from the MODU, AHTS vessels, ROVs, positioning equipment (transponders) and flaring/venting during the activity.	Sound emitted to the marine environment causing physical harm (auditory impairment – permanent threshold shift (PTS) or temporary threshold shift TTS)), masking of vocalisations, and / or behavioural changes to marine fauna.	10	N/A	-	Type A Low Order Impact	Tolerable
	Generation of noise from helicopter operations during take-off and landing aboard the MODU.						

7.6.2 Source of Risk

During the infill drilling campaign, low intensity underwater noise of a continuous and intermittent nature will be generated, namely from: the cavitation of thrusters and power generation from the AHTS vessels within the operational area; power generation and drilling aboard the MODU; noise generated by positioning equipment (transponders), underwater ROV operations, short-term flaring/venting operations, and from helicopter operations within the operational area.

Noise Generate by the AHTS Vessels including dynamic positioning (DP)

The operation of the vessel engines, propeller cavitation, and thrusters contributes to underwater noise emissions within the operational area. Sound generated from these activities will contribute to and exceed ambient underwater noise levels which range from 80 dB re 1 µPa in calm conditions and low wind to 120 dB re 1 µPa under high wind and rain (Richardson *et al.*, 1995).

Koessler *et al.* (2020), estimated acoustic source levels from an AHTS vessel similar to that proposed for use during this activity, based upon all thrusters being included in the source level calculation for scenarios where the AHTS was under DP. Only the main propulsion system was considered for scenarios where the vessel was transiting. An overall source level of 183.0 dB re 1 µPa m was used for transit in the standby area and 186.6 dB re 1 µPa m was used for re-supply operations when the OSV was under DP. Likewise, McCauley (1998) measured underwater broadband noise equivalent to approximately 182 dB re µPa at 1 m from a vessel holding station in the Timor Sea. Under normal operating conditions when the vessel is idling, vessel noise would be detectable only over a short distance. The noise from a vessel holding its position using bow thrusters and strong thrust from its main engines was measured at 120 dB re 1 µPa at approximately 1 km from the source then dropped below 120 dB re 1 µPa within 3 to 4 km and may be detectable above background noise levels during calm weather conditions, for 20 km (McCauley, 1998) or more from the vessel although this range of audibility will be reduced under noisier (windier) background conditions.

Vessel noise varies the size, speed and engine type and the activity being undertaken. The AHTS vessels will use a DP thruster system to manoeuvre into the RSEZ at low speeds and to hold position whilst adjacent to the MODU. A vessel using DP thrusters can produce sound at levels between 108 and 182 dB re 1µPa at 1m at dominant frequencies between 50 Hz and 7 kHz (McCauley, 1998; Simmonds *et al.*, 2004).

Given the above, it is anticipated that whilst transiting or maintaining position within the operational area, noise generated by AHTS vessels would likely be audible at levels of 120 dB within 1 km of the vessel location, but attenuate rapidly to below 120 dB within 3-4 km from the vessel location. Given a single vessel would likely be stationed within the operational area for the duration of the infill drilling program, this noise emission would be temporary in nature i.e., would continue for a 3-4 months.

Noise Generated by the MODU

The noise emitted from MODUs consists of a combination of drill pipe operation and onboard machinery, and typically produces low intensity but continuous sound. Semi-submersible vessels are generally less noisy than drill ships (Richardson *et al.*, 1995), as they lack large hull areas, and the machinery is mounted on decks raised above the sea on risers supported by pontoons.

Noise modelling undertaken in 2020 by Jasco Applied Sciences (Koessler *et al.* 2020) on behalf of Beach Energy Limited, for a drilling operation undertaken by the Diamond Ocean Onyx (a sister MODU to the Diamond Ocean Apex) at water depths of 70-100 m applied source level spectrum, based on those measured for the Transocean Polar Pioneer, whilst anchored and drilling, at a broadband (10 Hz to 35 kHz) source level of 178.7 dB re 1 μ Pa m. However, this source level spectrum is considered conservative given McCauley (1998) reported noise levels generated by a semi-submersible rig, during non-drilling periods the typical broadband level encountered was approximately 113 dB (rms) re 1 μ Pa@125 m and studies undertaken by Austin *et al.* (2018) on various MODU types indicate that noise levels dropped to 117 dB re 1 μ Pa within 1 km of the MODU.

Whilst not undertaken within the Exmouth region, an acoustic monitoring program commissioned by Santos Ltd was undertaken during exploratory drilling of the Casino-3 well in the Otway Basin (located in Commonwealth waters approximately 30 km from mainland). A sound logger located 28.03 km from the drill site did not detect drilling noise and recorded ambient noise that ranged between 90 and 110 dB re 1 μ Pa (McCauley, 2004).

The MODU will not be using DP to maintain station keeping above the well centres, therefore DP will not contribute to noise emissions from the MODU.

Given the above, it is anticipated that whilst undertaking infill drilling operations within the operational area, noise generated by the MODU would potentially be audible at levels above 120 dB directly adjacent to the MODU, but attenuate to levels below 120 dB outside the operational area and be inaudible beyond 28 km from the well centres. This noise emission would be temporary in nature i.e., would continue for approximately 3-4 months.

Noise Generated by Positioning Equipment (Transponders)

Transponders may be required to inform anchor positioning. The expected frequency (Hz) and source level (dB re 1 μ Pa @ 1 m) of the signal from transponders is 18 – 36 kHz, 196 dB (ref. 1 μ Pa @ 1 m). The transponders are passive, and only transmit when the vessel is locating the mooring. Likewise, miniature acoustic monitoring beacons aboard the ROV may transmit intermittently to enable the ROV position to be monitored whilst in operation.

Noise Generated by ROV Operations

ROVs are used intermittently during the activity to undertake seabed and subsea equipment inspection. The ROVs are deployed from either a support vessel or from the MODU. Noise levels from the ROVs are of a lower intensity than either the MODU or support vessels, so would not be considered the primary source of noise emissions during their deployment. Therefore, the overall contribution of ROV noise associated with the activity are considered negligible and not assessed further.

Noise Generated by Helicopters

Esonification of the water column surrounding the MODU may occur during take-off and landing of helicopters servicing the MODU during crew-change operations. Helicopter engine noise is emitted at various frequencies however, the dominant tones are generally of a low frequency below 500 Hz (Richardson *et al.*, 1995) Richardson *et al.* (1995), reported helicopter noise being audible in air for four minutes before it passed over

receivers, but only detectable underwater for 38 seconds at 3 m depth and for 11 seconds at 18 m depth for the same flight path. The sound source was 162 dB re 1 μ Pa @ 1 m at its peak and had frequency of 155 Hz. Given helicopter transfers to the MODU may occur on a daily basis, the predicted level of potential exposure to marine mammals (if in the vicinity of the MODU at the time of take-off and landing and within surface waters of approximately 20 m depth) is approximately 1 minute per helicopter landing and / or take-off within a 24-hour period.

Noise Generated by Venting / Flaring Operations

A single flaring / venting operation for each well may be undertaken during this proposed infill drilling program. Given flaring is a contingent operation, potential flare noise is limited in both duration and intensity and would be expected to attenuate rapidly from source. Flare noise levels for the proposed activity have been predicted based upon the following methodology for calculating flare noise within the Association of German Engineers (VDI) Standard 3272 Standard Noise Levels for Flares:

$$L_{wac} = 112 (\pm 6) + 17 \log Q$$

Where:

L_{wac} = A-weighted sound power level of the flare (dBA)

Q = flare gas mass flow (t/h)

At a flare gas flow rate of 0.9627 tn / hr (120 m³ / hr) and a flare stack height of 30 m from the receptor, a flare sound power level (L_w) of 111.7 dBA \pm 6 dB is predicted. The gas flow rate applied has been based upon the overall volume of gas anticipated for a flaring / venting operation from Pyrenees Phase 4 well over a 15 min duration is approximately 30 m³. Based upon previously undertaken airborne propagation modelling, results indicate the underwater received sound pressure level during flaring of 136 dB re 1 μ Pa at 1 m below the sea surface is estimated to attenuate below the marine mammal behavioural response threshold of 120 dB re 1 μ Pa within only 7 m from the sea surface (Woodside, 2021).

Potential noise from flaring operations would be considered a secondary additive source of noise emissions given the primary (noisiest) source would be generated by the operation of the MODU, therefore flaring would make a limited contribution to overall noise emissions from the proposed activity and as such is not evaluated further.

7.6.3 Environmental Impact Assessment

Receptor Sensitivity and Noise Exposure Criteria

Noise has the potential to adversely affect marine fauna and in extreme cases cause physiological harm. Underwater noise generated by anthropogenic activities may impact on marine fauna by the following, presented in decreasing order of effect:

- Mortality or potential mortal injury – physical injury that may result in death of an animal through damage to internal organs:
- Physical impairment / injury to hearing organs:
 - Permanent threshold shift (PTS) – a permanent loss of hearing sensitivity. Recovery is not expected to occur.
 - Temporary threshold shift (TTS) – a temporary reduction in the ability of an animal to perceive sound. Recovery to pre-exposure levels is expected to occur.
 - Masking/ interference of biologically important sounds e.g. for communication, for navigation, and predator/ prey detection.
- Behavioural disturbance – typically short-term behavioural changes such displacement from biologically important habitat areas (such as feeding, resting, breeding, calving and nursery sites), avoidance, surfacing, etc. Behaviour expected to return to normal following cessation of noise.
- Indirect impacts, for example:
 - Impacts on other trophic levels (e.g. predator/ prey species displacement or depletion).
 - Reduced reproductive success.

Initial studies of underwater noise pollution focussed on megafauna and particularly marine mammals (Richardson *et al.*, 1995; Southall *et al.*, 2007; Theobald *et al.*, 2009), but in recent years effects have been discovered in other taxa at lower trophic levels, including various fish species (Hastings & Popper, 2005; Popper *et al.*, 2014), crustaceans (Tidau & Briffa, 2016) and zooplankton (McCauley *et al.*, 2017).

There are no currently recognised thresholds/methods for reliably assigning a generic distance for masking effect. The potential for acoustic masking by vessel noise is influenced by numerous confounding factors, including the juxtaposition of the vessel to the animals that are communicating, changes in ambient noise levels, the strength, duration and wavelengths (frequency) of the species' calls, the ability of the species to directionalise sounds, the ability of the species to discriminate frequencies/intensities of sounds, the distance between calling animals, the overlap in vessel and call frequencies, etc.

The nature of underwater noise levels expected to be generated AHTS vessels involving transient and relatively low intensity broadband noise, suggests that the potential for masking effects is likely to be limited to relatively close proximity to the noise source. Given that whales in the area that might be communicating would mostly be actively moving (migrating) through the area and hence unlikely to remain within any potential zone of masking for an extended period, it is unlikely that significant disruptions to communications that might result in adverse impacts to any species would occur.

Marine Mammals (Cetaceans)

Marine mammals that may occur within the operational area are provided in Section 4.5.8 and include low frequency (baleen whales e.g. sei, blue, humpback whales) and mid-frequency (dolphins and toothed whales e.g. orca and sperm whales). Of these species, the pygmy blue and humpback whales are expected to be the most frequently encountered particularly during annual migrations, given the overlap of the operational area with distribution and migratory corridor BIAs and the potential for opportunistic foraging within the operational area. It is likely that the pygmy blue whales will be regionally present, particularly over the summer season and may occur in the wider EMBA between April and August (north-bound migration) and October to January (south-bound migration).

Other cetacean species identified as potentially occurring in the operational area (Table 4-11) are expected to be limited to individuals infrequently traversing the operational area.

Anthropogenic noise has been identified as a potential threat to cetaceans, including blue whales.

Sound is very important to marine mammals and extensive research has been undertaken to understand the potential impacts of anthropogenic noise, with reviews by Richardson *et al.* (1995); Nowacek *et al.* (2007); Southall *et al.* (2007 and 2019); and Erbe *et al.* (2018). Underwater noise can interfere with key life functions of marine mammals (e.g. foraging, mating, nursing, resting and migration) by impairing hearing sensitivity, masking acoustic signals, eliciting behaviour responses, or causing physiological stress. Severity of the impacts typically decreases with the increase in distance from the sound source. Closer to the noise source, injuries such as tissue or organ damage (e.g. a permanent loss of hearing called permanent threshold shift (PTS); refer to Southall *et al.*, 2007) may be found. If hearing loss recovers with time, it is termed a temporary threshold shift (TTS).

Marine mammals can be grouped based on how different species group use and hear sound differently. Underwater noise exposure criteria (also termed impact criteria or noise thresholds) can then be weighted for each broad species group to emphasise noise frequencies that a group may be particularly vulnerable to. This approach is described by Southall *et al.* (2007). The noise exposure criteria for continuous (non-impulsive) underwater noise (e.g. MODU and marine vessel operations) and impulsive noise sources (e.g. noise from transponders) applied to evaluate physical impairment / injury (PTS & TTS) and behavioural disturbance are presented in Table 7-5 and Table 7-6 respectively.

Table 7-5: Continuous noise sources: marine mammal injury and disturbance thresholds for various functional hearing groups

Functional Hearing Group	Generalised Hearing Range	TTS Threshold (received level)	PTS Threshold (received level)	Behavioural Disturbance Threshold
Low-frequency cetaceans (baleen whales e.g. blue, fin, sei, right, humpback, minke, Bryde’s)	7 – 35,000 Hz	179 dB re 1 µPa ² s	199 dB re 1 µPa ² s	120 dB re 1 µPa
Mid-frequency cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 – 160,000 Hz	178 dB re 1 µPa ² s	198 dB re 1 µPa ² s	120 dB re 1 µPa
High-frequency cetaceans (true porpoises, river dolphins)	275 – 160,000 Hz	153 dB re 1 µPa ² s	173 dB re 1 µPa ² s	120 dB re 1 µPa

Table 7-6: Impulsive noise sources: marine mammal injury and disturbance thresholds for various functional hearing groups

Functional Hearing Group	Generalised Hearing Range	TTS Threshold (received level)	PTS Threshold (received level)	Behavioural Disturbance Threshold
Low-frequency cetaceans (baleen whales e.g. blue, fin, sei, right, humpback, minke, Bryde’s)	7 – 35,000 Hz	168 dB re 1 µPa ² s	183 dB re 1 µPa ² s	160 dB re 1 µPa
Mid-frequency cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 – 160,000 Hz	170 dB re 1 µPa ² s	185 dB re 1 µPa ² s	160 dB re 1 µPa

High-frequency cetaceans (true porpoises, river dolphins)	275 – 160,000 Hz	140 dB re 1 $\mu\text{Pa}^2\text{s}$	155 dB re 1 $\mu\text{Pa}^2\text{s}$	160 dB re 1 μPa
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The approach of Southall *et al.* (2007) recognises that even if the initial received levels are not great enough to cause injury, harmful effects can result from lower-level sounds which last for a longer duration.

Southall *et al.* (2007) conducted a comprehensive review of data published describing behaviour of marine mammals in response to sound, with the onset of behavioural disturbance to cetacean species reported at sound levels as low as 120 dB re 1 μPa . This may result in subtle responses such as changing in diving and breathing patterns, but that avoidance was generally not observed until sound levels reached more than 160 dB re 1 μPa (Southall *et al.*, 2007). The zone of responsiveness to sound is expected to be smaller than the zone of audibility because an animal will not likely respond to a sound that is barely detectable. Measured indicators of disturbance include changes in swim direction and speed, dive duration, surfacing duration and interval, and respiration and changes in vocalisation. The US National Marine Fisheries Service (NMFS) propose a behavioural response threshold of 120 dB re 1 μPa for continuous noise sources and 160 dB re 1 μPa for impulsive noise sources (NMFS, 2018). Todd *et al.* predict that animals (marine mammals) experience different noise regimes while traversing the water column and can potentially detect the higher-frequency components of drilling noise to a distance of 70 m from the source; however, while levels were unlikely to cause auditory injury, effects on echolocation behaviour are still unknown (JASA, 2020).

NMFS (2018) concluded that after noise exposure ceases or between successive exposures, there is potential for recovery from hearing loss i.e., exposure to PTS thresholds results in incomplete recovery and exposure to TTS thresholds results in complete recovery. The likelihood of a cetacean experiencing a TTS or PTS from continuous noise sources, is directly related to the duration of exposure to the threshold levels.

Extended exposure may occur if the cetacean remains within the exposure area whilst undertaking biologically important behaviours (calving, foraging, resting or migration). However, cetaceans are likely to display avoidance at lower exposure thresholds.

Noise generated by primary emissions sources (i.e., the MODU and AHTS vessels operations), short-term helicopter operations or secondary additive sources (i.e., flaring and ROV operations) are not predicted to exceed the permanent injury threshold levels for continuous (non-impulsive) noise sources (shown in Table 7-5), and therefore permanent injury to protected cetacean species is not anticipated. However, noise generated within the operational area may exceed thresholds that could result in short-term behavioural responses in cetaceans.

Noise generated by positioning equipment (transponders) is highly intermittent but may temporarily exceed impulsive noise thresholds for both physical and behavioural disturbance. However, given transponders emit short-duration ‘pings’ (i.e., they are not repetitive impulse noises), these pings are limited to positioning operations, individuals would be expected to quickly recover and exhibit avoidance behaviour. Therefore, potential impacts on individual marine mammals are considered minor and highly localised, with no impact identified at a community or species level.

Blue whales may be regionally present within a known foraging BIA during the activity, particularly over the summer season and may occur in the wider EMBA between April and August (north-bound migration) and October to January (south-bound migration), however, it is not considered likely that they would be present within the operational area during the activity. This is supported by cetacean and whale shark sightings records from the Pyrenees FPSO (also located within production licence WA-42-L) and associated support vessels. BHP collates and reports sightings data every six months to the Australian Antarctic Division of the Department of Agriculture, Water and the Environment (DAWE). Sightings of pygmy blue whales in the Pyrenees operational area are very rare, with only two sightings of pygmy blue whales recorded in the last eight years (one record from October 2015 and another from July 2013). This indicates it is highly unlikely (i.e., non-probable) that blue whales would be foraging within the operational area during the proposed activity. Sightings of humpback whales in the operational area are more common than blue whales, therefore it is considered probable that individual or aggregations of humpbacks could traverse the operational area during drilling activities.

The Conservation Management Plan (CMP) for the Blue Whale (DoE, 2015a) assesses the impacts of shipping and industrial noise (on blue whales) as ‘Minor’ i.e., ‘individuals are affected but no affect at population level’

Consistent with the CMP, BHP has assessed the temporary behavioural disturbance of a blue whale to be a potential, but highly unlikely, minor impact limited to individuals and no potential impact at a community or species level. Displacement of a blue whale from a foraging area is not considered a probable impact. Likewise, potential impacts to other marine mammals within the vicinity of the operational area, including humpback whales, is considered minor, with no potential impacts at a community or species level.

Marine Turtles

Five marine turtle species were identified as potentially occurring in the operational area (previous Table 4-11). The operational area overlaps inter-nesting habitat critical to the survival of flatback turtles, which is also a BIA (refer to Section 4.5.8). It is possible that individual turtles may be encountered traversing the operational area during the activities, however considering the water depths of the operational area (nearly 200 m), and distance to nesting beaches (over 20 km from the Muiron Islands; and 27 km from North West Cape), large numbers of inter-nesting adults are not expected.

Data on hearing by marine turtles is very limited. Turtles have been shown to respond to sounds in the low frequency range, with indications that they have the greatest hearing sensitivity in the frequency range of 100-900 Hz (Ketten & Bartol, 2005). There is no direct evidence of mortality or potential permanent injury to marine turtles from continuous noise sources such as vessels (Popper *et al.*, 2014). However, few studies have investigated the threshold level necessary for behavioural effects. Early work by Lenhardt (1994) observed caged marine turtles show avoid responses to low frequency tones. O'Hara and Wilcox (1990) reviewed the use of noise as acoustic deterrents. They found that airguns with a source level of approximately 220 dB re 1 μ Pa at 1m (measured in the 25 to 1,000 Hz range) were effective as a deterrent for a distance of about 30 m. Moein *et al.* (1994) also used airguns to investigate means to repel loggerhead turtles. Avoidance was observed at 175 dB re 1 μ Pa at 1m exposure. McCauley *et al.* (2000) found behavioural avoidance at 155 to 164 dB re 1 μ Pa²s with observed behavioural responses of caged marine turtles including rising to the surface and altered swimming patterns.

During the proposed activity, noise generated by both primary and secondary emissions sources may result in temporary disturbance to marine turtles in the vicinity of activity. At most, this will be a behavioural response such as a change in diving behaviour and avoidance of the area. Impacts to marine turtles are not considered significant based on the distance from the closest nesting habitat (over 20 km away, as such high numbers of turtles are not predicted), and as marine turtles are at low risk of potential mortality or permanent injury from continuous noise sources such as vessels (Popper *et al.*, 2014).

Fish, Sharks and Rays

There is a wide range of susceptibility to noise among fish. The primary factor likely to influence susceptibility is the presence or absence of a swim bladder. Generally, fishes with a swim bladder will be more susceptible than those without this organ. Many adult fishes, including the elasmobranchs (sharks, rays and sawfish) do not possess a swim bladder and so are not susceptible to swim bladder-induced trauma. The threshold criteria for PTS and recoverable injury has been calculated by Popper *et al.* (2014) to be between 207 and 213 dB re 1 μ Pa (peak sound pressure levels) depending on the presence or absence of swim bladders, and the threshold criteria for TTS is 186 dB re 1 μ Pa²s (cumulative sound exposure level). Given there is no exposure criteria for sharks and rays, the same criteria can be adopted, although sharks and rays do not possess a swim bladder, instead having oil-filled livers.

Most pelagic fish are expected to exhibit avoidance behaviour and swim away when noise reaches levels which may cause physiological effects. Available evidence suggests that behavioural change for some fish species may be no more than a nuisance factor. These behavioural changes are localised and temporary, with displacement of pelagic or migratory fish populations having insignificant repercussions at a population level (McCauley, 1994).

Seabirds and Migratory Shorebirds

The operational area overlaps a wedge-tailed shearwater breeding and foraging BIA (North West Cape area) (Figure 4-15). Given flaring operations are contingent, and if undertaken are limited in both duration and volume, any potential noise generated is predicted to have a negligible behavioural impact on individual avifauna that may happen to be in the direct vicinity of the flare boom during the operation. Short duration flaring is not anticipated to effect biologically important behaviours at either a community or population level.

Species Recovery Plans, Conservation Management Plans and Approved Conservation Advice

BHP has considered information contained in recovery plans, conservation management plans and approved conservation advice (refer to previous Table 4-12).

The Recovery Plan for Marine Turtles in Australia (DoEE, 2017) highlights noise interference from anthropogenic activities as a threat to turtles. The Recovery Plan refers to vessel noise and the operation of some oil and gas infrastructure as sources of chronic (continuous) noise in the marine environment, exposure of which may lead to avoidance of important turtle habitat. Five species of turtle may occur within the operational area. Of those, the flatback turtle has an inter-nesting BIA and inter-nesting habitat critical to the survival of the species (all waters within a 60 km radius of nesting on Thevenard Island, the Muiron Islands and Pilbara coast). The Recovery Plan does not list noise pollution as a threat to the Pilbara stock of flatback turtles, but does specify the following priority action: 'Manage anthropogenic activities to ensure marine turtles are not displaced from identified habitat critical to the survival'.

The operational overlaps a whale shark foraging BIA. Whilst the approved Conservation Advice for the Whale Shark (*Rhincodon typus*) (TSSC, 2015d) does not specify anthropogenic noise as a threat, it does list habitat disruption.

The operational area intercepts BIAs for humpback whales (migration) and pygmy blue whales (distribution) (refer to Figure 4-7 and discussed further in Section 4.5.8). The Conservation Management Plan for the Blue Whale (DoE, 2015a) highlights anthropogenic noise as a threat.

The operational area is not within a humpback whale calving, resting, foraging area, or a confined migratory pathway. Whilst the operational area is not within defined migration or foraging BIAs for pygmy blue whales, opportunistic foraging may occur.

Based on the noise levels likely from the proposed activity, turtles, whale sharks and whales transiting or in the vicinity of the operational area, may avoid the immediate area around the MODU and AHTS vessels. However underwater noise levels are expected to be localised, with possible effects to turtles and whales limited to, at worst, short-term avoidance behaviour. Infrequent, localised and temporary avoidance of a small area within the operational area will not affect the conservation status of turtles or whales that transit the operational area, is not anticipated to displace any blue whale from a foraging area, or compromise the objectives or recovery actions that form the basis of the Management Plans and Conservation Advice.

Potential Impacts from Noise to the Values of the Ningaloo World Heritage Property

The values of the Ningaloo World Heritage Property are detailed in Section 4.5.2.

There are no anticipated impacts from noise emissions on the following values of the Ningaloo World Heritage Property:

- Landscapes and seascapes of the property are comprised of mostly intact and large-scale marine and terrestrial environments;
- The lush and colourful underwater scenery provides a stark and spectacular contrast with the arid and rugged land;
- Benthic invertebrate species such as corals, sponges, and echinoderms; and
- Mass coral spawning events and seasonal upwelling.

The potential impacts to whale shark aggregations and cetaceans (either migrating and/or foraging) is presented above. Potential impacts from noise generation have been identified as minor and temporary, with no impacts anticipated at a population or species level and are not anticipated to affect the values of the Ningaloo World Heritage Property.

Likewise, the evaluation for fish, shark and rays, marine turtle species (including green turtle nesting, internesting and foraging), and seabirds and migratory shorebirds is presented above – all of which represent values of the Ningaloo World Heritage Property. Whilst the operational area is located approximately 13 km from the Ningaloo World Heritage Property, the potential impacts from noise emissions to the values of the property (as described above) are considered minor and temporary in nature and the aspect of the activity is

not inconsistent with the protection of conservation of these values, nor are they contrary to any relevant species recovery plans, approved conservation plans and threat abatement plans for the conservation of any protected species that are also considered values of the property (See Table 4-12).

Potential Cumulative Noise Impacts

Commercial Shipping

As described in Section 4.11.6 the operational area lies outside of declared and charted shipping fairways (Figure 4-27). The nearest shipping route heading northeast is approximately 45 km from the operational area. Both these shipping lanes and the operational area lie in deep offshore waters, where noise generated by the activity is expected to attenuate below injury and disturbance thresholds in close proximity to the operational area, with no intersect above these thresholds within the distance to shipping fairways. Therefore, no cumulative noise emission impacts are predicted for the activity in relation to commercial shipping.

Oil and Gas

As described in Section 4.11.7, there are a number of oil and gas facilities within Commonwealth waters in the of the Exmouth Sub-basin, namely:

- Woodside’s Vincent Development (*Maersk Ngujima-Yin* FPSO) in production licence WA-38-L, approximately 12 km from the operational area;
- Santos’ Ningaloo Vision Development (*Ningaloo Vision* FPSO) in production licence WA-35-L, approximately 15 km north of the operational area; and
- Woodside’s subsea gas injection, production and water injection wells located in WA-28-L approximately 15 km from the operational area.

In the instance when field activities are undertaken simultaneously, which is highly unlikely given the intermittent nature of these activities, there is a potential for noise generated from one activity to be audible within the field of a separate activity. However, given the distance apart from these facilities, the diminishment of noise with distance to below injury or disturbance thresholds, potential cumulative impacts are considered minor and short-term, with no impact at a community or species level.

Field SIMOPS

BHP’s Pyrenees Development (*Pyrenees Venture* FPSO) within WA-42-L (the same permit area as the Crosby and Stickle wells). The operational area of the Pyrenees Phase 4 Infill Drilling activity is above two well centres, both located approximately 2 km from the Pyrenees Venture FPSO. It is possible that some cumulative noise impact occurs, especially within open water between the FPSO and the MODU. However, it is anticipated this potential cumulative effect is limited to minor short-term noise impacts below disturbance thresholds.

7.6.4 Control Measures

The clearly defined regulatory, corporate and industry (good practice) controls accepted by BHP to manage the impacts associated with noise emissions from the MODU and AHTS vessels are detailed below:

Table 7-7: Noise emissions – control measures

Control Measure	Source of Requirement / Good Practice
Project Induction	EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans (modified to include whale sharks and turtles); and EPBC 2005/2034 condition 1 (a) iv
BHP APU Whale, Dolphin and Whale Shark Sightings Cards	EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans (modified to include whale sharks and turtles); EPBC 2005/2034 condition 1 (a) v: and NOPSEMA Bulletin – ‘Recording and Reporting MMO Data’ Conservation Management Plan (CMP) for the Blue Whale

Control Measure	Source of Requirement / Good Practice
Preventative Maintenance System (PMS)	MODU Safety Case & Management System Vessel Preventative Maintenance System

7.6.5 Demonstration of ALARP

Noise emissions generated during the Pyrenees Phase 4 Infill Drilling Program are considered a ‘Type A’ (lower order) impact based upon the Decision Context described in Section 6.1.1 of this EP with potential cumulative impacts considered minor and short-term. However, given the Operational Area overlaps with a number of BIAs, namely a flatback turtle inter-nesting BIA, a wedge-tailed shearwater breeding and foraging BIA, a whale shark foraging BIA and a potential foraging area (but not a defined foraging BIA) for blue whales (based upon the recently published Guidance on key terms within the Blue Whale Conservation Management Plan, DAWE, 2021) a conservative (precautionary) approach to assessment of control measures has been adopted. The precautionary approach aligns with the blue whale Conservation Management Plan but differs from the ‘precautionary principle’ detailed within the EPBC Act (Section 391) given there are no ‘threats of serious or irreversible harm’ identified.

As such the following demonstration of ALARP (Table 7-8) is consistent with those for ‘Type B’ Decision Criteria as described in Section 6.1.1 and the Conservation Management Plan (CMP) for the Blue Whale.

Table 7-8: Detailed engineering assessment – noise emissions

Hierarchy of Control	Control Measure	Accept/Reject	Reason
Eliminate	Do not undertake the activity	Reject	By not undertaking either infill drilling or well intervention activities, the overall potential for fauna disturbance and or injury would be eliminated. Given DAWE assesses the potential impacts of shipping and industrial noise as ‘minor’ i.e., ‘individuals are affected but no affect at population level’ the potential environmental benefits of not undertaking the activity in relation to noise generation are also considered minor. BHP does not consider this control as feasible, as the premise for field development requires these activities to occur. Additionally, if the field is not further developed, BHP would incur significant financial cost and eventually render the Pyrenees Development unviable.
Substitute	None identified	N/A	N/A
Engineer	None identified	N/A	N/A
Separate	Avoid periods of marine fauna sensitivity (e.g. whale migration, foraging and turtle inter-nesting)	Reject	The Conservation Management Plan (CMP) for the Blue Whale requires that anthropogenic noise in biologically important areas be managed such that any blue whale continues to utilise the area without injury and is not displaced from a foraging area. DAWE Guidance states ‘Mitigation measures must be implemented to reduce the risk of displacement occurring during operations where modelling indicates that behavioural disturbance within a Foraging Area may occur.’ Given the CMP assesses the impacts of shipping and industrial noise as ‘Minor’, i.e., has little importance, influence, or effect, then the potential benefit gained by avoiding periods of marine fauna sensitivity is at most minor at a population level, and therefore assumed to be negligible at an individual level. Additionally, whilst avoiding periods of marine fauna sensitivity for some species may reduce the risk to that species, the risk is not eliminated, and could unintentionally present risks to alternate species utilising the area at other times. Given other proposed adaptive management controls (described below) are targeted towards monitoring and avoidance of disturbance to individuals,

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Hierarchy of Control	Control Measure	Accept/Reject	Reason
			<p>these are considered more effective at reducing the risk of displacement to any cetacean, including blue whales.</p> <p>Likewise, the potential benefit that may accrue from avoiding periods of peak humpback whale density is considered to be negligible based on the simple observation that even with all the oil and gas development (and associated vessel movements) occurring in the Exmouth Basin over the last ten years the humpback whale population (Stock IV) has grown at an estimated 10% per year to the point where IUCN have removed the humpback whales from the threatened category and there have been no recorded cases of whale-vessel collisions. As discussed previously, Bejder et al. (2015) found the population abundance of eastern and western Australian humpback whales has recovered to more than approximately 50% of their pre-whaling abundance and argued that, based on meeting the eligibility criteria for removing a species from any category in the list of threatened species under the EPBC Act, the available scientific evidence does not support the listing of humpback whale populations on the EPBC Act list of Threatened species. The Australian Government removed the humpback whale from the threatened species list in February 2022, however the species remains protected under the EPBC Act. Further, population estimates indicate blue whale populations have been recovering despite current levels of industry and shipping inside foraging BIAs (McCauley <i>et al.</i> 2018). Similarly, potential threats to marine turtles are considered minor in the context of timing of the activity.</p> <p>The timing of the activity is dependent on MODU availability and existing contracting arrangements. The financial cost associated with altering a contract for a MODU that is sequenced for a window of opportunity is considerable and is considered grossly disproportionate to any minor or negligible benefit that may be gained in the highly unlikely event that an individual whale may be temporarily disturbed from undertaking a biologically important activity, when there is no impact to the long-term recovery objectives as detailed under any plan of management.</p>
Administrative	Adaptive Management Plan	Accept	<p>The adoption of adaptive management strategies upon the detection of cetaceans entering the operational area, may reduce the likelihood of potential disturbance to individuals or aggregations of whales from the activity. Adaptive management measures such as maintaining stand-off distances when in transit within the operational area and the cessation of operations with elevated noise levels (i.e., flaring) upon the detection of whales within the operational area is considered both reasonable and practicable.</p>
Monitoring	In field marine mammal observations	Accept	<p>Marine mammal observation undertaken within the permit area during the mobilisation of the MODU to and from the operational area and during periods of elevated noise generation, such as flaring would assist in detecting the potential presence of cetaceans within the operational area and inform adaptive management measures. Additionally, opportunistic marine mammal observations undertaken by the MODU and vessel crews for the duration of the activity may assist in detecting cetaceans potentially entering the operational area.</p> <p>The cost and effort associated with allocating existing crew members to undertake and record marine mammal observations whilst in field for these periods is considered both reasonable and practicable.</p>
	Dedicated Marine Mammal Observers	Reject	<p>Dedicated Marine Mammal Observers (MMOs) stationed aboard the MODU and/or AHTS vessels for the full duration of the activity are not likely to reduce potential impacts over and above marine</p>

Hierarchy of Control	Control Measure	Accept/Reject	Reason
	(MMOs) for the duration of the activity		mammals observations undertaken by vessel and MODU crews. Likewise, there is little benefit gained in maintaining dedicated MMOs whilst undertaking routine operations whilst on location in the operational area given there are no noise reduction controls available to eliminate noise from minimum power generation requirements. There is financial cost associated with engaging dedicated MMOs as well as increasing overall POB aboard vessels / MODU, and this cost is considered grossly disproportionate when there is little to no benefit gained by implementing this control.
	Passive acoustic monitoring (PAM) to detect cetaceans in the operational area	Reject	The cost of a PAM system has been estimated to be unacceptably high for a short-duration activity and would require several permanent mooring locations in the operational area with real-time monitoring and analysis. Additionally, there is little benefit gained in implementing this control given there are no noise reduction controls available to eliminate noise from minimum power generation requirements. The MODU is stationary during the activity and that AHTS vessels would primarily stationary whilst in-field or moving slowly within the operational. BHP considers the cost grossly disproportionate when there is little to no benefit gained by implementing this control.

7.6.6 Demonstration of Acceptability

Whilst noise emissions generated during the Pyrenees Phase 4 Infill Drilling Program are considered a ‘Type A’ (lower order) impact based upon the Decision Context described in Section 6.1.1 of this EP, a more detailed demonstration of acceptability has been provided consistent with that of a ‘Type B’ potential impact.

Controls considered and applied to reduce the potential impact of noise emissions align with EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans (modified to include whale sharks and turtles); EPBC 2005/2034 condition 1 (a) v: and NOPSEMA Bulletin – ‘Recording and Reporting MMO Data’. Additional, consideration has been given to adopting a precautionary approach to reducing the potential impact of anthropogenic noise consistent with the Conservation Management Plan (CMP) for the Blue Whale (DoE, 2015a).

Noise emissions generated whilst undertaking the activity do not contravene any Plan of Management for a World Heritage place (including Ningaloo WHA), National Heritage place or Ramsar wetland identified within the EMBA.

The detailed ALARP evaluation for noise emissions has been conducted and any reasonable and practicable alternate, additional, or improved controls have been adopted, including adaptive management controls consistent with the Conservation Management Plan (CMP) for the Blue Whale (DoE, 2015a).

There have been no objections or claims raised by relevant stakeholders in relation to noise emissions generated whilst undertaking the activity.

Consideration of actions prescribed in listed species recovery plans, conservation advice and threat abatement plans (Table 4 12) have been assessed and potential impacts and risks are not inconsistent with:

- EPBC Act Significance Guidelines; and
- Recovery Plan for Marine Turtles in Australia 2017-2027.

Additionally, the proposed activity is not inconsistent with the Conservation Management Plan (CMP) for the Blue Whale (DoE, 2015a) given the following:

The CMP stated objective is ‘The long-term recovery objective for blue whales is to minimise anthropogenic threats to allow for their conservation status to improve so that they can be removed from the EPBC Act

threatened species list.’ Therefore, for conservation status to improve, recovery must be at a population level. The CMP assesses the impacts of shipping and industrial noise as ‘Minor’: ‘individuals are affected but no affect at population level’ Given BHP assess the potential of injury to, or disturbance of, a blue whale to be limited to individuals and a minor in nature, this evaluation is consistent with the Commonwealth evaluation under the CMP. Therefore, the long-term recovery objectives for blue whales would not be compromised due to potential impacts from this proposed activity.

Further, the CMP assigns shipping and industry noise a ‘Moderate’ risk, because whilst impacts are Minor, the likelihood of their occurrence is assessed as ‘Almost certain’. The likelihood classification recognises that impacts from noise will occur. So, the potential minor impact from this proposed activity is accounted for in the risk ranking and criteria for addressing that moderate risk. The CMP also states that ‘for the conservation status of both subspecies to improve so that they no longer meet the criteria for threatened species listing under the EPBC Act, the cumulative impacts of the above listed threats should also be considered’. Section 7.6.3 of this EP is consistent with this statement by considering potential cumulative impacts from noise generation during the activity.

In addition to the long-term objectives of the CMP, the ‘Interim objective 4’ of the CMP states: ‘Anthropogenic threats are demonstrably minimised’. Further, the CMP states ‘mitigation measures must be implemented to reduce the risk displacement occurring during operations where modelling indicates that behavioural disturbance within a Foraging Area may occur.’ In the context of risk reduction (as required under the CMP), this EP demonstrates consistency by continually reducing potential environmental impacts and risks to ALARP and acceptable levels as is also required under the OPGGS(E) Regulations.

Action A.2.3 of the CMP states ‘Anthropogenic noise in biologically important areas will be managed such that any blue whale continues to utilise the area without injury, and is not displaced from a foraging area’. The EPO 03 ‘No physical and/or observable biologically significant behavioural disturbance on protected species (including breeding, foraging, resting or migration)’ aligns with objectives of Action A.2.3 of the CMP.

The Guidance on key terms within the Blue Whale CMP states: ‘Activities proposed to occur outside designated Foraging Areas must adopt best practice adaptive management approaches in the event that indicators of whale foraging (such as aggregating in a particular area) are evident to ensure that impacts to whales are not unacceptable e.g. injury or displacement.’ The guidance further states: ‘Noting the potential for whale foraging and feeding to occur in areas of high primary productivity outside of designated Foraging Areas, consideration also needs to be given to management of industry activities and underwater anthropogenic noise where opportunistic foraging potential exists.’ Given the operational area of the proposed activity is outside a designated foraging area, but there is potential for opportunistic foraging to occur, BHP has adopted an adaptive management approach consistent with DAWE guidance and in addition to established controls under EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans and EPBC 2005/2034 condition 1 (a) iv. Given the proposed approach, the low likelihood of a blue whale being present in the operational area during the activity, and the temporary nature of noise generated by the proposed activity, BHP considers it highly unlikely for noise generation to injure any whale, stop or prevent any blue whale from foraging, cause any blue whale to move on when foraging, or stop or prevent any blue whale from entering a foraging area.

Relevant principles of Ecologically Sustainable Development (ESD) (as defined within Section 3A of the EPBC Act) have been considered with respect to potential impacts from noise emissions generated whilst undertaking the proposed activity with the following determination:

- The ‘Integration Principle’ has not been compromised given there have been no objections or claims raised by relevant stakeholders regarding noise emissions;
- The ‘Intergenerational Principle’ has not been compromised given there are no identified health, diversity and productivity impacts that may affect the environment for future generations;
- The ‘Biodiversity Principle’ has not been compromised given the mitigation of potential impacts and risks to matters of National Environmental Significance (MNES) has been considered and controls adopted to continually manage potential impacts and risks to ALARP and acceptable levels for the duration of the proposed activity;
- The ‘Valuation Principle’ is not considered relevant given there are no identified costs associated with noise generation from the proposed activity; and

- The 'Precautionary Principle' is not considered relevant to the potential impacts and risks associated with noise emissions given there are no 'threats of serious or irreversible harm' as detailed within EPBC Act (Section 391). However, a 'precautionary approach' consistent with the Conservation Management Plan (CMP) for the Blue Whale (DoE, 2015a) has been adopted to evaluate alternate, additional, or improved controls including the adoption of an adaptive management strategy.

BHP is satisfied that when the accepted controls are implemented the environmental performance outcome (EPO) of "No physical and/or observable biologically significant behavioural disturbance on protected species (including breeding, foraging, resting or migration)" will be met, therefore BHP considers the impact to be managed to an acceptable level.

7.7 Routine and Non-Routine Atmospheric Emissions

7.7.1 Summary of Risk Assessment and Evaluation

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Decision Context	Acceptability
Atmospheric emissions	Exhaust emissions of particulates and volatile organic compounds (VOCs) from MODU & AHTS vessel engines and generators & AHTS vessel incinerators; and Emissions from MODU venting off / flaring reservoir hydrocarbon gas	Localised and temporary reduction in ambient air quality from non-GHG emissions and contribution to global GHG emissions.	10	N/A	-	Type A Low Order Impact	Tolerable

7.7.2 Source of Risk

The Australian Commonwealth Clean Energy Regulator defines ‘Scope 1’ greenhouse gas emissions as: *“emissions released to the atmosphere as a direct result of an activity, or series of activities at a facility level. Scope 1 emissions are sometimes referred to as direct emissions.”*

The following sources of atmospheric emissions generated during the proposed activity constitute ‘Scope 1’ or ‘direct’ emission sources.

Exhaust Emissions and Incineration

The MODU and AHTS vessels use marine diesel oil (MDO) to power engines, generators, mobile and fixed plant and equipment and the incinerator. The combustion of fuel onboard the MODU and AHTS vessels, and the incineration of waste onboard the AHTS vessels will generate emissions of greenhouse gas (GHG), such as carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and non-GHG such sulphur oxides (SO_x) and nitrogen oxides (NO_x), particulate material and volatile organic compounds (VOCs).

The average diesel fuel usage during drilling and completions for a typical MODU is in the order of 15,000 L per day and 10,000 L per day per AHTS vessel. The atmospheric emissions have been calculated using E&P Forum (1994) methods (assuming three AHTS vessels in continuous use) and are presented in Table 7-9.

Table 7-9: Calculated atmospheric emissions from MODU and AHTS vessels

Parameter	MODU (tonnes / day)	Vessel (tonnes / day)
CO ₂ eq	41	27
SO _x	0.01	0.007
NO _x	1.05	0.7

Venting of Hydrocarbon Gas

During the activity, hydrocarbon gas may be cold vented or flared from the MODU to the atmosphere if it is not possible to flush into the wellbore. The volume estimates provided in Table 7-10 are based on existing or planned pressure measurements and well design. During well intervention and re-entry / re-completion of the wells, the total volume of residual gas that may require venting is estimated to be <30 m³ per well assuming the entire annulus and tubing from the TH to the gas lift valve is full of gas and the gas is unable to be flushed into the well. Gas purged from the production annulus will be vented or flared to the atmosphere via the fluids handling package aboard the MODU.

Once completed, the production wells will be tied into the existing field infrastructure and flowed back to the Pyrenees Venture FPSO.

Table 7-10: Estimated gas volumes vented

Source of gas	Venting location	Gas Volume
Crosby-3H1 production annulus	MODU	<30 m ³
Crosby-4H2 production annulus	MODU	<30 m ³
Stickle-4H1 production annulus	MODU	<30 m ³
	Total volume	<92 m ³

The Australian Commonwealth Clean Energy Regulator defines ‘Scope 2’ and ‘Scope 3’ greenhouse gas emissions as:

Scope 2: “greenhouse gas emissions are the emissions released to the atmosphere from the indirect consumption of an energy commodity”. Scope 2 emissions may be referred to as indirect emissions.

Scope 3: “indirect greenhouse gas emissions other than scope 2 emissions that are generated in the wider economy. They occur as a consequence of the activities of a facility, but from sources not owned or controlled by that facility’s business”

There are no identified Scope 2 (indirect) emissions associated with the activity.

Scope 3 emissions are not considered within the context of this activity given they relate to sources of emissions not owned or controlled by BHP.

BHP has given regard to the EPBC Policy Statement ‘Indirect consequences’ of an action: Section 527E of the EPBC Act when evaluating potential indirect consequences from the proposed Pyrenees Phase 4 Infill Drilling activity (the primary action).

The ‘primary action’ of drilling is a sub-component of the broader operations of the Pyrenees Field, but the activity of drilling does not produce reservoir hydrocarbons. In the context of atmospheric emissions, the indirect ‘event’ or ‘circumstance’ from the production of reservoir hydrocarbons is a contribution to global GHG emissions resulting in human-induced climate change.

Given the extraction of reservoir hydrocarbons (during Pyrenees Field operational activities) rather than the activity of drilling, may result in a ‘secondary action’ i.e., another action taken by a different person (customer) that was not undertaken at the direction or request of BHP (the person taking the ‘primary action’), BHP shall give further regard to the EPBC Policy Statement ‘Indirect consequences’ of an action when undertaking the 5-yearly revision of the *Pyrenees Facility Operations Environment Plan* (PYHSE-E-0001) as required under regulation 19 of the OPGGS(E) Regulations.

7.7.3 Environmental Impact Assessment

Atmospheric emissions associated with power generation, waste incineration, flaring and venting operations release GHG and non-GHG pollutants resulting in a localised reduction of ambient air quality and a contribution to global greenhouse gas emissions. GHG emissions are a cause of human-induced climate change.

According to the United Nations Intergovernmental Panel on Climate Change (IPCC) Working Group II Sixth Assessment Report (IPCC, 2022) observed impacts of human-induced climate change include, more frequent and intense extreme events, widespread adverse impacts and related losses and damages to nature and people, beyond natural climate variability. Additionally, the report details near-term (2021-2040) risks associated with human-induced climate change, including global warming reaching 1.5°C in the near-term, causing unavoidable increases in multiple climate hazards and presents multiple risks to ecosystems and humans. The following potential risks have been identified within a medium to high level of confidence of occurring:

- an increased frequency, severity and duration of extreme events placing many terrestrial, freshwater, coastal and marine ecosystems at high or very high risks of biodiversity loss;
- Continued and accelerating sea level rise will encroach on coastal settlements and infrastructure and commit low-lying coastal ecosystems to submergence and loss; and
- The number of people at risk from climate change and associated loss of biodiversity will progressively increase.

Whilst the burning of fuel oil for power generation and transport associated with this activity does not have the potential to cause these identified impacts and risks in isolation, the activity does contribute to overall global GHG emissions. Given the short-duration of the activity and the consumption of fuel oil is limited to that required for power generation and transport requirements during the activity, the overall contribution to global GHG levels is considered negligible.

The reduction in ambient air quality associated with the release of non-GHG pollutants such as sulphur oxides (SO_x) and nitrogen oxides (NO_x) has the potential to cause adverse health effects, however a reduction in air quality is highly localised to the source of emissions, such as directly adjacent to exhaust systems and flare booms. Given these pollutants will rapidly disperse within the unimpeded offshore location, the temporary and localised reduction in ambient air quality is not expected to adversely affect personnel or avifauna should they be transiting the operational area.

Likewise, given the closest residential area is Exmouth located approximately 27 km southeast of the operational area and emissions are expected to rapidly dissipate into the surrounding atmosphere, no impacts are predicted for regional communities.

Ozone-depleting substances are used in closed refrigeration systems on board vessels. There is no planned release of ozone-depleting substances during the activity, therefore impacts are not predicted.

There are no identified impacts from a minor reduction to local air quality to any values of any World Heritage Properties associated with Scope 1 (direct) atmospheric emissions generated during the activity.

There are no identified cumulative impacts on local air quality associated with Scope 1 (direct) atmospheric emissions generated during the activity in relation to other regional offshore activities.

7.7.4 Control Measures

The clearly defined regulatory, corporate and industry (good practice) controls accepted by BHP to manage the impacts associated with direct (Scope 1) atmospheric emission generated via the operation of the MODU and AHTS vessels are detailed below:

Table 7-11: Atmospheric emissions – control measures

Control Measure	Source of Requirement / Good Practice
Well Operations Management Plan (WOMP) (NOPSEMA accepted)	Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations, 2011

Control Measure	Source of Requirement / Good Practice
MODU Safety Case (NOPSEMA accepted)	Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations, 2009
Marine Order 97 (Marine Pollution Prevention – Air Pollution (as applicable to vessel class: <ul style="list-style-type: none"> • Very low sulphur fuel oil (VLSFO); • International Air Pollution Prevention (IAPP) Certificate; • Ship Energy Efficiency Management Plan (SEEMP); • Ozone-depleting substances (ODS) Record Book; and • No discharge of ODS. 	Annex VI of MARPOL 73/78 and Marine Order 97 (Marine Pollution Prevention – Air Pollution (as applicable to vessel class).
Preventative Maintenance System (PMS)	MODU Safety Case & Management System Vessel Preventative Maintenance System
Emissions Recording and Reporting	<i>National Greenhouse and Energy Reporting Act 2007</i> (NGER Act)

7.7.5 Demonstration of ALARP

Scope 1 atmospheric emissions generated by the MODU and AHTS vessels for the duration of the *Pyrenees Phase 4 Infill Drilling Program* with the potential to generate localised and temporary reduction in ambient air quality and a negligible contribution to overall GHG emissions is considered a ‘Type A’ (lower order) potential impact based upon the Decision Context described in Section 6.1.1 of this EP. Given the limited (temporary) nature and scale of atmospheric emissions generated during the proposed activity, and given the controls detailed above are consistent with both regulatory requirements (including international maritime regulations) and industry good practice, BHP considers the potential impact from Scope 1 emissions has been managed to ALARP.

However, giving consideration to the external context of the IPCC Working Group II Sixth Assessment Report (IPCC, 2022) additional opportunistic controls for Scope 1 emissions have been considered applying the ALARP methodology for a ‘Type B’ (higher order) impact based upon the Decision Context described in Section 6.1.1 of this EP. This assessment is presented in Table 7-12.

Table 7-12: Detailed engineering assessment – atmospheric emissions

Emissions Reduction Hierarchy of Control	Control Measure	Accept/Reject	Reason
Avoid	Do not undertake the activity	Reject	By not undertaking either infill drilling or well intervention activities, the overall production of the field and subsequent release in atmospheric emissions would be reduced. BHP does not consider this control as feasible, as the premise for field development requires these activities to occur. Additionally, if the field is not further developed, BHP would incur significant financial cost and eventually render the Pyrenees Development unviable. Whilst this would limit overall production and subsequent emissions, BHP believes it reasonable to transition to lower carbon alternatives in line with the Paris Agreement rather than cease production prematurely.
	No use of MDO for either transport or power generation aboard the	Reject	The use of MDO for both power generation and transport aboard the MODU and AHTS vessels is the only feasible option given both constitute the use of internal combustion engines. Eliminating the use of MDO within the timeframes of this activity is not feasible.

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Emissions Reduction Hierarchy of Control	Control Measure	Accept/Reject	Reason
	MODU or AHTS vessels		
	No cold venting of hydrocarbon gas	Reject	The venting of gas is necessary for technical and HSE reasons for release of pressure and therefore cannot be eliminated.
	No flaring of gas during drilling activity	Reject	No flaring is planned during the activity; however flaring may be required for safety reasons if gas volumes cannot be flushed downhole and exceed what can be safely cold vented.
Reduce	Vessel Emission Reduction Plan	Accept	A vessel emissions reduction plan including the monitoring of vessel activities and fuel consumption when in field has the potential to reduce overall atmospheric emissions for the duration of the infilling drilling program. The cost and effort associated with developing and monitoring the plan during the activity is considered reasonable and practicable.
	Automated MODU Power Management System	Reject	<p>An automated power management system aboard the MODU has the potential to reduce emissions by automatically adjusting the number of generators used to maintain minimum power requirements for the MODU to facilitate the operations whilst still maintaining essential services. The technology would have greater effect on a DP rig given greater fuel consumption demands to mobilise and maintain station keeping. As the MODU for this activity is moored on location, fuel consumption is limited to that required to maintain winch tension.</p> <p>During offshore operations, the MODU uninterrupted power supply to maintain functionality, including all safety features. Also, running engines at idle for prolonged periods increases the risk of carbonising the engines causing reduced reliability and increasing maintenance costs.</p> <p>Some MODUs designed and constructed more recently have the ability to regulate power usage to a greater degree than the MODU currently under contract to undertake this activity. Retrofitting an automated power management system is not considered feasible, and as such is not a reasonable or practicable measure to reduce emissions during this activity.</p>
	Establish activity-specific scope 1 emissions reduction targets	Reject	<p>BHP Corporate have established the following Scope 1 & Scope 2 GHG reduction targets (for BHP operated assets):</p> <ul style="list-style-type: none"> • A short-term target to maintain operational GHG emissions at or below FY2017 levels by FY2022; • A medium-term target to reduce operational GHG emissions by at least 30 per cent from FY2020 levels by FY2030; and • A long-term goal to achieve net zero operational GHG emissions by 2050. <p>Given corporate emissions reduction targets are a whole-of-company approach, and the targets exceed the timeframes of this short-duration activity, they are not practical to implement for this program. However, the emissions generated by this program shall be monitored with the information used to evaluate the success of the broader long-term company targets.</p>
Offset	Voluntarily offset all GHG emissions from the activity through carbon offsets eligible under the	Reject	BHP is a member of the Taskforce on Scaling Voluntary Carbon Markets (TSVCM), a private sector-led initiative sponsored by the International Institute of Finance. In January 2021, the TSVCM released a report which states that a large-scale voluntary carbon market is critical to reaching the Paris Agreement goals and estimates that voluntary carbon markets need to grow by more

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Emissions Reduction Hierarchy of Control	Control Measure	Accept/Reject	Reason
	Climate Active Carbon Neutral Standard		<p>than 15-fold by 2030 in order to support the investment required to deliver a 1.5°C pathway.</p> <p>The corporate BHP offset strategy includes:</p> <ul style="list-style-type: none"> • Directly investing in offset-generating projects that deliver sustainability co-benefits and that can provide a long-term supply of offsets; • Working with others to support the move toward mature international and sub-national carbon market mechanisms; and • Developing a clear approach to both the voluntary and regulatory use of offsets to meet emission reduction commitments, as well as for structured product offerings to our customer base <p>In FY2021, BHP Corporate retired 300,000 carbon offsets in the form of verified carbon units equivalent to the net increase in our FY2021 operational emissions from FY2020 of 0.3Mt CO₂-e. Whilst carbon offsetting contributes to BHPs broader emissions reduction targets, it is not considered reasonable to offset on an activity-by-activity basis, given activity specific emissions data already informs the overarching offsetting strategy.</p>
Substitute	Replace very low sulphur fuel oil (VLSFO) use with marine-grade biodiesel	Reject	The substitution of very low sulphur fuel oil (VLSFO) (marine diesel oil) with an alternate marine-grade biodiesel has been tested within the maritime industry, but as yet, the large-scale adoption of biodiesel for shipping has not occurred. Therefore, biodiesel is not readily available for use in the N.W. Shelf.
	Replace very low sulphur fuel oil (VLSFO) use with ultra-low sulphur fuel oil (ULSFO) of lower-calorific value	Reject	The substitution of very low sulphur fuel oil (VLSFO) (marine diesel oil) with an alternate ultra-low sulphur fuel oil (ULSFO) diesel fuel with a lower calorific value is not feasible given the fuel specification requirements of the AHTS vessels' and MODU generators.
	Vessel Tender Process considering vessel fuel efficiency	Accept	<p>By incorporating vessel fuel efficiency considerations within the Vessel Tender Process, there is opportunity to evaluate and engage vessels with higher fuel efficiency when available to market. This includes prioritisation of battery-supported vessels where minimum performance capacity can be demonstrated.</p> <p>The cost and effort associated with developing and implementing this process during procurement is considered reasonable and practicable.</p>
	LNG-powered / dual fuel AHTS vessels	Reject	LNG / dual-fuel powered vessels have the potential to reduce atmospheric pollutants, but the lower calorific value of LNG compared with MDO means the vessels consume a larger quantity of LNG fuel than MDO for an equivalent voyage. Whilst a limited number of LNG-powered support vessels have been tested for in-field applications, these vessels are not readily accessible to the region. The conversion costs associated with re-engineering a AHTS vessel from MDO to LNG are significant. LNG supply chains for refuelling are not as accessible when compared with conventional MDO supply within the region.
	AHTS vessels for lesser capacity OSV during the activity	Reject	Replacing large AHTS vessels with smaller (and more fuel efficient) OSV for routine supply operations may reduce the overall fuel consumption for the project. However, given the short duration of the activity, and the need for AHTS to mobilise the MODU to and from well locations, the mobilisation costs to change out

Emissions Reduction Hierarchy of Control	Control Measure	Accept/Reject	Reason
			vessel types would be prohibitive. Additionally, even if OSV were mobilised to field for a short duration, the AHTS vessels would remain on standby thereby incurring additional costs and consuming fuel in standby mode.
	Greenfield development rather than infill drilling.	Reject	The International Energy Agency (IEA) World Energy Outlook 2020 (October, 2020) has modelled the Global oil demand between 2010 and 2040 and declines in supply from 2019 by scenario. IEA proposed the primary source of supply to meet demand be via investment in existing field over new field development. The proposed Pyrenees Infill Drilling Program aligns with this investment model to meet global oil demand in the short-term.
Monitor	Monitoring of fuel usage and reporting to the Australian Climate Change Regulator via NGER	Accept	BHP will monitor atmospheric emission from the activity consistent with the National Greenhouse and Energy Reporting Act and report these emissions to the Climate Change Regulator on an annual basis.
	Monitoring of Scope1 and 2 emissions from BHP operated assets (CO ₂ -e)	Accept	BHP calculates and reports emissions from all operated assets by financial year as reported within publicly available BHP Annual Reports. Monitoring allows for the tracking of performance against BHP Corporate emissions reductions targets.
Advocate	Actively advocate for GHG emissions reductions related to Scope 1 from this activity	Reject	As per the BHP Climate Transition Action Plan 2021, BHP has adopted a series of advocacy principles and positions to encourage alignment with the Paris Agreement goals at a corporate level. These principles are high-level and relate to a whole-of-business approach to advocacy rather than project-specific advocacy for Scope 1 emissions, therefore it is not appropriate to directly advocate to reduce emissions specifically associated with this activity.

7.7.6 Demonstration of Acceptability

Whilst atmospheric emissions generated during the Pyrenees Phase 4 Infill Drilling Program are considered a ‘Type A’ (lower order) impact based upon the Decision Context described in Section 6.1.1 of this EP, a more detailed demonstration of acceptability has been provided consistent with that of a ‘Type B’ potential impact.

Scope 1 atmospheric emissions from hydrocarbon combustion for vessel and MODU use in Australian waters are permissible under Marine Order 97 (Marine Pollution Prevention – Air Pollution). Controls are in place that are consistent with National Greenhouse and Energy Reporting Act 2007 (NGER Act) requirements. There are no relevant actions prescribed in recovery plans or conservation advice in relation to atmospheric emissions released whilst undertaking the activity. There are no relevant actions prescribed in listed species recovery plans, conservation advice and threat abatement plans (Table 4-12) relating to direct atmospheric emissions from offshore activities. Whilst habitat loss and degradation has been identified as a potential threat to a number of listed species, the minor and temporary reduction in ambient air quality associated with direct emissions from the activity does not threaten regional habitat.

Atmospheric emissions generated whilst undertaking the activity do not contravene any Plan of Management for a World Heritage place (including Ningaloo WHA), National Heritage place or Ramsar wetland identified within the EMBA.

The detailed ALARP evaluation for atmospheric emissions has been conducted and any reasonable and practicable alternate, additional, or improved controls have been adopted.

There have been no objections or claims raised by relevant stakeholders in relation to atmospheric emissions generated whilst undertaking the activity.

Relevant principles of Ecologically Sustainable Development (ESD) (as defined within Section 3A of the EPBC Act) have been considered with respect to potential impacts from atmospheric emissions generated whilst undertaking the proposed activity with the following determination:

- The 'Integration Principle' has not been compromised given there have been no objections or claims raised by relevant stakeholders regarding atmospheric emissions;
- The 'Intergenerational Principle' has not been compromised given there are no identified health, diversity and productivity impacts that may affect the environment for future generations associated with the short-duration, localised and limited release of direct (Scope 1) atmospheric emissions;
- The 'Biodiversity Principle' has not been compromised given there are no significant impacts and risks associated with direct (Scope 1) atmospheric emissions to matters of National Environmental Significance (MNES);
- The 'Valuation Principle' is not considered relevant given there are no identified costs associated with direct (Scope 1) emissions generated whilst undertaking the activity; and
- The 'Precautionary Principle' is not considered relevant to the potential impacts and risks associated with direct (Scope 1) atmospheric emissions given there are no 'threats of serious or irreversible harm' as detailed within EPBC Act (Section 391). However, a detailed ALARP evaluation has been undertaken to identify reasonable and practicable alternate, additional, or improved controls to reduce direct emissions associated with the activity.

BHP is satisfied that when the accepted controls are implemented the environmental performance outcome (EPO) of "Planned atmospheric emissions limited to those necessary to undertake the activity and maintain well integrity" will be met, therefore BHP considers the potential impacts and risks to be managed to an acceptable level.

7.8 Routine and Non-Routine Marine Discharges

7.8.1 Summary of Risk Assessment and Evaluation

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Decision Context	Acceptability
Routine MODU & AHTS vessel discharges within operational area	Routine planned discharge of sewage, grey water, putrescible (food), desalination brine, cooling water, and deck and bilge water to the marine environment from the MODU & AHTS vessels.	Localised and temporary reduction in water quality adjacent to the discharge point associated with minor increases in nutrients, salinity, temperature and oily water/chemical residues.	10	N/A	-	Type A Low Order Impact	Tolerable
	Discharge of BOP control fluids or other chemicals such as hydraulic fluids and greases (and well kill brine as contingency).	Localised and temporary reduction in water quality adjacent to the discharge point associated with hydrocarbon and chemical contaminants causing adverse toxicity effects.	10	N/A	-		Tolerable
Discharge of drill cuttings	WBM cuttings discharged overboard when riser installed.	Localised changes in turbidity, altered physical characteristics of sediment.	10	N/A	-	Type A	Tolerable
	Cuttings contamination with reservoir hydrocarbon.	Localised, short-term changes in water quality and toxicity at the surface due to cuttings discharge.	10	NA	-	Low Order Impact	Tolerable
Discharge of water-based drill fluids	WBM fluid discharged overboard into water column.	Localised and temporary reduction in water quality adjacent to the discharge point associated with minor increases in turbidity.	10	N/A	-	Type A	Tolerable
		Potential localised toxicity to marine biota, accumulation of heavy metals in sediments.	10	N/A	-	Low Order Impact	Tolerable
Discharge of cement during drilling activities	Cement residue from flushing of pipework and cement unit/ tank after each cement job.	Localised, short-term changes in water quality and toxicity at the surface due to cement discharge.	10	N/A	-	Type A	Tolerable
	Mixed cement and/or cement additives mixed for use but not subsequently used discharged overboard.	Localised loss of biota from smothering.	10	NA	-	Low Order Impact	Tolerable

7.8.2 Source of Risk

Routine MODU and AHTS Vessel Discharges

During the activity, both the MODU and AHTS vessels will generate and routinely discharge to the marine environment treated sewage, grey water, putrescible (food) wastes and desalination brine, cooling water, bilge water and deck drainage.

Sewage, Grey Water and Food Waste

The volume of sewage, grey water and food wastes generated is directly proportional to the number of persons onboard (POB) the MODU / vessel. The total volume of sewage and grey water generated by the MODU and AHTS vessels (if fully manned) is estimated to be in the order of 5 m³ to 15 m³ per day depending on POB. Food waste generated is typically 1 L per person per day. This scale of discharge falls within the scope of the Environment Plan Reference Case – Planned Discharge of Sewage, Putrescible Waste and Grey Water (National Energy Resources Australia, 2017).

Desalination Brine Reject from Reverse Osmosis

Potable water is produced onboard the MODU / vessel using reverse osmosis (RO) machinery. RO is a membrane-technology filtration method that removes salt molecules and ions from seawater by applying pressure to the solution when it is on one side of a selective membrane. The result is that a brine solution with salinity elevated by approximately 10% is retained on the pressurised side of the membrane and the potable water is allowed to pass to the other side.

Cooling Water

Seawater is used as a heat exchange medium for the cooling of machinery engines on some vessels; others use air cooling. Seawater is pumped onboard the vessel, passes through heat exchangers and is subsequently discharged from the vessel with temperature elevation in the order of 2 to 5°C. Seawater used for cooling is dosed with chlorine following intake and discharged with low residual chlorine concentrations that are rapidly diluted by prevailing water currents.

Deck Drainage

No wastes contaminated with hydrocarbons or chemicals will be routinely discharged from the MODU or AHTS vessels' deck drains. Drainage from areas with potential for hydrocarbon or chemical contamination will be managed to ensure that it has an oil content of less than 15 ppm prior to overboard discharge or sent to shore for disposal.

Rainfall and wash down of the decks may result in minor quantities of chemical residues, such as detergent, oil and grease entering the deck drainage system and being possibly discharged overboard.

Routine and Non-Routine Discharges During Activities

Drill Fluids

Once the riser is installed, the lateral well sections are drilled with WBM. On the MODU, drill cuttings will be directed over solids control equipment to separate the cuttings from the drilling fluids to allow continuous recirculation of the fluids. Drill cuttings, drilling fluids and any residual WBM that remains adhered to the cuttings are discharged overboard resulting in localised decrease in water quality as a result of turbidity. The lighter particles disperse with the currents, while the heavier particles and cuttings fall to the seabed in the vicinity of the well head. On completion of the well, excess WBM are discharged overboard unless they can be used on the next well. Based on the nature of drilled cuttings being circulated out of the well via drilling "mud" system, the cuttings will be "wet" with the base fluid, which includes fine particles mixed into the drilling "mud" to enhance the fluid properties.

Drill Cuttings

Drilled cuttings are circulated out of the well and processed with a variety of solids control equipment at surface on the rig. Recovered solids and cuttings would be discharged from the rig down a suspended drape hose. Subject to final well design, approximately 684.2 m³ of cuttings would be discharged from the Stickle-4H1 and Crosby-4H2 well locations over a 4–6-week period.

Cement

Cement is utilised to cement casings in place to form a seal between the casing and the formation prior to drilling subsequent intervals in the well. The majority of the cement remains downhole but minor volumes may be discharged to the environment, including:

- When testing cementing unit aboard the MODU (approx. 1-2 m³);
- When abandoning the motherbore of the well (approx. 10 m³); or
- Disposal of excess cement at the end of campaign that cannot be utilised by next operator.

Cementing fluids generally consist of Portland cement and additives such as inorganic salts, lignins, bentonite, barite, defoamers, silica and surfactants.

Bulk cement may also be discharged directly overboard if critical problems occur during a cement job that could lead to a compromise in well integrity (in the order of 55 m³ based upon 9-5/8" casing).

BOP Control (Actuator) / Subsea Control Fluids

As part of the activity, the BOP is required to be regularly function and pressure tested when subsea, as defined by company policy and legislative requirements. During this testing, BOP control (actuator) fluid, which generally consists of water mixed with a glycol-based detergent or equivalent water-based anti-corrosive additive suitable for open hydraulic systems, is released to the ocean. The operation of valves on the SXT will result in the release of small volumes water-based hydraulic control fluids.

7.8.3 Environmental Impact Assessment

Routine MODU and AHTS Vessel Discharges

Sewage, Grey Water and Food Waste

The potential impacts associated with sewage, grey water and food waste discharges from both MODUs and vessels are discussed in detail in the Environment Plan Reference Case (National Energy Resources Australia, 2017).

The impacts and risks from routine discharges are considered to fall within the scope of this description since:

- The volume and types of discharge are consistent with the Reference Case limitations;
- The discharges will not affect a (State or Commonwealth) marine reserve or occur within 3 nmi of a World Heritage Property, National Heritage Place, Wetland of International Importance or the Great Barrier Reef Marine Park; and
- The discharges are not inconsistent with management documentation for any EPBC Act listed threatened or migratory species.

Due to the prevailing wind and large scale current patterns in the open water marine environment of the Pyrenees Field, it is expected that discharges will be quickly dispersed and diluted such that any temporary change in water quality will be limited to the vicinity of the discharge point for a very short time.

Studies of moving vessels have shown very high dispersion rates for effluents (Loerh *et al.*, 2006). Given the small discharge volumes and the open water location, the potential environmental impact and risk from routine the MODU and AHTS vessel discharges within the operational area is considered to be low.

The operational area is located more than 12 nmi from land, which is beyond the distance required by Marine Order 96 (Marine Pollution Prevention – Sewage) 2009 and Marine Order 95 (Marine Pollution Prevention – Garbage) 2013 at which untreated sewage may be discharged.

Brine Reject from Reverse Osmosis

The brine solution will be quickly dispersed and diluted to undetectable levels within a few metres of the discharge point. Given the relatively low volume of discharge, the relatively low increase in salinity and the open ocean environment, the discharge of desalination brine stream is considered to have an insignificant environmental effect.

Cooling Water

When discharged to sea the cooling water will be subject to turbulent mixing and loss of heat to the surrounding waters. The area of detectable increase in seawater temperature is likely to be less than 10 m radius. The impact of cooling water discharge is considered to be insignificant.

Deck Drainage

Open deck drainage aboard the MODU may contain very low levels of residual contaminants such as residual from foot traffic or from small deck-spills of chemicals. Any residual in the discharge would rapidly dilute and disperse in the open ocean, the environmental effects will be temporary and localised. The discharge of deck drainage is considered to have a negligible environmental effect.

Oil / Water Discharge

All drains from chemical storage areas aboard the MODU, such as drill floor, mud pit rooms, mud pump room, shaker house, engine room are routed to the MARPOL-compliant oily water separator. Residual oil in water treated to 15ppm prior to discharge would rapidly dilute and disperse in the open ocean, the environmental effects will be temporary and localised. The discharge of deck drainage is considered to have a negligible environmental effect.

Routine and Non-Routine Discharges During Activities

Drill Fluids

The whole fluids and fluid components of the WBM systems currently in use are 'non-toxic' or 'almost non-toxic' (Hinwood *et al.*, 1994). Barite, bentonite and guar gum are listed as an "E" Category fluids under the OCNS and considered to be PLONOR (Pose Little Or No Risk to the environment) (OSPAR, 2013) and will be discharged in combination with drill cuttings. Barite and bentonite may contain some heavy metal concentrations. Most of the metals detected in drilling muds are present primarily as trace impurities in barite, bentonite clay, or the sedimentary rocks (drill cuttings) in the formations penetrated by the drill bit (Neff, 2008). The metals of environmental concern (because of their potential toxicity and persistence) that may be present in some drilling mud barites include cadmium, chromium, copper, mercury, lead, and zinc. These metals are present in barite primarily as insoluble mineralised sulphide salts (Trefry *et al.*, 1986 ; Simpson and Batley, 2007). These solid metal sulphides have limited environmental mobility. Given the low concentrations of stock barite (approx. 75 ppb) within the WBM formulation, coupled with the low concentrations of heavy metals including mercury and cadmium in stock barite (<1ppm and <3ppm respectively), the overall volumes of heavy metals within the drill fluid discharges are minimal.

Most barites also contain high concentrations of aluminium, iron, and silicon, associated primarily with mineral impurities in the barites. These metals also are abundant in clays and are not considered toxic to marine organisms.

The LC50 of WBM to mysid shrimp is estimated to be >300,000 ppm placing it in the 'non-toxic' category under the classification system used by WA Department of Minerals and Petroleum (Hinwood *et al.*, 1994).

WBM drilling fluids discharged overboard at the sea surface are expected to dilute and disperse rapidly, further reducing the concentrations of heavy metals that settle within benthic sediments.

Whilst trace levels of heavy metals released into the environment increase the toxicity of sediments, and these trace elements have the potential to become bioavailable to benthic invertebrates, and potentially bioaccumulate in the marine environment, given the limited concentrations and volumes of these metals the overall impact is considered low.

Drill Cuttings

Turbidity

When drill cuttings and adhered water-based muds are discharged into the sea, the larger particles and flocculated solids, representing approximately 90% of the mass of the mud solids consisting of fine-grained unflocculated clay-sized particles and a proportion of the soluble components of the mud form a turbid plume in the upper water column that drifts with the prevailing currents away from the discharge point and is rapidly diluted as it disperses horizontally down current, and vertically through the water column.

A detailed literature review was undertaken by Neff (2005) of studies in the U.S. Gulf of Mexico and the North Sea investigating both the short and long-term impacts of drilling discharges on the marine environment. The review states that the impacts associated with discharge of cuttings are related to the total mass of drilling solids discharged, and the relative energy of the receiving environment at the discharge location. In well-mixed ocean waters, such as the location of the *Pyrenees Phase 4 Infill Drilling Program*, drilling muds and cuttings

are diluted by 100-fold within 10 m of the discharge point and by 1,000-fold after a transport time of about 10 minutes at a distance of approximately 100 m from the discharge point (Neff, 2005). The literature review indicated that because of the rapid dilution of the plume in the water column, harm to marine flora and fauna in the water column was unlikely and had never been demonstrated. Likewise, a post drilling survey completed within days of drilling (ENI, 2008) confirmed that water turbidity was low as the wellhead and seabed could be seen from a distance of several metres.

Drill cuttings dispersion modelling (GHD, 2021b) was undertaken using a 3D hydrodynamic output to simulate the dispersion and deposition of cuttings and muds. The cuttings and muds was modelled at the Stickle-4H1 well location to reflect a discharge schedule of ~18 days in duration, with a total of 11.2 days of solids discharge and 7 days where no discharge occurs. A total of 540.5 m³ of cuttings and 54.0 m³ of muds was modelled, while a total of 130.7 m³ of muds modelled for release over short periods (1-2 hours) between each well interval.

The modelling indicated the following results for the extent of total suspended solids (TSS) anticipated for a lateral well:

- The area of influence (AOI) for instantaneous exposure to TSS exceeding 1 mg/L was predicted to extend a maximum distance of ~9 km from the well location, with an AOI area of ~5,900 ha (Figure 7-2). For an exposure duration of 1 day (cumulative over the 50 simulation days, non-continuous), the AOI is significantly reduced in spatial extent to a maximum distance of ~0.5 km from the well site and an area of ~30 ha. For an exposure duration of 7 days (cumulative over the 50 simulation days, non-continuous), the AOI is reduced to a length scale of ~0.1 km from the well site and an area of ~2 ha.
- The nearest distance between an instantaneous TSS exceedance of 1 mg/L and the proximal Ningaloo Coast World Heritage Area is 9.7 km.
- Instantaneous maximum TSS – this is the maximum TSS that occurred at any location during the simulation* (Figure 7-3). Values shown range from 10 to 100 mg/L, however they are instantaneous, so represent temporary impacts only. The plume exceeded 10 mg/L at distances of up to 3.6 km from the Stickle-4H1 well.
- 1 hour exceedance TSS contours – this shows the areas in which the TSS values shown in the colour bar are exceeded for a duration of 1 hour (Figure 7-4). The spatial extent (and concentrations) are reduced significantly compared to the instantaneous figure (Figure 7-3). The area in which the plume exceeded 10 mg/L for one hour extends a maximum distance of 2.6 km
- 6 hour exceedance TSS contours – similar to the 1 hour exceedance (Figure 7-5). The plume exceeds the TSS values shown in the colour bar for a duration of 6 hours. The area in which the plume exceeded 10 mg/L for one hour extends a maximum distance of 250 m

*The simulation used for these examples was the discharge beginning on 11 Mar 2012. This simulation was selected because it produced the largest plume (i.e. longest distance before concentrations reduced below 1 mg/L).

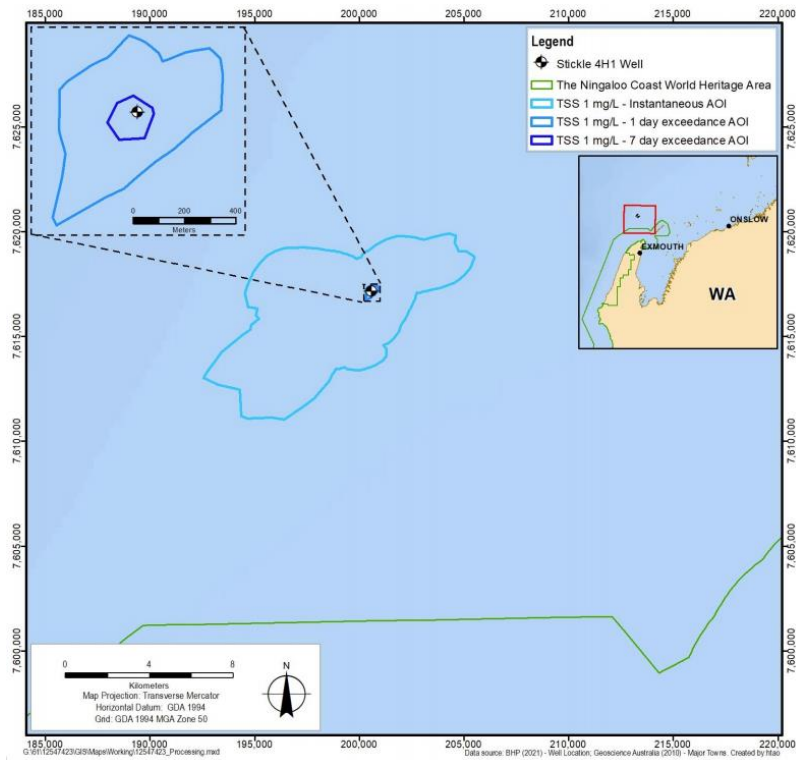


Figure 7-2: Area of Influence (AOI) from drill cutting generated at Stickle-4H1 well location (GHD, 2021b)

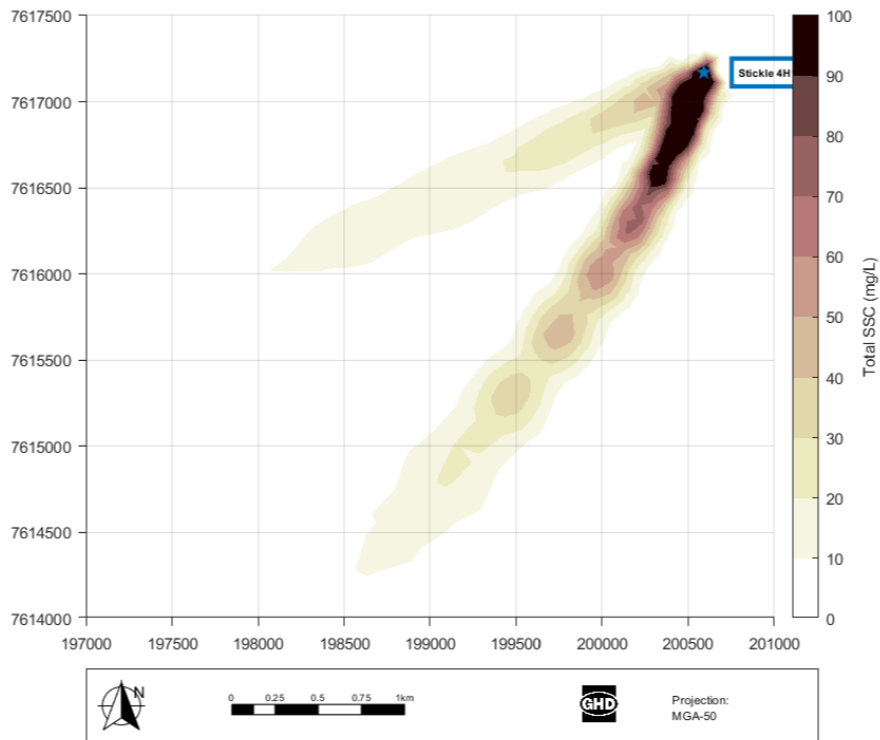


Figure 7-3: Instantaneous maximum TSS contours from drill cutting generated at Stickle-4H1 well location (GHD, 2021b)

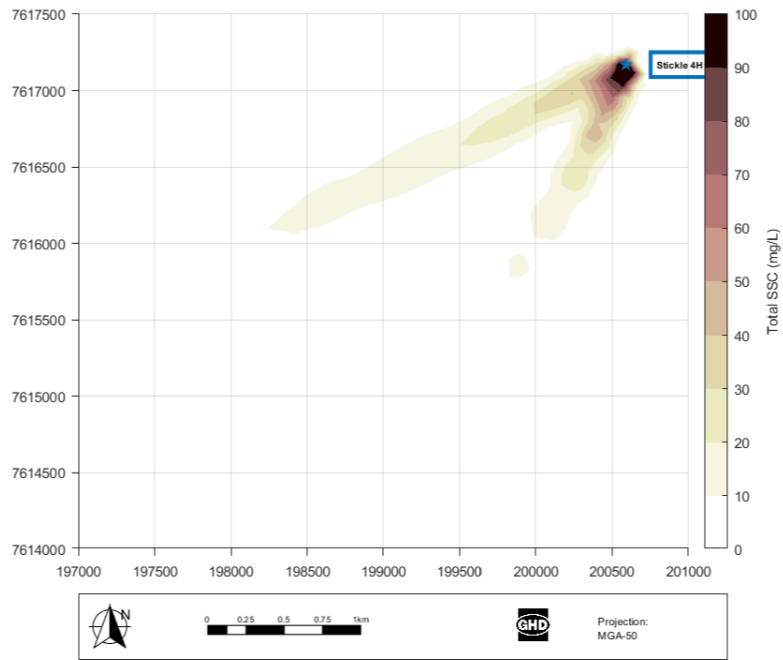


Figure 7-4: 1 hour exceedance TSS contours from drill cutting generated at Stickle-4H1 well location (GHD, 2021b)

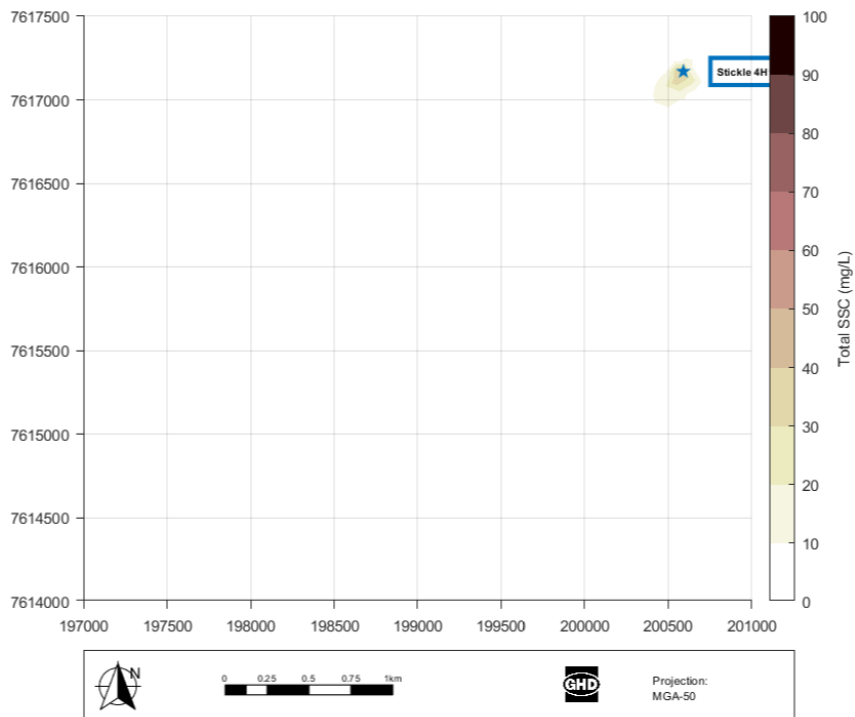


Figure 7-5: 6 hour exceedance TSS contours from drill cutting generated at Stickle-4H1 well location (GHD, 2021b)

Smothering of Seabed

Smothering of benthic infauna may occur in locations where the rate of cuttings deposition exceeds the rate at which benthic infauna are able to move up through the sediments. There is no generally agreed threshold point for tolerance to sedimentation as it depends on the species and the structure of the accumulating

material. Smit *et al.* (2008) conducted an extensive literature review of species sensitivity distributions for sediment burial in the marine environment. They found the 50% hazardous level for burial of deep-water benthic infauna was 5.4 cm. If the depth of cuttings was 5.4 cm; this equates to a density of approximately 75 kg/m² (assuming a specific gravity of cuttings of 1.4).

Results from drill cuttings dispersion modelling undertaken at the Stickle-4H1 well location indicated that there was no potential for exceedance of the trigger sedimentation thickness threshold of 3 mm deposition or sedimentation rate threshold (10 mg/m²/day) for any of the release scenarios over any season. Given the close proximity, similar water depth and the smaller volume of discharges anticipated from the drilling of a single lateral, these results are considered reflective of potential contingent lateral at Crosby-4H2.

The area of similar depth range (between 10 – 500 m) within the North West Province bioregion is estimated to be 5,645 km² (Baker *et al.*, 2008); therefore even if cuttings settled on the seabed within the operational area, the cumulative area of disturbance is an extremely small portion of similar habitat (<0.00000045%) and the environmental impact is considered to be insignificant.

Alteration of Sediment Characteristics

The deposition of drill cuttings can markedly alter the sediment characteristics, particularly the grain size composition, within a localised area. Habitat disturbance may occur due to the difference in particle characteristics of the sedimented cuttings compared to the existing sediment. This change will be temporary as sediment redistributes and disperses over time. Given cuttings are to be discharged at surface during the *Pyrenees Phase 4 Infill Drilling Program*, and cuttings dispersion modelling indicated no potential for an exceedance of the 3 mm sedimentation thickness threshold, no alteration of sediment characteristics is anticipated during the activity.

Conclusion

Given the intermittent surface discharge of limited volumes of drill cuttings, and the high degree of natural dispersion within ~200 m water depth the benthic community within and outside the operational area is not expected to result in benthic disturbance from the potential smothering effect of drill cutting discharge.

Any potential settlement of drill cuttings at below threshold levels (3 mm thickness or a deposition rate of 10 mg/m²/day) is unlikely to result in persistent impacts and a rapid return to 'normal' conditions is anticipated as the infauna and epifauna recolonise the potentially disturbed area.

From the above information, the elevated TSS concentrations (above 10 mg/L) are generally short-lived and last on the order of hours at any particular location. The exception is for waters located near the well, which are subjected to elevated concentrations for longer durations during the discharge events. Given the detail above, short-term minor impacts to a very small portion of comparable habitat are anticipated. No cumulative impacts and risks are expected for up to 3 lateral wells across two well centres.

There are no anticipated impacts from a conservative instantaneous TSS exceedance of 1 mg/L at the Ningaloo Coast World Heritage Area.

Cement

At completion of cementing operations, small amounts of residual cement slurry remaining in the mixing area will be discharged to sea before it sets to concrete. The cement slurry discharged to sea has low dispersibility, although some will disperse in the water column. As such, there will be some localised, short-term decrease in water quality until the cement slurry settles to the seabed as a very thin layer spread over a wide area. Pelagic water column fauna such as fish, turtles and whales are unlikely to be affected as the decrease in water quality will be localised and short-term (hours) and these mobile species would avoid the area. The environmental consequence of this disturbance is insignificant because of the minor quantities involved and the essentially inert nature of the material (CIN, 2004). The benthic habitats affected by this localised disturbance will be unconsolidated sediments that are colonised by a sparse, low abundance epibiotic and infaunal community. As this habitat type and benthic community are ubiquitous throughout the North West Bioregion, potential deterioration in habitat quality in this small area is not considered to be significant.

BOP Control (Actuator) / Subsea Control Fluids

Concentrated BOP control fluids (such as Stack Magic EcoF) are diluted to 2 to 3% in water on the MODU to make up the BOP control fluid subsequently released to the marine environment. When used at this concentration, Stack Magic EcoF it is classed as a Group E product by the OCNS and therefore considered to be PLONOR. If an alternative BOP control fluid is used aboard the MODU, only BOP control fluids ranked D or better on OCNS ranked list will be utilised.

During a typical well drilling programme, the BOP is function tested during assembly and maintenance and during operation on the seabed. Approximately 1500 litres of diluted control fluid is discharged to the ocean during each function test. Acute toxicity is not likely to occur due to the low inherent toxicity of the control fluid composition. Chronic toxicity will not occur because a) the already dilute fluid is further diluted upon release and dispersed away from the BOP, and b) even if there was no dispersion the interval between releases exceeds the biodegradation period of the fluid.

The release of small volumes of water-based low-toxicity subsea control fluids will result in a temporary and localised alteration in water quality in the vicinity of the release source point, resulting in potential adverse effects to marine biota. Given the low volumes discharged and the limited number of release events, the potential impacts are expected to be very localised with only a slight impact on the marine environment due to rapid dilution.

Summary

Threatened or Migratory Fauna and Local Fauna

As discussed in the sections above, all planned discharges will have a limited discharge extent localised to the area around the source point, with rapid dilution occurring due to the deep waters, the offshore ocean environment and the volumes and nature of discharges involved. Reduction in water quality will be limited to the proximity of the operational area with limited adverse effects to marine biota as a result of short-term reduction in water quality.

The operational area overlaps with BIAs for humpback whales, pygmy blue whales, and flatback turtles and as such these species may be encountered within the operational area. Marine fauna within the operational area are likely to be transient, however they may be affected if they come in direct contact with a release (i.e. by passing through the immediate discharge area). If contact does occur with any marine fauna, it will be for a short duration due to rapid dispersion, such that exposure time may not be of sufficient duration to cause a toxic effect. Given the small volumes of discharges, the water depth of release and the rapid dilution, the likelihood of ecological impacts to these marine fauna is considered to be highly unlikely.

There are no identified impacts to any values of any World Heritage Properties associated with routine and non-routine marine discharges within the operational area.

There are no identified cumulative impacts associated with routine and non-routine marine discharges within the operational area.

7.8.4 Control Measures

The clearly defined regulatory, corporate and industry (good practice) controls accepted by BHP to manage the impacts associated with marine discharges generated via the operation of the MODU and AHTS vessels and the drilling activity are detailed below:

Table 7-13: Marine discharges – control measures

Control Measure	Source of Requirement / Good Practice
Macerator for putrescible waste	Marine Order 95 (Pollution Prevention – Garbage)
IOPP Certificate	Marine Order 91 (Pollution Prevention – Oil)
MARPOL-compliant oily water filter system	
ISPP Certificate & Sewage Treatment Plant (STP)	Marine Order 96 (Pollution Prevention – Sewage)
Discharge Location	
Chemical Assessment Process	MARPOL Annex II; BHP Hazardous Materials Acquisition Environmental Supplement (AO-HSE S-0002) consistent with Offshore Chemical Notification Scheme (OCNS); and

Control Measure	Source of Requirement / Good Practice
	EPBC 2005/2034 condition 1 (a) i
Drill Fluid Testing	American Petroleum Institute (API) Specification 13A: Drilling Fluid Materials.
Mercury (Hg) & Cadmium (Cd) limits in stock barite	Environmental, Health, and Safety Guidelines Offshore Oil and Gas Development (IFC, June, 2015); and US Environmental Protection Agency (EPA) under the National Pollutant Discharge Elimination System (NPDES) General Permit for the Gulf of Mexico.
Solids Control Equipment	EPBC 2005/2034 condition 1 (a) ii
Cement Management	BHP Cementing Standard (DR-PET-STD-DC-0142)
Additional Opportunistic Controls	
Routine wastes (i.e., greywater) stored onboard and transferred to shore for onshore treatment and disposal.	Health and safety risks associated with the storage of routine vessel wastes onboard. Owing to the short duration of the activity (approximately 3-4 months), transfers not practicable and increase the risk of spills/ leaks and risk to personnel during transfer operations. Additional costs involved in transfers disproportionate to the environmental benefit gained given the rapid dilution in offshore waters and low potential impact from routine vessel discharges. Additionally, the proposed controls are consistent with industry good practice and relevant Marine Orders for discharge to the marine environment.
Storage of drill cuttings aboard the MODU for onshore disposal	Given drill cutting are treated aboard the MODU, the program exclusively uses a WBM system and cuttings dispersion modelling indicates only slight, localised and temporary increases in TSS, the cost and logistical effort to dispose of drill cutting onshore is considered grossly disproportionate to any environmental benefit gained.

7.8.5 Demonstration of ALARP

Routine discharges generated by the MODU and AHTS vessels for the duration of the *Pyrenees Phase 4 Infill Drilling Program* is considered a ‘Type A’ (lower order) impact based upon the Decision Context described in Section 6.1.1 of this EP. Given the limited (temporary) nature and scale (within proximity of the operational area) of routine discharges generated during the proposed activity, and given the controls detailed above are consistent with both regulatory requirements (including international maritime regulations and EPBC 2005/2034 condition 1 (a) i & 1 (a) ii) and industry good practice (including the EP Reference Case (National Energy Resources Australia, 2017), BHP considers the impact has been managed to ALARP and no further detailed engineering evaluation of alternate, additional or improved controls is required. However, opportunistic controls have also been evaluated but not adopted given the proposed controls have been deemed disproportionate in cost when compared with the negligible potential environmental benefit gained.

7.8.6 Demonstration of Acceptability

Routine marine discharges in Australian waters are permissible under MARPOL and relevant Marine Orders. BHP is satisfied that when the accepted controls are implemented the environmental performance outcome (EPO) of “Impacts to water quality from planned discharges reduced to ALARP” will be met, therefore BHP considers the impact to be managed to an acceptable level. Consideration of actions prescribed in listed species recovery plans, conservation advice and threat abatement plans (Table 4-12) have been assessed. The Recovery Plan for Marine Turtles in Australia (DoEE, 2017) identifies chemical discharge as a relevant threat to marine turtles. The proposed activity is not inconsistent with recovery plan for marine turtles, as a range of control measures were identified and adopted that align with the intent of the recovery plan.

Additionally, the operational area does not intersect any Commonwealth or State marine parks or KEFs and no impacts to commercial or recreational fisheries are expected.

Drilling cuttings distribution modelling (GHD, 2021b) indicates not impact to the Ningaloo World Heritage Area.

No concerns or objections regarding routine and non-routine discharges have been raised by relevant stakeholders.

7.9 Waste Management

7.9.1 Summary of Risk Assessment and Evaluation

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Decision Context	Acceptability
Waste management	Waste (hazardous and non-hazardous) generated during activities	Increase waste to landfill. Additional usage of onshore waste reception facilities	10	N/A	-	Type A Low Order Impact	Tolerable

7.9.2 Source of Risk

Offshore vessels produce a variety of solid wastes, including domestic and industrial wastes. These include aluminium cans, bottles, paper and cardboard, scrap steel, chemical containers, batteries, and medical wastes. These materials could potentially impact the marine environment if discharged in significant quantities.

Waste is segregated onboard the MODU and AHTS vessels and stored in designated skips and waste containers. Wastes are segregated into the following categories:

- Non-hazardous waste (or general waste);
- Hazardous waste; and
- Recyclables (further segregation is conducted in line with practices at existing BHP operations in the region).

Non-Hazardous Waste

General non-hazardous waste include general domestic and galley waste and recyclables such as scrap materials, packaging, wood and paper and empty containers. Volumes of non-hazardous waste generated on the vessels are generally low.

Hazardous Waste

Hazardous wastes are defined those wastes that are or contain ingredients harmful to health or the environment. Hazardous wastes likely to be generated onboard includes oil contaminated materials (e.g., sorbents, filters and rags), chemical containers and batteries. The volumes of hazardous wastes generated are relatively small.

7.9.3 Environmental Impact Assessment

Improper management of wastes may result in pollution and contamination of the environment. There is also the potential for secondary impacts (ingestion and/ or entanglement) on marine fauna that may interact with wastes such as packaging and binding materials, should these enter the ocean.

All waste (hazardous and non-hazardous) generated during the activity will be transported to and managed appropriately by third parties. Environmental impacts associated with onshore disposal relate to the small incremental increase in waste volumes received at the onshore licensed waste recycling and/or disposal sites. The environmental impacts associated with waste disposal onshore are anticipated to be low because of the minor quantities involved and recycling of some materials.

Accidental loss overboard of single items or units of waste may impact the environment through a reduction in water quality, or present a hazard to marine fauna, depending on the waste involved. Given the small volumes

of waste generated and the management in place to prevent loss overboard (e.g. covers on skips/bins), the risk of impact is considered to be low. No significant environmental impacts are anticipated because of the minor quantities involved and the localised area of impact.

There are no identified impacts to any values of any World Heritage Properties associated with waste management for the activity.

There are no identified cumulative impacts associated with waste management for the activity.

7.9.4 Control Measures

The clearly defined regulatory, corporate and industry (good practice) controls accepted by BHP to manage the impacts associated with waste management are detailed below:

Table 7-14: Waste management – control measures

Control Measure	Source of Requirement / Good Practice
Waste Management	MARPOL 73/78 Annex III and V, and the following Marine Orders, as appropriate to vessel class; Marine Order 94 (Pollution Prevention – Packaged Harmful Substances); and Marine Order 95 (Pollution Prevention – Garbage)
Project Induction	BHP procedures and standards
Additional Opportunistic Controls	
None identified	-

7.9.5 Demonstration of ALARP

Waste management aboard the MODU and AHTS vessels for the duration of the *Pyrenees Phase 4 Infill Drilling Program* is considered a ‘Type A’ (lower order) impact based upon the Decision Context described in Section 6.1.1 of this EP. Given project waste streams are appropriately stored offshore and transported to a licenced mainland facility for treatment, recycling and/or disposal and the controls detailed above are consistent with both regulatory requirements and industry good practice, BHP considers the impact has been managed to ALARP and no further detailed engineering evaluation of alternate, additional or improved controls is required. No opportunistic controls have been identified that could further reduce potential environmental impacts and risks.

7.9.6 Demonstration of Acceptability

The proposed waste management controls are consistent with MARPOL and relevant Marine Orders. BHP is satisfied that when the accepted controls are implemented the environmental performance outcome (EPO) of “No unplanned release of solid waste or objects to the marine environment” will be met, therefore BHP considers the impact to be managed to an acceptable level. Consideration of actions prescribed in listed species recovery plans, conservation advice and threat abatement plans (Table 4-12) have been assessed. The Threat Abatement Plan for the impacts of marine debris on vertebrate wildlife of Australia’s coasts and oceans (DoEE, 2018) identifies ship-sourced marine debris as a risk to vertebrate marine life through entanglement or ingestion, as do other species-specific conservation advices for marine mammal, marine reptiles, whale sharks and seabirds and migratory shorebirds. The proposed activity is not inconsistent with any of these plans given the proposed controls have been designed to prevent marine pollution.

Additionally, there is no anticipated impact to any Commonwealth or State marine parks, KEFs or to commercial or recreational fisheries.

No concerns or objections regarding waste management practices have been raised by relevant stakeholders.

8 Environmental Risk Assessment: Unplanned Events

This section of the EP presents the environmental risk assessment for unplanned events that may occur during the *Pyrenees Phase 4 Infill Drilling Program*.

8.1 Risk Assessment and Evaluation

The purpose of this section is to address the requirements of Regulations 13(5) and 13(6) by providing an assessment and evaluation of all the identified risks and impacts associated with the petroleum activity and associated control measures that will be applied to reduce the impacts and risks to ALARP and an acceptable level.

The environmental aspects and sources of risk identified during the ENVID process were divided into planned activities (i.e. routine operations) and unplanned events (i.e. incidents). This section presents the environmental impacts and risks associated with unplanned events. Table 8-1 summarises the impact and risk analysis for the aspects associated with the unplanned events. A comprehensive risk and impact assessment for each of the unplanned events, and subsequent control measures proposed by BHP to reduce the risk and impacts to ALARP and acceptable levels, are detailed in the following subsections.

Table 8-1: Summary of the environmental impact and risk analysis for unplanned events

EP Section	Aspect	Value Potentially at Risk / Impact										Risk Assessment & Evaluation			
		Environmental							Socio-Economic			Severity Factor	Likelihood Factor	Residual Risk	Acceptability
		Marine Sediment	Water Quality	Air Quality	Ecosystems / Habitat	Marine Species	Marine Protected Areas	Key Ecological Features	Commercial Fisheries	Shipping Activities	Tourism and Recreation				
	Unplanned Events														
8.3	Hydrocarbon release – Loss of well control														
	Hydrocarbon release due to loss of well control		x		x	x	x	x	x	x	x	100	0.03	3	Tolerable
8.4	Hydrocarbon release – Loss of flowline inventory														
	Dropped object on flowlines or anchor drag resulting in subsea release of hydrocarbons		x		x	x	x		x		x	10	0.03	0.3	Tolerable
8.5	Hydrocarbon release – Vessel collision														
	Vessel collision resulting in surface release of MDO		x		x	x	x	x	x		x	30	0.03	0.9	Tolerable
8.6	Unplanned discharges – Chemicals and Minor Hydrocarbon Spills														
	Minor spills/ leaks of chemicals and hydrocarbons		x			x						10	0.1	1	Tolerable
8.7	Unplanned discharges – Solids														
	Dropped solid objects overboard from MODU or vessel	x	x			x						10	0.1	1	Tolerable
8.8	Marine fauna interaction														
	Vessel interactions / strike with marine fauna					x						10	0.03	0.3	Tolerable
8.9	Introduction of invasive marine species														
	Biofouling of vessel and submersible equipment, or through ballast water exchange				x	x						100	0.03	3	Tolerable

8.2 Worst-Case Spill Scenarios

8.2.1 Scenario Context

Several unplanned events may occur during the proposed activities, resulting in the potential for large-scale releases of hydrocarbons (i.e. incidents or emergencies). Worst-case credible spill scenarios were identified through the environmental impact and risk assessment process and a series of workshops. The following scenarios were identified:

- Subsea release of hydrocarbons from the Stickle-4H1 production well from a loss of well control (LOWC) scenario
- Subsea release of hydrocarbons from a flowline resulting from a dropped object
- Surface release of marine diesel oil (MDO) from a vessel collision.

Table 8-2 presents the worst-case hydrocarbon spill scenarios identified.

Table 8-2: Summary of worst-case hydrocarbon spill scenarios

Scenario	Hydrocarbon Type	Worst-case Maximum Spill Volume	Comment	Oil Spill Modelling?	EP Section
Subsea release of crude oil from a loss of containment from the Stickle-4H1 well.	Stickle crude	Crude: 0.986 MMbbl (156,774 m ³) (Gas: 192.5 MMscf) over 69 days	Maximum credible volume modelled with highest flow LOWC with both horizontal laterals (L1 and L2) completed with screens and open to flow	Yes	8.3
Subsea release of crude oil from Crosby or Stickle subsea flowline due to rupture from dropped object or MODU mooring anchor drag.	Crosby crude	~77 m ³ over 1 hour	Maximum credible volume based on loss of inventory of flowline with >90% water-cut	No	8.4
	Stickle crude	~18 m ³ over 1 hour			
Surface release of MDO from fuel tank rupture on AHTS vessel due to collision at the Crosby well location.	Marine diesel oil	330 m ³ over 6 hours	Maximum credible volume based on largest fuel tank capacity on AHTS vessel.	Yes	8.5

An overview of the oil spill modelling undertaken for the worst-case maximum spill volumes presented in Table 8-2 is presented in Section 8.2.2.

Non-Credible Scenarios

Vessel grounding was discussed and considered but determined non-credible given the water depths and offshore location of the operational area, and therefore, not discussed further.

8.2.2 Oil Spill Modelling Overview

Spill modelling was carried out using SINTEF’s Oil Spill Contingency and Response (OSCAR) System (Version 11.0.1). OSCAR is a system of integrated models that quantitatively assess the fate and transport of hydrocarbons in the marine environment, as well as evaluate the efficacy of response measures (Reed *et al.*, 2001; Reed *et al.*, 2004).

OSCAR provides an integrated hydrocarbon transport and weathering model that accounts for hydrocarbon advection, dispersion, surface spreading, entrainment, dissolution, biodegradation, emulsification, volatilisation and shoreline interaction.

Three-dimensional (3D) OSCAR modelling was undertaken in stochastic mode (total of 150 realisations per scenario) with start dates spaced approximately fortnightly over a five year period. Inputs into the model were sourced from HYCOM (regional ocean currents, temperature and salinity profiles), TPXO7.2 (tidal currents) and NCEP/NCAR (regional winds).

OSCAR enables simulation of a hydrocarbon release scenario in deterministic mode (i.e. a scenario is simulated with one start date with spatial results available at fixed time intervals over the duration of the simulation) or stochastic mode (i.e. a scenario is simulated a number of times with varying start dates, and the results are outputted spatially in a probabilistic manner).

Table 8-3 provides the details on the model input specifications for the modelled scenarios.

Table 8-3: Model input specifications

Parameter	Subsea Crude Spill (loss of well control)	Surface MDO Spill
Location	Stickle well at: Latitude 21° 31' 23.679" S (21.523244° S) Longitude 114° 06' 35.289" E (114.109803° E)	Crosby well at : Latitude 21° 32' 43.063" S Longitude 114° 05' 42.504" E
Depth of spill (m)	182.5	Sea surface
Total depth at location (m)	199	199
Hydrocarbon type	Stickle crude oil	Marine diesel oil
Liquid release volume	156,774 m ³ (0.97 MMbbl)	330 m ³
Liquid release rate (ave.)	13,886 STB/d (2,207 m ³ /day)	-
Gas release volume	192.5 MMscf (5,450,993 sm ³)	-
Gas release rate (ave.)	2.71 MMscf/day	-
Release duration	69 days	Instantaneous
Number of realisations (runs)	150	
Timing of release risk period	All months	

Weathering Modelling

Modelling for both the MDO spill and the loss of well control scenarios, included a preliminary analysis of the hydrocarbon weathering using the SINTEF Oil Weathering Model. The model predicts the weathering (i.e. mass balance partitioning) of hydrocarbons under steady-state metocean conditions. Weathering simulations were run for constant wind speeds of 1 m/s (low winds), 5 m/s (moderate winds) and 10 m/s (high winds). The simulations were based on a test case of 100 m³ of hydrocarbon release instantaneously onto the sea surface.

8.2.3 Hydrocarbon Properties

Generally, the crude oil produced from the Pyrenees reservoirs (Crosby, Ravensworth, Stickle, Tanglehead Wild Bull [upper Pyrenees] and Moondyne) has very similar properties, which is a heavy crude (API 19) with some dissolved methane (25 to 30%). There are very small quantities of lighter hydrocarbons and no hydrogen sulphide (H₂S) within the well streams. However, there is minor potential for reservoir souring to occur over time as produced formation water injection volumes increase. Up to 2.2% CO₂ is present in the well streams. All of the Pyrenees crude oils can be classified as Group III oils under the International Tanker Owners Pollution Federation (ITOPF) classification system, with the Moondyne crude assessed as the most persistent. Data collected on the well fluids suggest the reservoir hydrocarbons were expelled from mature sediments that were deposited under sub-oxic (probably marine) conditions.

Table 8-4 and Table 8-5 provide a summary of characteristics of the hydrocarbons relevant to the worst-case spill scenarios identified. Selection of appropriate hydrocarbon analogues were selected from the SINTEF Oil Library that provides the best match to the specified hydrocarbons.

Properties of Crude Oil

BHP provided GHD with the laboratory report for Pyrenees crude, which is a similar oil to both Crosby and Stickle crude, and was used to further inform the selection of a hydrocarbon analogue to represent the crude oil for spill modelling purposes.

Martin Linge Crude 13C was selected from SINTEF's oil library as the crude analogue. A comparison of the whole oil properties for Stickle Crude, Pyrenees crude and SINTEF's *Martin Linge Crude 13C* (Table 8-4) indicates a close match between the four crude oils.

While the asphaltene content of *Martin Linge Crude 13C* is lower than Stickle crude, the higher wax content is compensatory for this aspect. Direct comparisons of the viscosity are not possible because of the large variation in measurement temperatures across the oils. However, the key thing to note is the difference in temperatures at which the viscosity measurements are recorded. Crude oils can vary in viscosity significantly as the temperature changes (i.e. high temperature = low viscosity, and vice versa). The reference temperature for SINTEF's *Martin Linge Crude 13C* is quite cold (13°C), whereas the Stickle crude and Pyrenees crude reference temperatures are warm (60°C and 40°C respectively), so large viscosity differences would be expected.

A comparison of the distillation curves of *Martin Linge Crude 13C* and Pyrenees crude (note, no distillation data are available for Stickle crude) are presented in Figure 8-1. The distillation curve is derived from laboratory tests to determine the percentage of hydrocarbon evaporated (recovered) when heated to various temperatures (or 'cuts'). Lighter oil components evaporate under lower temperatures, whereas heavier oil components have a greater tendency to remain in liquid state, requiring higher temperatures to evaporate. This is analogous to oil weathering in the marine environment, whereby lighter components have a higher tendency to evaporate, dissolve or decay, and heavier components tend to persist as liquid hydrocarbon for extended durations. The distillation curve therefore provides a reasonable prediction of the relative proportions of hydrocarbon components that will have rapid rates of weathering and the relative proportions that will persist. The comparison of the distillation curves of *Martin Linge Crude 13C* and Pyrenees crude indicates excellent agreement, which suggests similar weathering patterns are likely occur in the marine environment. Further, as Pyrenees is a similar oil to both Stickle crude, *Martin Linge Crude 13C* is considered an appropriate analogue for use in the oil spill modelling.

Table 8-4: Comparison of whole crude properties of Pyrenees, Stickle and SINTEF’s *Martin Linge Crude 13C*

Parameter	Crosby Crude Oil ¹	Pyrenees Crude Oil ²	Stickle Crude Oil ³	SINTEF: <i>Martin Linge Crude 13C</i>
API Gravity	19.42	19.3	18.7	20.73
Wax Content (%)	0.2	0.5	0.5	0.66
Pour Point (°C)	<-24	-30		-36
Asphaltene (%)	0.2	<0.5	0.4	0.11
Specific Gravity	0.9376	0.9384	0.89	0.93
Viscosity (cP)	19 @ 63°C	59.13 @ 40°C	11.1 @ 62°C	294 @ 13°C

Note 1: Data from Core Laboratories (2003)

Note 2: Data from Intertek (2011)

Note 3: Data from Core Laboratories (2004)

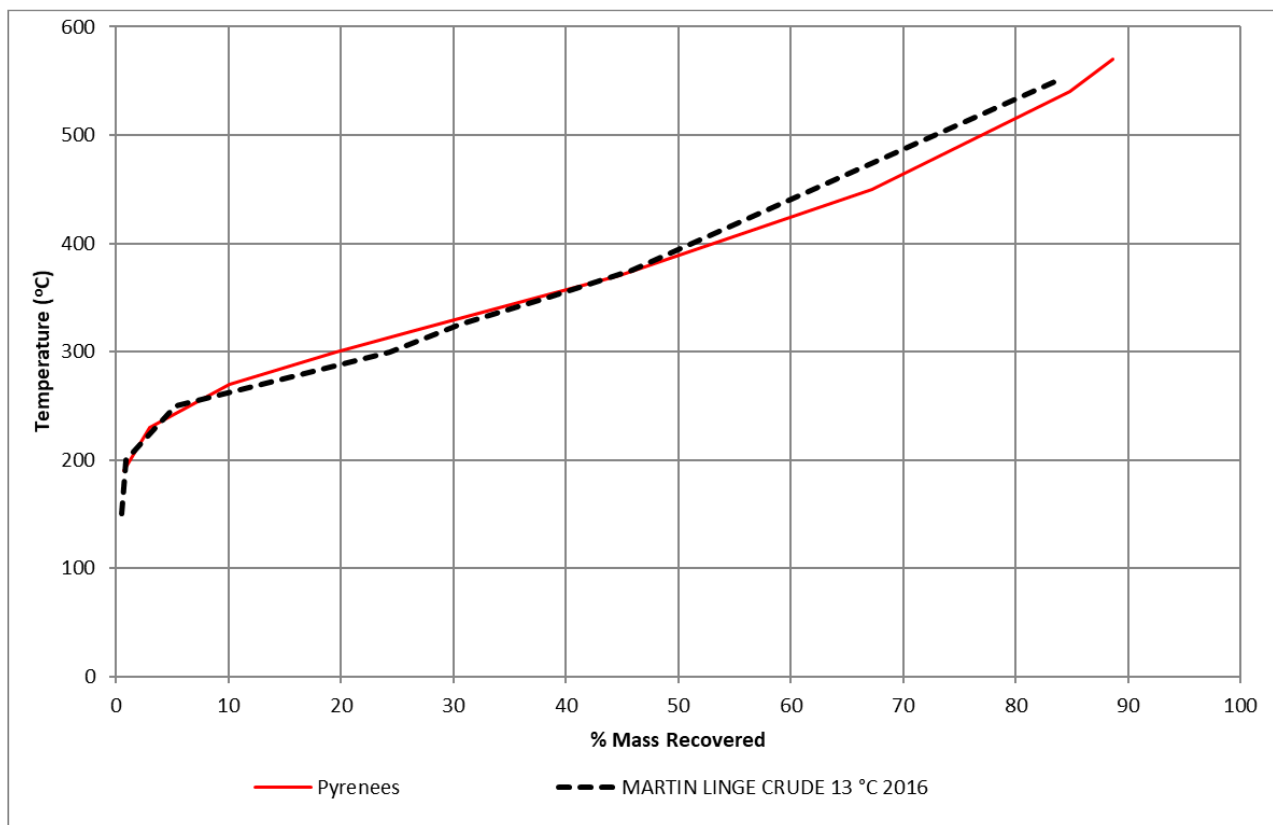


Figure 8-1: Comparison of the boiling point curves for Pyrenees crude and the SINTEF’s crude analogue (*Martin Linge Crude 13C*)

Properties of Marine Diesel Oil

Marine diesel is a moderate weight, moderately persistent oil in the marine environment. The International Tanker Owners Pollution Federation (ITOPF) and the Australian Maritime Safety Authority (AMSA) (2015) categorise diesel as a moderate group III hydrocarbon. For the MDO spill modelling, *Marine Diesel (IKU)* was

selected from the SINTEF oil library to represent MDO. A summary of the marine diesel oil properties is provided in Table 8-5.

Table 8-5: Marine diesel oil properties

Parameter	Marine Diesel Oil (data from SINTEF's <i>Marine Diesel IKU</i>)
API Gravity	0.843
Wax Content (%)	0.05
Pour Point (°C)	-36
Asphaltene (%)	0.05
Specific Gravity	36.4
Viscosity (cP)	3.9 @ 20°C

8.2.4 Pyrenees Crude Oil Toxicity Assessment

Toxicity tests of Pyrenees crude were undertaken on a broad range of taxa of ecological relevance for which accepted standard test protocols are well-established. These ecotoxicology tests are mainly focused on the early life stages of test organisms, when organisms are typically at their most sensitive to hydrocarbons. The toxicity tests were conducted on eight mainly tropical species, representatives from five major taxonomic groups and four trophic levels (Table 8-6).

Samples of Pyrenees crude were sent to a laboratory for ecotoxicological studies. The laboratory-based toxicity tests used a range of water-accommodated fraction (WAF) concentrations of weathered and unweathered crude oil to expose to the different test organisms. Aliquots of the Pyrenees crude oil sample were weathered using the Mackay Chamber Testing techniques for a 24 hour weathering period, with a wind speed of 6.6 m/s (12.8 knots) and water temperature of 25°C.

Table 8-6: Trophic descriptions, analytical methods and test-end points for toxicity tests

Toxicity Test	Trophic Description	Test Duration	Test-End Point	Type
Microalgae (<i>Isochrysis aff. galbana</i>)	Planktonic primary producer	72 h	Cell yield	Chronic
Macroalgae (<i>Ecklonia radiata</i>)	Primary producer	72 h	Germination	Chronic
Sea Urchin (<i>Heliocidaris tuberculata</i>)	Grazer	1 h 20 min	Fertilisation rate	Chronic
Sea Urchin (<i>Heliocidaris tuberculata</i>)	Grazer	72 h	Larval development	Chronic
Milky Oyster (<i>Saccostrea echinata</i>)	Filter feeder	48 h	Larval development	Chronic
Amphipod (<i>Milnea plumulosa</i>)	Predator	96 h	Survival	Acute
Fish Larvae (Barramundi) (<i>Lates calcarifer</i>)	Predator	7 d	Imbalance	Chronic
Fish Larvae (Barramundi) (<i>Lates calcarifer</i>)	Predator	7 d	Biomass (dry weight)	Chronic

The results of the Pyrenees crude toxicity tests are presented in Table 8-7. The assessment used the BurriOZ program to analyse the concentration at which there were no observed effects (NOEC). This is considered the most conservative measure of toxicity in that it is the lowest concentration at which no test organisms are affected. Outputs from BurriOZ were used to plot species sensitivity distributions (SSD) to derive the concentration that protects 95% of species with 50% confidence. Analysis by the BurriOZ programme is designed to utilise NOEC values derived from chronic toxicity tests to provide high reliability trigger values. The ANZECC/ARMCANZ (2000) guidelines state: “The use of chronic NOEC data or equivalent in the model to derive high reliability trigger values, rather than an effect level (e.g. LOEC or LC₅₀), provides an additional degree or assurance that the 95% protection level with median confidence give adequate protection to the environment.”

The NOECs of unweathered Pyrenees crude ranged from 116.5 to 889 ppb (Table 8-7). The 95% species protection trigger value of the unweathered Pyrenees crude was 94.00 ppb (Table 8-8). According to the GESAMP (2002) classification, unweathered Pyrenees crude has low chronic aquatic toxicity.

The NOECs of the weathered Pyrenees crude ranged from 140 to 734 ppb (Table 8-7). The Pyrenees crude weathered for 24 hours, was slightly more toxic than the unweathered Pyrenees crude, with a 95% species protection trigger value of 21.44 ppb (Table 8-8). According to the GESAMP (2002) classification, weathered Pyrenees Crude has moderate to low chronic aquatic toxicity.

Table 8-7: Summary of toxicity tests for unweathered and weathered Pyrenees crude (ppb)

Toxicity Test	LOEC		NOEC		EC ₅₀ or IC ₅₀		BurriOZ Input Value	
	Unweathered	Weathered	Unweathered	Weathered	Unweathered	Weathered	Unweathered	Weathered
Microalgal growth	663	330	290	140	383.7	544.1	290	140
Macroalgal germination success	>889	773	889	261	>889	773	889	261
Sea Urchin fertilisation	>604	770	604	330	>604	731.8	604	330
Sea Urchin larval development	233	330	116.5	140	259.2	239.1	116.5	140
Milky Oyster larval development	233	770	116.5	330	348.8	698.4	116.5	330
Amphipod survival	>604	330	604	140	>604	224.3	>60.4*	22.43
Fish Larvae (Barramundi) imbalance	>757	>734	757	734	>757	>734	757	734
Fish Larvae (Barramundi) growth (biomass)	>757	>734	757	734	>757	>734	757	734

* Value not used in BurriOZ calculations

Table 8-8: Trigger values derived from species sensitivity distribution curves for unweathered and weathered Pyrenees crude

Treatment	Level of Species Protection	Derived Trigger Value for TRH Concentrations (ppb)
Unweathered Pyrenees crude	95%	94.00
Weathered crude (for 24 hours)	95%	21.44

Both the unweathered and the weathered Pyrenees crude were more toxic to sea urchin larval development and less toxic to fish relative to the other tests. The weathered Pyrenees crude was more toxic to macroalgal germination, oyster larval development and amphipod survival than the unweathered crude. Other studies have shown that even after the more toxic volatile fractions have evaporated, the heavier components that remain are still potent toxicants. Studies undertaken to assess the ecotoxicological effects of the WAF of crude oil and condensate from Santos’ Cooper and Eromanga basins, found that the toxicity to five freshwater species was highly variable. When expressed in terms of initial total petroleum hydrocarbons (TPH), the toxicity of the compounds was similar for fresh crude, aged crude and aged condensate, but much higher than fresh condensate. When expressed as in terms of load of production concentration (g/L), aged and fresh condensates were similar in toxicity but higher than aged and fresh crude. Weathering had little effect on the toxicity of crude oil but significantly increased the toxicity of condensate. This higher toxicity may be due to the greater proportion of hydrocarbons of chains 10 and above. The photo activation and increased solubility of these hydrocarbons may also have contributed (Santos, 2003).

8.2.5 Hydrocarbon Exposure Values

As described in Section 4.1, the spatial extent of the EMBA has been derived using stochastic hydrocarbon fate and transport modelling of the worst-case hydrocarbons spills. To present this large amount of simulated data in a meaningful way and to inform the impact and risk assessment and environmental management actions, appropriate hydrocarbon exposure values were applied to each of the hydrocarbon components. NOPSEMA recommends the selection of hydrocarbon exposure values that broadly reflect the range of consequences that could occur at various concentrations (NOPSEMA, 2019).

The crude spill EMBA shown in Figure 4-1 was defined using low exposure values (Table 8-9). These low exposure values may not be ecologically significant but they are adequate for identifying the full range of environmental receptors that might be contacted by hydrocarbons (NOPSEMA, 2019). In this EP, the EMBA defined by the low exposure values, was used to run the protected matters searches (Section 4.5).

To inform the impact and risk assessment, exposure values that may be representative of biological impact were identified. These are called ‘moderate’ and ‘high’ exposure values (Table 8-9). The moderate and high exposure values were modelled to identify receptors contacted and therefore potentially impacted in the event of the worst-case spill scenarios identified.

Table 8-9: Summary of exposure values applied in the hydrocarbon spill modelling

Exposure Type / Exposure Value		Description
Surface (floating) hydrocarbons	1 g/m ²	<p>Low:</p> <p>It is recognised that 1 g/m² represents the practical limit of observing hydrocarbon sheens in the marine environment. This exposure value is below the levels that would cause ecological impacts, but is considered relevant to approximate the area of effect to socio-economic receptors.</p> <p>This exposure value has been used to define the spatial extent of the environment that may be affected (EMBA) from surface hydrocarbons; and used to describe environmental sensitivities within the EMBA.</p>
	10 g/m ²	<p>Moderate:</p> <p>This value is considered appropriate to assess ecological impact risk, as it is the estimate for the minimum thickness of oil that will result in harm to seabirds through ingestion from preening of contaminated feathers, or the loss of thermal protection of their feathers. This has been estimated by different researchers at 10-25 g/m² (Koops <i>et al.</i>, 2004; French, 2009). Furthermore, based on literature reviews on aquatic birds and marine mammals (Engelhardt, 1983; Clark, 1984; Geraci and St. Aubin, 1988; and Jenssen, 1994), the exposure value for harmful impacts is 10 g/m².</p> <p>This exposure value is used to determine the risk of exposure that can cause adverse impact to turtles, sea snakes, marine mammals and seabirds (NRDAMCME, 1996). Therefore, the</p>

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Exposure Type / Exposure Value	Description
	threshold of 10 g/m ² was selected as a reasonable and conservative value to apply to the risk evaluation with respect to surface oil.
50 g/m ²	<p>High:</p> <p>This high exposure value for surface oil is above the minimum threshold observed to cause ecological effect. At this concentration surface slicks would be clearly visible on the sea surface.</p>
Shoreline (accumulated) hydrocarbons	<p>Low:</p> <p>This low exposure value defines the area for potential socio-economic impacts (e.g. reduction in aesthetic value of the area).</p> <p>This exposure value has been used to define the spatial extent of the environment that may be affected (EMBA) from shoreline hydrocarbons; and used to describe environmental sensitivities within the EMBA.</p>
	<p>Moderate:</p> <p>The concentration for exposure to hydrocarbons stranded on shorelines is derived from levels likely to cause adverse impacts to intertidal habitats and associated fauna. Studies have reported oil thicknesses of 0.1 mm (100 g/m²) as the lethal exposure values for benthic epifaunal invertebrates on intertidal habitats (rock, artificial, or man-made) and in intertidal sediments (mud, silt, sand and gravel) (French-McCay et al., 2003; French-McCay et al., 2004; French-McCay, 2009). It is also the impact threshold assumed for oiling of birds (French-McCay et al., 2004).</p> <p>This exposure value has been used to inform the risk evaluation with respect to accumulated hydrocarbons and the threshold for shoreline response, based on possible clean-up options.</p>
	<p>High:</p> <p>This low exposure value predicts area likely to require intensive clean-up effort.</p>
Total submerged hydrocarbons (entrained plus dissolved)	<p>Low:</p> <p>Total submerged hydrocarbons, also referred to as ‘total water-accommodated fraction’ or entrained hydrocarbons, encompass oil droplets in the water column. Much of the published scientific literature does not provide sufficient information to determine if toxicity is caused by the dissolved or the entrained hydrocarbon component, but rather the toxicity of total submerged hydrocarbons. Variation in the methodology of the water-accommodated fraction may account for much of the observed wide variation in reported threshold values, which also depend on the test organism, duration of exposure, oil type and the initial oil concentration.</p> <p>Total oil toxicity acute effects of total oil as LC50 for molluscs range from 500 to 2,000 ppb. A wider range of LC50 values have been reported for species of crustacea and fish from 100 to 258,000,000 ppb (Gulec et al., 1997; Gulec and Holdway, 2000; Clark et al., 2001) and 45 to 465,000,000 ppb (Gulec and Holdway, 2000; Barron et al., 2004) respectively.</p> <p>The 10 ppb exposure value represents the very lowest concentration and corresponds with the lowest trigger levels for total hydrocarbons in water recommended in the ANZECC water quality guidelines for Australia (ANZECC, 2000).</p> <p>This exposure value has been used to define the spatial extent of the environment that may be affected (EMBA) from total submerged hydrocarbons; and used to describe environmental sensitivities within the EMBA.</p>
	<p>High:</p> <p>This exposure value is considered conservative in terms of potential sub-lethal impacts to most species and lethal impacts to sensitive species based on literature for toxicity testing as described above.</p> <p>This exposure value has been used to inform the risk evaluation with respect to total submerged hydrocarbons.</p>
Dissolved hydrocarbons	<p>Low:</p> <p>A large number of studies have been published describing the toxicities of hydrocarbons. The common theme in findings is that the observed toxicity of crude and refined hydrocarbons is primarily attributable to volatile and water-soluble aromatic hydrocarbons (monocyclic aromatic hydrocarbons (MAHs), naphthalenes and phenanthrenes) and polycyclic aromatic hydrocarbons (PAH) of higher molecular weight.</p>

Exposure Type / Exposure Value	Description
	<p>Toxicity to aquatic organisms increases with time of exposure, such that organisms may be unaffected by brief exposures (acute) to the same concentration that is lethal at longer exposures (chronic). Data from French-McCay (2002 and 2003) showed that species sensitivity (fish and invertebrates) to dissolved aromatics exposure greater than 4 days (96-hour LC50) under different environmental conditions varied from 6 to 400 ppb with an average of 50 ppb.</p> <p>This exposure value has been used to define the spatial extent of the environment that may be affected (EMBA) from dissolved hydrocarbons; and used to describe environmental sensitivities within the EMBA.</p>
50 ppb	<p>Moderate:</p> <p>This exposure value approximates toxic effects, particularly sub-lethal effects to sensitive species (NOPSEMA, 2019). French-McCay (2002) indicates that an average 96-hour LC50 of around 50 ppb could serve as an acute lethal threshold. For most marine organisms, a concentration of between 50 and 400 ppb is considered to be more appropriate for risk evaluation.</p> <p>The exposure value for dissolved hydrocarbons has been established with reference to ecotoxicological testing and hydrocarbon chemical analysis undertaken by BHP, on Pyrenees crude oil. Toxicity tests of Pyrenees crude were undertaken on a broad range of taxa of ecological relevance for which accepted standard test protocols are well-established. These ecotoxicology tests are mainly focused on the early life stages of test organisms, when organisms are typically at their most sensitive to hydrocarbons. The toxicity tests were conducted on eight mainly tropical species, representatives from five major taxonomic groups and four trophic levels.</p> <p>The results indicated that Pyrenees crude weathered for 24 hours, was slightly more toxic than the unweathered crude. A derived 95% species protection trigger value of unweathered Pyrenees crude was 94 ppb and 21.44 ppb for weathered Pyrenees crude (Jacobs, 2015). Based on the results, an average exposure value of 50 ppb is considered appropriate for the risk evaluation with respect to dissolved hydrocarbons.</p>
400 ppb	<p>High:</p> <p>This exposure value approximates toxic effects including lethal effects to sensitive species (NOPSEMA, 2019).</p>

8.2.6 Potential Impacts of Hydrocarbons

To help inform the hydrocarbon spill impact and risk assessment, a summary of potential impacts to the environmental values, sensitivities and receptors within the EMBA from exposure to hydrocarbons is provided in Table 8-10; this information is drawn upon within the hydrocarbon risk assessment for each release scenario.

Table 8-10: A summary of potential impacts to environmental values, sensitivities and receptors within the EMBA from exposure to hydrocarbons

Receptor	Impacts of hydrocarbon on sensitive receptors at the moderate exposure values
<i>Marine fauna</i>	
<p>Plankton (including phyto/zooplankton, larvae, fish eggs)</p>	<p>The effects of hydrocarbons on plankton have been well studied in controlled laboratory and field situations. The different life stages of a species often show widely different tolerances and reactions to oil pollution (Harrison, 1999). Usually the eggs, larval and juvenile stages will be more susceptible than the adults. Surface and entrained oil could impact fish eggs and larvae due to entrainment in surface slicks. However, fish eggs and larvae are highly dispersive and are carried significant distances by ocean currents. Any impacts to fish eggs and larvae are not anticipated to significantly impact on fish populations.</p> <p>Post-spill studies on plankton populations are few, but those that have been done have shown either no effects or temporary minor effects (Kunhold, 1978). The prime reason put forward to explain the lack of observed effects is that many marine species produce very large numbers of eggs and larval stages to overcome natural losses (such as through predation by other animals; adverse hydrographical and climatic conditions; or failure to find a suitable habitat and adequate food). Therefore, it is unlikely that any localised losses of eggs or larvae caused by a single oil spill event in the open ocean, would have no discernible effect on the size or health of future adult populations in the area.</p> <p>A possible exception to this would be if the oil spill were to coincide with, and be transported to, a mass synchronous spawning event, such as that which is known to occur for corals over a four to five-day period in March/April (Simpson, 1985). Lethal and sub-lethal effects of water-accommodated fractions of oils have been reported for coral gametes at much lesser concentrations than predicted for adult colonies (Simpson <i>et al.</i>, 1993; Heyward <i>et al.</i>, 1994; Harrison, 1999; Epstein <i>et al.</i>, 2000).</p> <p>Recently spawned gametes and larvae may be especially vulnerable to oil spill effects since they are generally positively buoyant and would be exposed to surface slicks. The potential consequences of this vulnerability, in the unlikely event of a worst-possible release event occurring, would be mitigated by the very large numbers of eggs and larvae released (as discussed above).</p>
<p>Fish, sharks and rays (including commercial species)</p>	<p>Near the sea surface, fish are likely to be able to detect and avoid contact with surface slicks and as a result, fish mortalities rarely occur in open waters from floating oils (Scholz <i>et al.</i>, 1992; Kennish, 1997). Pelagic fish species are therefore generally not highly susceptible to impacts from hydrocarbon spills. Demersal fish species living and feeding on or near the seabed in deeper waters are not likely to be affected by surface and entrained oil in open waters. Likewise, most reef fish are expected to occur at water depths significant enough to be unaffected by surface oil; whereas reef fish in shallow waters (<10 m) and sheltered embayments are at greatest risk from surface oil (Law <i>et al.</i>, 2011), particularly if they are territorial and unlikely to leave their habitat.</p> <p>Within the moderate exposure value area of the EMBA, the shallower intertidal reef areas around the Ningaloo Reef, Montebello Islands, Lowendal Islands, Barrow Island, Thevenard Island and the Muiron Islands are considered to include fish habitats most sensitive to surface oil. Potential direct impacts may include gill contamination, enlarged livers, fin erosion, metabolic stress, reduced production and survival of eggs and larvae, and reduced survival and growth of recruits (Giari <i>et al.</i>, 2012; Theodorakis <i>et al.</i>, 2012).</p> <p>Potential impacts to pelagic fish species include smothering and coating of gills and epidermal areas by suspended oil droplets that could potentially lead to reduction in oxygen exchange efficiency, irritation and infection. Fish may also ingest entrained oil or contaminated food leading to physiological impacts. The toxicity of dispersed hydrocarbons to fish species has been the subject of a large number of laboratory studies. In general, fish mortalities and/or ecosystem level impacts are rarely observed following oil spills, as for example, evidenced by the lack of any shifts in species composition or abundance of coastal fishes following the Deepwater Horizon spill in the Gulf of Mexico (Fodrie and Heck, 2011). There are various possible explanations for a buffering of effects of surface oil exposure including fish mobility, avoidance behaviour and/or foraging ecology (Peterson <i>et al.</i>, 1996, Edgar <i>et al.</i>, 2003). Exposure to dissolved hydrocarbons from crude oil may delay embryo development in some fish potentially prolonging their susceptibility to mechanical damage as well as increased levels of mortality (Carls and Thedinga, 2010).</p>

Receptor	Impacts of hydrocarbon on sensitive receptors at the moderate exposure values
	<p>While fish, sharks and rays do not generally break the sea surface, individuals may feed near the surface for short periods. The probability of prolonged exposure to a surface slick by fish, shark and ray species is low.</p> <p>Whale sharks have a broad distribution in tropical and warm temperate seas. In Australian waters, they are known to aggregate at Ningaloo Reef and in the Coral Sea. The whale shark is a migratory fish and only visits Australian waters seasonally. Within the moderate exposure value area of the EMBA, whale sharks are common within the waters adjacent to the Ningaloo Marine Park during their spring and autumn distribution.</p> <p>Whale sharks feed on plankton, krill and fish bait near or on the water surface and they are often observed swimming near the surface during seasonal aggregations. Evidence from tracking studies undertaken at the Ningaloo Marine Park and at other international locations indicate that whale sharks can dive to great depths (~700 m) and that they can remain away from the surface for long periods. As such, it is possible that they may come into direct contact with surface oil or hydrocarbons in the water column during their known aggregation around Ningaloo coast.</p>
<p>Marine mammals</p>	<p>Marine mammals (whales, dolphins and dugongs) come to the sea surface to breathe air. They are therefore theoretically vulnerable to exposure to oil spill impacts caused by contact with hydrocarbons at the sea surface. Whales and dolphins are smooth-skinned, hairless mammals so oil tends not to stick to their skin and since they do not rely on fur for insulation, they will not be as sensitive to the physical effects of oiling.</p> <p>Small doses of oil have been shown to cause acute fatal pneumonia in mammals when aspirated. Studies on effects of petroleum vapours on terrestrial mammals and seals showed (in cases of prolonged exposures and high concentrations) absorption of hydrocarbons in organs and other tissues, and damage to the brain and central nervous system. However, short-term inhalation of petroleum vapours at concentrations similar to those found in oceanic oil spills may not be necessarily detrimental either in terms of structural tissue damage or respiratory gas exchange.</p> <p>Ingested oil, particularly the lighter fractions, can be toxic to marine mammals. Ingested oil can remain within the gastro-intestinal tract and be absorbed into the bloodstream and thus irritate and/or destroy epithelial cells in the stomach and intestine. Dispersed oil is unlikely to cause any effect to marine mammals due to the low toxicity of dispersed oils, low period of exposure that could occur and the low dosage of oil that may be received.</p> <p>The way whales and dolphins consume their food may well affect the likelihood of their ingesting oil. Baleen whales (such as humpback whales), which skim the surface, are more likely to ingest oil than toothed whales, which are 'gulp feeders' (Etkin, 1997). Spilled oil may also foul the baleen fibres of baleen whales, thereby impairing food-gathering efficiency or resulting in the ingestion of oil or oil-contaminated prey. Baleen whales may therefore be vulnerable to oil if feeding. Weathered oil residues from an oil spill event may persist for long periods, causing a potential risk to baleen whales' feeding systems. It should be noted that adult humpback whales, which are seasonally present and relatively abundant in the region, are not thought to be feeding during their migration through the region.</p> <p>The most common whale species in the North West Shelf region is the humpback whale (<i>Megaptera novaeangliae</i>) which migrates through the region, during their movement along the Western Australian coast. Humpback whale migration in this region is characterised by three directional phases, these are:</p> <ul style="list-style-type: none"> • Northbound phase – starts June, peaks July and tapers off by early August; • Transitional phase (peak numbers expected at this time) – occurring late August and early September; and • Southbound phase – occurring early August until the end of November (this phase is segmented by 2-3 week delay in appearance of peak numbers of cow/calf pods after the main migratory body has passed). <p>The moderate exposure value area of the EMBA extends over known migratory paths for the humpback whale and the pygmy blue whale. In the northwest region, the pygmy blue whale migrates along the 500 m to 1,000 m depth contour on the edge of the continental slope. The northbound component of this migration takes place from May to mid-August, with a peak in July/August, and the southbound component occurs from late October to November/December, with a few isolated individuals moving south in January.</p>

Receptor	Impacts of hydrocarbon on sensitive receptors at the moderate exposure values
	<p>Data capture during the Deepwater Horizon (DWH) response efforts showed that bottlenose dolphins, a species also common throughout the EMBA, were subject to adrenal gland disease and dysfunction as a result of the DWH spill (Deepwater Horizon Natural Resource Damage Assessment Trustee, 2016).</p> <p>Dugongs are common in several locations within the moderate exposure value area of the EMBA particularly where there are seagrass beds such as the Ningaloo coastline and the Muiron Islands. Larger populations of dugongs are known to inhabit the extensive seagrass beds in Shark Bay, where spill modelling indicates a >50% probability of exposure to moderate thresholds of total submerged hydrocarbons, but where moderate levels of surface oiling is not predicted.</p> <p>No information is available regarding the susceptibility or sensitivity of dugongs to hydrocarbon spills. Dugongs that come into contact with floating hydrocarbons as they come to the surface to breathe would be at risk from direct contact potentially causing skin lesions and irritation of mucous membranes (such as those in the nose, throat and eyes). Entrained and dispersed oil is unlikely to cause any effect on dugongs due to the low toxicity, low period of exposure that could occur and the low dosage of oil that may be received, although indirect effects may occur from impacts of hydrocarbons on their food source (refer to seagrass beds below).</p>
<p>Marine reptiles</p>	<p><i>Turtles:</i> Marine turtles are vulnerable to the effects of hydrocarbon spills at all life stages (eggs, post hatchlings, juveniles and adults) whilst in the water or onshore (NOAA, 2010); however, there is little documented evidence of the effect of hydrocarbons on turtles. Should turtles make contact with a spill, the impact is likely to include oiling of the body as well as irritations caused by contact with eyes, nasal and other body cavities and possibly ingestion or inhalation of toxic vapours (Jones, 1986). Post-mortem investigations on dead loggerhead turtles from the Mediterranean implicated oil as a cause of death in a number of cases (Gramentz, 1988). In these cases, tarballs were found in the mouth and gastro-intestinal tract of the turtles, suggesting ingestion of tarballs as a possible cause of death.</p> <p>Direct contact of marine turtles with hydrocarbons and exposure from hydrocarbons may lead to the following problems:</p> <ul style="list-style-type: none"> • Digestion/absorption of hydrocarbons through food contamination or direct physical contact, leading to damage to the digestive tract and other organs • Irritation of mucous membranes (such as those in the nose, throat and eyes) leading to inflammation and infection • Contamination of eggs leading to inhibition of development or developmental defects in hatchlings, either due to oil on the nesting beach or through transference from the adult turtles whilst laying the eggs • Hatchlings becoming oiled after emerging from the nests and making their way across the beach to the water. <p>Within the moderate exposure value area of the EMBA, important areas for marine turtles that may be exposed to hydrocarbons in a large scale spill include the North West Cape of the Ningaloo coast, the Montebello Islands, Lowendal Islands, Barrow Island, Thevenard Island and the Muiron Islands. Turtle nesting on beaches at these locations may be vulnerable through the shoreline accumulation of oil. In addition, in the nesting season (September to May for green and loggerheads, and July to May for hawksbill turtles), adult turtles will tend to aggregate in the inter-nesting areas adjacent to the nesting beaches, increasing the vulnerability of turtles in this area in the event of a hydrocarbon spill due to greater turtle densities. Eggs may become directly exposed to hydrocarbons as a result of female turtles becoming oiled from surface oil exposure or when crossing shorelines, resulting in the transfer of hydrocarbons to eggs during nest preparation and laying, which may in turn effect embryo development or lead to embryo mortality (NOAA, 2010).</p> <p>Newly hatched turtles entering the water from nesting beaches are likely to be highly susceptible to oiling from either shoreline accumulated oil or surface oil, however impacts would be highly seasonal and limited to the periods when hatchlings emerge from the nests 6-8 weeks following nesting by adults.</p> <p><i>Seasnakes:</i> Several species of seasnake are known to occur in the moderate exposure value area of the EMBA. The sensitivity of seasnakes to hydrocarbon spills has been poorly studied. It is expected that susceptibility will be due to their need to surface in order to breathe. Seasnakes also have the ability to breathe through cutaneous respiration (Heatwole, 1999). Surface oil may coat the skin, impairing respiration. Seasnakes may also be</p>

Receptor	Impacts of hydrocarbon on sensitive receptors at the moderate exposure values
	<p>susceptible to toxic effects through ingestion of contaminated prey items, however laboratory testing has shown Pyrenees crude to have a very low toxicity and contains a low proportion of the more toxic light end components. It is predicted that any interface with hydrocarbons is unlikely to cause an impact to significant numbers, given the widespread distribution of this fauna group within the NWS.</p>
<p>Seabirds and shorebirds</p>	<p>Birds exposed to hydrocarbons may suffer a range of internal and external health effects. Direct contact with hydrocarbons and exposure from hydrocarbons has the potential to cause the following:</p> <ul style="list-style-type: none"> • Oiled feathers affecting the ability of the birds to fly and those birds on the sea surface may suffer from loss of buoyancy and drown or die from hypothermia; • Skin irritation or ulceration of eyes, mouth or nasal cavities; • Internal effects from poisoning or intoxication through ingestion, preening and ingestion of oil via their prey items; • Reduced reproduction ability; • Reduction in the number of eggs laid; • Decreased shell thickness; and • Disruption of the normal breeding and incubating behaviours. <p>The surface oil component poses the greatest risk of impact to seabirds due to the amount of time they spend on or near the sea surface. Individuals are at risk of lethal or sub-lethal physical and toxic effects due to external exposure (oiling of feathers) and ingestion, especially those close to the source point where concentrations are at their highest. Even small quantities of feathers contaminated by oil can be lethal, causing hypothermia and reduced buoyancy (O'Hara and Morandin, 2010). Seabirds are less likely to be affected by entrained and dissolved hydrocarbons, except through the ingestion of contaminated prey.</p> <p>The waters of the North West region of WA support large populations of seabirds, predominantly tern species (DSEWPac, 2012d) and the moderate exposure value area in the EMBA includes important breeding, feeding, foraging and refuge sites for a number of EPBC Act-listed migratory and threatened seabirds. The seabirds that most commonly occur within the moderate exposure value area in the EMBA include albatross, petrels, terns and shearwaters. Other seabirds that occur within the wider North West region of WA include noddies, tropicbirds, frigatebirds and boobies. Seabirds spend most of their time at sea, travelling over large distances to forage over the open ocean, returning to land during breeding only and therefore some seabirds may transit the offshore waters within the moderate exposure value area in the EMBA and come into contact with surface oil. While individual seabirds may be affected, it is not predicted that large numbers of seabirds will be impacted from surface oil as they are unlikely to be present in significant numbers due their vast distribution area.</p> <p>In contrast, shoreline accumulated oil poses the greatest risk of impact to shorebirds whereby they come into contact with hydrocarbons washed up onto shore where the shorebirds spend time feeding, roosting and breeding. Seabirds are also at risk when they return to land to breed. Both adults and chicks/fledgings may be impacted through contact, ingestion and/or oiling of feathers. Oiled adults may also transfer oil on to their eggs or chicks. There is the potential of bioaccumulation of toxins ingested by adults affecting embryos and the development of chicks, although this is considered to be low due to the low toxicity of the weathered oil. Indirect impacts may effects shorebirds and wading birds through contamination of foraging areas that may result in a reduction in available prey items (Clarke, 2010).</p> <p>Shoreline accumulated oil at the moderate exposure value has the potential to impact Christmas Island, Broome Region, Eighty Mile Beach, Montebello Islands, Port Hedland Region, Barrow Island, Dampier Region, Thevenard Island, Muiron Islands, Onslow Region, Exmouth Region, Ningaloo Region, Carvarvon Region, Bernier Island, Dorre Island, Dirk Hartog Island, Shark Bay Region, Geraldton Region, Abrolhos Islands, Rottnest Island, Perth and Albany Regions. Additionally, moderate levels of shoreline loading may extend into the Indonesian Exclusive Economic Zone (EEZ) namely Java, Bali, East Nusa Tenggara, Palau Lombok, West Nusa Tenggara, Palau Sumba and other minor Indonesian islands.</p>

Receptor	Impacts of hydrocarbon on sensitive receptors at the moderate exposure values
	<p>These offshore islands and coastal habitats (particularly intertidal mud flats and sandy beaches) that are important staging sites for migratory shorebirds and important breeding sites. Intertidal mud flats and sandy beaches are also important habitat for shorebirds and migratory wading birds that spend time roosting and feeding on invertebrate infauna such as polychaetes, crustaceans and gastropods.</p>
Shoreline Habitats	
<p>Intertidal sandy beaches/ mud flats</p>	<p>Sandy beaches and intertidal sediments occur extensively along the Ningaloo coast, the western side of Exmouth Gulf, and are also found on many of the offshore islands including but not limited to the Muiron Islands and Barrow Island. They represent an important habitat that supports burrowing fauna of crabs, mainly ghost crabs, and burrowing bivalve molluscs, as well as a diverse community of benthic infauna comprising polychaetes, crustaceans and gastropods. In addition, the beaches provide seasonally important habitat for turtle nesting, breeding seabirds and migratory wading birds, the impacts from hydrocarbons are described previously above.</p> <p>The physical effect of oil is likely to be more significant than the toxicological effect to sandy beach biota given that the crude oil contained in the Pyrenees reservoirs consists mainly of biodegraded hydrocarbons that typically have a very low aromatic content and consequently tend to be low in toxicity. However, temporary declines in infauna and epifauna populations may have an indirect effect on feeding shorebirds, seabirds and migratory wading birds.</p>
<p>Intertidal rocky shores/ reefs</p>	<p>Epibiota that colonise intertidal rocky shores/ reef are vulnerable to oil spills. Filter feeders such as molluscs are particularly vulnerable to lethal and various sub-lethal effects from hydrocarbons in the water column. The latter include alteration in respiration rates, decreases in filter feeding activity, reduced growth rates, biochemical effects, increased predation, reproductive failure and mechanical destruction by waves due to inability to maintain hold on substrate (Connell and Miller, 1981; Ballou <i>et al.</i>, 1989). The risk of significant impact to rocky shore and limestone platform biota from crude oil from the Pyrenees reservoirs is low due to the low aromatic content and consequently tends to be low in toxicity. In contrast, the recovery time from MDO may be longer.</p>
<p>Macroalgal beds</p>	<p>The morphological features of the algae, such as the presence of a mucilage layer or the presence of fine 'hairs' will influence the amount of hydrocarbon that will adhere to the algae. A review of field studies conducted after spill events by Connell and Miller (1981) indicated a high degree of variability in level of impact, but in all instances the algae appeared to be able to recover rapidly from even very heavy oiling. They attributed the rapid recovery of algae to the fact that for most algae new growth is produced from near the base of the plant while the distal parts (which would be exposed to the oil contamination) are continually lost.</p> <p>A heavy oiling of medium crude oil in Panama resulted in the loss of algae on coastal reefs. Within two months, algal cover had 'recovered' to a level in excess of the seasonal average, although species composition had changed (Cubit <i>et al.</i>, 1987). The time necessary for recovery of species diversity and community structure is not known.</p> <p>Macroalgal beds occur both intertidally and subtidally within the moderate exposure value area of the EMBA particularly along the western shores of the North West Cape and around the Muiron Islands. Macroalgae on reef fronts and reef edges would not be exposed to direct oiling but may experience exposure to entrained oil or by stranded oil on shorelines that becomes remobilised and entrained in the water column (below entrained thresholds of concern) due to periodic tidal and wave action exposure and during cyclone events. The effect of hydrocarbons on macroalgae, particularly on intertidal shores, is largely dependent on the degree of direct exposure, the shoreline exposure (degree of wave and tidal action) and how much of the hydrocarbon adheres to the algae. Macroalgae on exposed shores is predicted to recover quicker than sheltered shores as a result of wind, wave and tidal driven coastal processes naturally 'flushing' hydrocarbons from the shoreline.</p>
<p>Coral reefs</p>	<p>Corals on reef fronts, reef edges and in deeper lagoonal areas will come into contact with entrained oil through dispersion or by dissolution of toxic hydrocarbons into the water column. Corals reefs will also be vulnerable to stranded oil on shorelines that becomes remobilised due to periodic tidal and wave action exposure and during cyclone events. Exposure of subtidal corals to water soluble hydrocarbon fractions has the potential to result in lethal or sub-lethal toxic effects.</p>

Receptor	Impacts of hydrocarbon on sensitive receptors at the moderate exposure values
	<p>Experimental studies and field observations have found all species of corals to be sensitive to the effects of oil, although there are considerable differences in the degree of tolerance between species (Jackson <i>et al.</i>, 1989). The effect of oil on corals range from short or long-term sub-lethal effects to irreversible tissue necrosis and death. The timing of an oil spill event in relation to other environmental stresses, such as ambient temperature, or reproductive stage could also have significance in that corals are likely to be more sensitive to oil spill events at times of physiological stress.</p> <p>In an experiment to observe the effect of direct oiling, Johannes <i>et al.</i> (1972) exposed the upper half of 22 species of corals to crude oil for one and a half hours. Oil adhered to the exposed surfaces of most species and tissue death ensued in these areas, but not where there was no oil adhesion. Branching corals, such as species of <i>Acropora</i> and <i>Pocillopora</i>, appear to be more sensitive than other morphological types. Differences in sensitivities may be due to the ease with which oil adheres to the coral structures, the degree of mucous production and self-cleaning or simply different physiological tolerances.</p> <p>The water-accommodated fractions of oil can produce lethal and sub-lethal effects in corals (Loya and Rinkevich, 1980); however documented effects such as increased mucous production, decreased growth rates, changes in feeding behaviours and expulsion of zooxanthellae (Peters <i>et al.</i>, 1981; Knap <i>et al.</i>, 1985) generally only occur at concentrations of water-accommodated hydrocarbons that are considerably higher than would occur in field situations.</p> <p>A study by Shafir <i>et al.</i> (2007) examined the effect of water-soluble oil fractions (WSFs) of two oils and six different dispersants on two species of corals at concentrations that would occur in event of heavy exposure. The effect of WSFs of oil on the corals tested did not indicate a high sensitivity; rather the effect was described as “none of the crude oil WSF had any impact on survivorship of either <i>Stylophora pistillata</i> or <i>Pocillopora damicornis</i>.” (p.5572 of Shafir <i>et al.</i>, 2007). That is, at the concentrations tested there was no effect on survivorship of corals. This experiment is consistent with reports of highly variable response by corals after exposure to oils.</p>
<p>Mangroves</p>	<p>Mangroves are considered to be an important component of tropical ecosystems as they provide protection for coastlines and a source of organic matter and nutrients for marine ecosystems.</p> <p>The sensitivity of mangroves to oil spills has been well recorded, with extensive defoliation, and sometimes mortality, being noted following a number of oil spills. These spills have varied in size, oil type, degree of oiling and mangrove species. In general, studies have suggested that damage occurs through the smothering of lenticels (mangrove breathing pores vital for respiration) on pneumatophores or prop roots or by the loss of leaves due to chemical burning (Duke <i>et al.</i>, 1999). Smothering and contamination can lead to mortality of plants, seedlings and propagules. A comprehensive review of the literature on the impacts of oil spills on mangroves was conducted by Thorhaug (1987), from which it was concluded that while defoliation of mangroves was a common occurrence, massive mortality was not always the ultimate outcome. Mangrove death is predicted whenever when more than 50% of the leaves are lost (Evans, 1985). There may also be some sub-lethal impact to mangroves due to toxicity and it is known that mangroves take up hydrocarbons from oil that contacts leaves, roots or sediments, and it is suspected that this uptake causes defoliation through leaf damage and tree death (Wardrop <i>et al.</i>, 1987).</p> <p>Within the moderate exposure value area of the EMBA, mangroves occur in the Cape Range National Park (Ningaloo) particularly in Mangrove Bay and Yardie Creek, as well as limited mangrove communities on the Muiron Islands. The isolated stands of mangroves at Mangrove Bay, although relatively small, are of high ecological importance because they are one of the few stands of mangroves on the western coast of the Ningaloo Marine Park.</p>
<p>Seagrass beds</p>	<p>Laboratory tests have illustrated the sensitivity of seagrasses to both surface oil and dissolved or physically dispersed hydrocarbons (Hatcher & Larkum, 1982; Baca and Getter, 1984; Wilson & Ralph, 2017). Stress response has also been demonstrated for seagrass at low hydrocarbon concentrations similar to that expected to occur in oil spill situations (Thorhaug, 1987; Thorhaug <i>et al.</i>, 1991).</p> <p>Potential direct impacts to seagrasses from hydrocarbons include mortality due to smothering and chemical toxicity. Indirect impacts may occur due to reduced light attenuation, which would restrict the seagrasses ability to photosynthesise, leading to reduced growth rates and reduced flowering capability. Entrained oil may also adhere to seagrass in shallower areas, inhibiting respiration. The susceptibility of seagrass to hydrocarbons will depend largely on their distribution, with communities in deeper water less likely to be affected, whereas seagrass beds in shallower waters are more likely to be affected by</p>

Receptor	Impacts of hydrocarbon on sensitive receptors at the moderate exposure values
	<p>dispersed oil droplets or, in the case of emergent seagrasses, direct oiling. Intertidal seagrass communities would theoretically be the most susceptible because the leaves and rhizomes may both be affected.</p> <p>Seagrass beds occur within the moderate exposure value area of the EMBA occur in the Cape Range/Ningaloo coast area and the Muiron Islands.</p>
Socio-economic	
Fisheries	<p>The EMBA overlaps a number of Commonwealth and State Managed Fisheries (refer to Section 4.11.2) as well as into areas of Australian waters in the Timor Sea where Indonesian Fishers are permitted to operate (refer to Section 4.11.3), and other marine waters within the Indonesian EEZ. Whilst the potential area of moderate exposure is widespread, the level of fishing within the actual area of moderate exposure within the broader EMBA is anticipated to be low. Exclusions zones surrounding a spill can directly impact fisheries by restricting access to fishing vessels. Commonwealth and fisheries are unlikely to be affected from an oil spill due to the water depth at which many of them operate. State pelagic fisheries may be affected by a loss of fishing effort associated with avoidance of the oil spill, or gear clean-up and associated costs. The market value/demand for fish may also be impacted due to actual or perceived tainting of catches and closure of fishing grounds could also impact operations. The significance of any decrease in market value/demand for fish may be substantial to those few individual fishery operators working in the affected areas but it is unlikely to cause any significant long-term impact to the identified managed fisheries that operate in the region. Should fish tainting or perceived fish tainting be evident within the MoU Box, impacts to Indonesian traditional fishers may be significant given the target area of fishing effort and the potential for subsistence-level living. Aquaculture activities such as pearl and prawning farming may also be affected by oil in the water column tainting stock.</p>
Tourism and recreation	<p>There is a wide variety of nature-based tourism and recreational activities including recreational fishing that occurs in the EMBA for the worst-case spill scenarios. Much of this within the Australian EEZ occurs in the Cape Range/ Ningaloo Marine Park area during the peak tourism season from April to October; although some of the offshore islands also attract visitors such as the Muiron Islands. The southern coastlines of multiple Indonesian islands may potentially be affected by moderate shoreline loading. In the event of an oil spill, there is the potential for temporary closure of all recreational activities, including diving, due to the risk to public health and safety. Similar impacts arising from the shoreline stranding of hydrocarbons will add a visual impact and potentially restricted access to shorelines.</p>
Defence	<p>Military exercise areas are located at Exmouth associated with Royal Australian Air Force Base Learmonth (refer to Section 4.11.5). These training zones overlap the moderate exposure value area within the EMBA. However, they are designated for aerial training and are unlikely to be impacted by a hydrocarbon spill.</p>
Shipping	<p>The impact on shipping in the event of a worst-case discharge is likely to be limited to the potential for minor modification of shipping routes through the implementation of exclusion zones to avoid the spill. Shipping operations may be affected by spill response efforts by way of a 'Notice to Mariners' being issued to avoid the area, leading to the potential diversion from normal shipping routes.</p>
Oil and gas activities	<p>A number of oil and gas operators have operations within the moderate exposure value area within the EMBA. In the event of a large scale spill, petroleum production operations in the region would likely remain unaffected unless a surface slick was within the vicinity and considered to represent a safety hazard at which time the likely response would be to cease production activities. A potential second order effect that may also cause production to cease is a closure of the surrounding areas (such as for safety or navigation control) preventing offtake tankers or support vessels from operating in the area. The impact of ceasing production would be the postponement of income from sales.</p>
Indigenous	<p>Any oil that reaches the coastline from a large scale spill has potential to impact on registered sites and indigenous heritage places along the coastline. In the unlikely event of an oil spill, shoreline accumulated oil may effect sensitive artefacts or areas, which could damage their heritage value. Furthermore, personnel accessing the area to implement response strategies have potential to damage or destroy heritage values of the area. These sensitivities will be prioritised and taken into account as part of the daily Operational SIMA within the <i>Pyrenees Phase 4 Infill Drilling Program OPEP</i>.</p>

Receptor	Impacts of hydrocarbon on sensitive receptors at the moderate exposure values
<p>Maritime heritage</p>	<p>There are a number of shipwrecks in the EMBA and moderate exposure value area. Surface hydrocarbons will have no impact on shipwrecks. Shipwrecks on shorelines that are exposed at low tide have the potential to be coated in oil with each ebb tide. Hydrocarbons in the water column pose the greatest risk of impacts shipwrecks. Microbial communities (biofilms) on structures and in the surrounding seafloor play important roles in shipwreck preservation and degradation, and in recruitment of macro-organisms to artificial reefs (Hamdan <i>et al.</i>, 2018). Hydrocarbons in the water column may potentially impact those microbial and encrusting communities that may in turn affect the structural integrity of the shipwreck.</p>
<p>Protected areas</p>	
<p>World Heritage and National Heritage</p>	<p>The Ningaloo Coast with World Heritage and National Heritage listings falls within the moderate exposure value area within the EMBA. The environmental values and sensitivities of the Ningaloo Coast are described in Sections 4.5.2 and 0. The potential impacts to these are described in the relevant sections of this Table. In the event of an oil spill, receptors in these areas would be prioritised for protection through the Shoreline Protection and Shoreline Clean-up response strategies described in Section 8 and the <i>Pyrenees Phase 4 Infill Drilling Program OPEP</i>.</p>
<p>Commonwealth and State Marine Parks</p>	<p>The EMBA overlaps several Marine Parks (refer to Sections 4.10.1 and 4.10.2). In the event of an <u>unplanned MDO spill</u>, modelling predicted the following Marine Parks could be contacted by <u>surface</u>, <u>total submerged</u> and <u>dissolved hydrocarbons</u> at moderate exposure values:</p> <ul style="list-style-type: none"> • Gascoyne, Montebello and Ningaloo AMPs; and • Muiron Islands and Ningaloo State Marine Parks: <p>In the event of an <u>unplanned crude spill</u>, modelling predicted Marine Parks could be contacted by <u>surface</u>, <u>total submerged</u>, and <u>dissolved hydrocarbons</u> at moderate exposure values.</p> <p>At the moderate surface threshold (10 g/m²), very high contact probabilities were predicted for Gascoyne AMP (96.7%) and Ningaloo AMP (85.3%) with lower probabilities at Montebello AMP (22%) and Dampier AMP (0.7%). Likewise, the following State Marine Parks were predicted to be exposed to moderate surface thresholds: Ningaloo (60.7%); Muiron Islands (45.3%); Barrow Island (14%); and Montebello Islands (12%).</p> <p>At high thresholds of total submerged hydrocarbon (100ppm), high contact probabilities were predicted at Gascoyne AMP (100%), Ningaloo AMP (96.7%), Carnarvon Canyon AMP (76%) and Abrolhos AMP (72%) with lower probabilities at Agro-Rowley Terrace AMP (61.3%), Shark Bay AMP (54.7%), Montebello AMP (41.3%), Perth Canyon AMP (15.3%), South-West Corner AMP (10.7%), Mermaid Reef and Dampier AMPs (5.3%), Kimberley AMP (4%), Jurien AMP (2%), Eighty Mile Beach and Two Rocks AMPs (1.3%) and Roebuck and Geographe AMPs (0.7%). Likewise, the following State Marine Parks were predicted to be exposed to high thresholds: Ningaloo (79.3%); Muiron Islands (38%); Barrow Island (23.3%); Montebello Islands (15.3%); Rowley Shoals (4%); Abrolhos (2%); and Thevenard Island and Jurien Bay (0.7%).</p> <p>No contact was predicted at any AMP or State Marine Park at a moderate to high dissolved hydrocarbon threshold.</p> <p>The environmental values and sensitivities of these Marine Parks are described in Sections 4.10.1 and 4.10.2. The potential impacts to these are described in the relevant sections of this Table.</p>
<p>Key ecological features</p>	<p>The EMBA overlaps several KEFs (refer to Section 4.10.3). In the event of an <u>unplanned MDO spill</u>, modelling predicted the following KEFs could be contacted by <u>surface</u>, <u>total submerged</u> and <u>dissolved hydrocarbons</u> at moderate exposure values:</p> <ul style="list-style-type: none"> • Ancient coastline at 125-m depth contour; • Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula; • Commonwealth waters adjacent to Ningaloo Reef; • Continental slope demersal fish communities; and

Receptor	Impacts of hydrocarbon on sensitive receptors at the moderate exposure values
	<ul style="list-style-type: none"> Exmouth Plateau. <p>In the event of an <u>unplanned crude spill</u>, modelling predicted KEFs could be contacted by <u>surface</u>, <u>total submerged</u>, and <u>dissolved hydrocarbons</u> at moderate exposure values.</p> <p>At the moderate surface threshold (10 g/m²), very high contact probabilities (82-100%) were predicted for the Continental Slope Demersal Fish Communities (CSDFC) KEF (100%), the Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula (Canyons) KEF (100%), Commonwealth waters adjacent to Ningaloo Reef KEF and the Exmouth Plateau KEF. High contact probabilities are predicted for the Ancient coastline at 125 m depth contour (Ancient coastline) KEF (60%).</p> <p>The environmental values and sensitivities of these KEFs are described in Section 4.10.3, and the potential impacts are described in the relevant sections of this Table. The ancient coastline at 125-m depth contour, the canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula, and the continental slope demersal fish communities KEFs are entirely subtidal. The benthic communities/ habitats associated with these KEFS, such as filter feeding communities and demersal fish assemblages are not predicted to be impacted by hydrocarbons in the event of a spill based on the water depths at which they occur. However, the pelagic marine faunal assemblages that are attracted to the nutrient rich waters, such as whales, whale sharks, large pelagic fish and seabirds are at risk of impacts from surface and entrained hydrocarbons.</p>

8.3 Hydrocarbon Release – Loss of Well Control

8.3.1 Summary of Risk Assessment and Evaluation

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Decision Context	Acceptability
Loss of well control during infill drilling due to failure of well barrier integrity.	Loss of hydrocarbons (crude oil) to the marine environment.	Reduction in water quality with potential for toxicity effects to marine fauna and flora (including potential mortality), oiling of offshore, nearshore and shoreline habitats (smothering). Disruption to biologically important behaviours (feeding / breeding / migration). Hypothermia due to hydrocarbon exposure. Impacts to socio-economic receptors.	300	Highly Unlikely (0.03)	9	Type B Higher Order Risk	Tolerable

8.3.2 Source of Risk

A loss of well control can lead to an uncontrolled release of reservoir hydrocarbons and other wellbore fluids to the environment. BHP has identified a subsea release of crude oil resulting from a loss of well control (failure of well barrier integrity) from the Stickle-4H1 well as the scenario with the worst-case credible environmental outcome.

BHP have calculated the worst-case discharge (WCD) for a LOWC event consistent with the methodology applied within the *SPE Technical Report; Calculation of Worst-Case Discharge (WCD), Rev 1 2016* (Society of Petroleum Engineers, 2015). Reservoir modelling was undertaken for both a Crosby and Stickle formations to determine the WCD for the Pyrenees Phase 4 drilling program.

The modelling has demonstrated that the Crosby-3H1 well cannot sustain flow with both laterals open (i.e. prior to installation of the plug). This is because at expected reservoir conditions (pressure, water cut), the lower lateral (L1) is unable to flow against the hydrostatic backpressure without gas lift. The higher pressure L1 over pressures the upper lateral (L2), such that with both laterals open, the well is unable to flow due to the high hydrostatic back pressure in the well. The upper lateral (L2) intersects a marginally lower pressure part of the reservoir, with significantly lower water content, which results in a lower hydrostatic backpressure, and capacity to flow without gas lift.

Considerations in using Stickle-4H1 dual lateral rather than Crosby-4H2 single lateral for determining worst-case discharge volumes and rates includes: the greater reservoir exposure at Stickle-4H1 compared with Crosby-4H2, and the intersection of unpenetrated fault blocks and the possible presence of a gas cap at Stickle-4H1 compared with the interpreted swept sections at the Crosby-4H2 heel reducing the amount of exposed hydrocarbons.

Reservoir modelling of the Stickle-4H1 assumed the failure of all well barriers and both horizontal laterals (L1 and L2) completed with screens and open to flow. Whilst a highly unlikely scenario, the WCD has been based upon this open-hole flow rate via an 18 ¾" subsea release orifice for the full duration (69 days) of a potential LOWC scenario. Reservoir modelling indicates that open-hole flow rates of Stickle crude oil would likely decrease from approximately 24,870 bbl/d down to approximately 9,397 bbl/d until a dynamic well kill operation could be achieved. Further information on the duration of a LOWC event based on the time to implement a

dynamic well kill operation via the drilling of a relief well is presented in *Pyrenees Phase 4 Oil Pollution Emergency Plan* (OPEP) (BHPB-04PY-N950-0022).

Based upon the detailed reservoir modelling, the total volume of Stickle crude that may be expected over a 69 day LOWC scenario in the Pyrenees Field equates to approximately 1 MMbbl (156,774 m³). To inform the impact and risk evaluation, and to assist with emergency response planning for this potential scenario, BHP have undertaken quantitative oil spill modelling (Section 8.2.2). Results of the modelling are presented in below.

Industry Statistics

A review of international data provided in the Bureau of Safety and Environmental Enforcement (BSEE) *Loss of Well Control Occurrence and Size Estimators Report* (BSEE, 2017) and the International Oil and Gas Producers *Blowout Frequencies – Risk Assessment Data Directory Report* (IOGP, 2019) was undertaken to provide an understanding of historical event frequency of well release incidents on production wells. The frequencies are mainly based on data from the areas of the US Gulf of Mexico (GoM) outer continental shelf and North Sea. The data is based on events reported in the SINTEF Offshore Blowout Database.

The data reported for releases during the development drilling of normal oil wells are the most analogous statistics to apply to infill drilling activities in the Pyrenees Field. The data demonstrates the very low likelihood of a release during development drilling activities for normal oil wells:

- Probability, reported as frequency per year, of a well blowout from development drilling of normal oil wells is 3.4×10^{-5} , and for a well release is 3.3×10^{-4} .

Oil Spill Modelling Results

Hydrocarbon Weathering Behaviour

Martin Linge Crude 13C was selected from SINTEF's oil library to represent Stickle crude oil for the subsea crude oil spill scenario. Results of the weathering analysis are shown in Figure 8-2 and are summarised as follows. Under low winds (1 m/s), 95% of the surface slick is predicted to remain after 5 days (120 hours), with only 5% evaporated. Under moderate winds (5 m/s), ~12% of the initial surface slick is predicted to evaporate after 5 days, with ~8% dispersed to the water column and the remaining 80% persisting as floating oil. In high winds (10 m/s), the oil is predicted to be rapidly dispersed, with ~60% entrained in the water column after 5 days, ~15% evaporated and ~25% remaining on the sea surface.

The crude oil has a high tendency to form stable emulsions, reaching a water content of 50% after 5 days with persistent low winds (1 m/s), and reaching 80% water content after 72 hours and 24 hours under moderate (5 m/s) and high wind speeds (10 m/s), respectively (Figure 8-2).

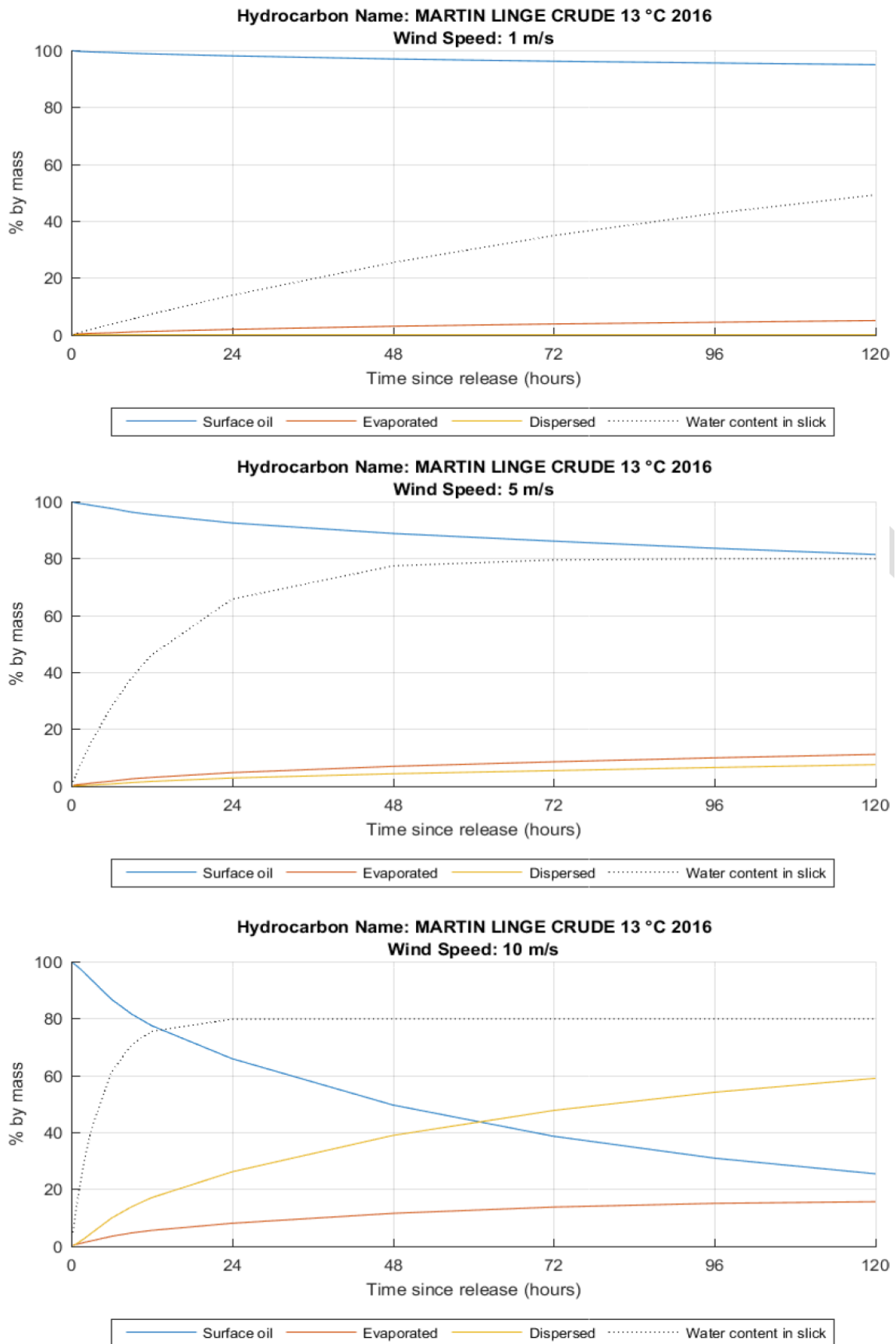


Figure 8-2: Simulated weathering of the SINTEF Martin Linge Crude 13C hydrocarbon for constant wind speeds of 1 m/s (top), 5 m/s (middle) and 10 m/s (bottom) (GHD, 2021a)

Stochastic Spill Modelling Results

The stochastic modelling outputs are presented below for the fate and transport of hydrocarbons (surface, total submerged, dissolved and shoreline accumulated) at the exposure values defined in previous Table 4-1. The spatial extents of each threshold are described, with more detailed analysis focussing on the moderate (for shoreline oiling, surface hydrocarbons and dissolved hydrocarbons) and high (for total submerged oil) thresholds, which represent the lower limits for biological impacts.

Low threshold values were used to inform the detailed Description of Environment in Section 4 of this EP.

Sea Surface Hydrocarbons

Low exposure (>1 g/m²)

Surface oil above the low threshold (1 g/m²) was predicted to extend up to ~1,700 km to the north-northwest and ~800 km to the southwest, of the spill location.

Moderate exposure (>10 g/m²)

Exceedances of the moderate (10 g/m²) threshold occurred up to 600 km north and 500 km west of the spill location.

Very high contact probabilities (82-100%) were predicted for the Continental Slope Demersal Fish Communities (CSDFC) key ecological feature (KEF) (100%), the Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula (Canyons) KEF (100%), the Gascoyne Australian Marine Park (AMP), the Ningaloo AMP, the Commonwealth waters adjacent to Ningaloo Reef KEF and the Exmouth Plateau KEF. Maximum time-averaged concentrations at these locations were between 56.9 and 78.4 g/m², and minimum arrival times were very short (0.1-0.7 days or 2-17 hours) except for Exmouth Plateau KEF, which had a minimum arrival time of 2.7 days.

High contact probabilities are predicted for the Ningaloo State Marine Park (SMP) (60.7%), the Ancient coastline at 125 m depth contour (Ancient coastline) KEF (60%), the Muiron Islands SMP (45.3%) and the Ningaloo Region (38%). These receptors received maximum time-averaged surface oil concentrations of 44-110.3 g/m² with minimum arrival times of 1.1-1.9 days (26-46 hours).

Moderate contact probabilities (10-33%) are predicted for the Muiron Islands, the Onslow Region, the Montebello Islands, the Montebello Islands SMP, the Montebello AMP, Barrow Island, the Barrow Island SMP and the Lowendal Islands. Maximum time-averaged surface oil concentrations ranged between 20 and 55 g/m² at these receptors, with minimum arrival times of 2.7 days (Muiron Islands) to 6.4 days (Montebello Islands and the Montebello Islands SMP).

Low contact probabilities (≤7%) were predicted for the remaining contacted receptors of the Exmouth Region, Thevenard Island, the Dampier Region, the Dampier Archipelago and the Dampier AMP. Maximum time-averaged oil concentrations at these receptors were between 11.3 g/m² (Dampier AMP) and 43 g/m² (Exmouth Region). Minimum arrival times of 6.3-59.2 days were predicted at these receptors.

High exposure (>50 g/m²)

Contact by surface oil exceeding the high (50 g/m²) thresholds was limited to within 200 km of the release location.

Very high contact probabilities were predicted for the Canyons KEF (98%) and the CSDFC KEF (92%). These receptors received maximum time-averaged surface oil concentrations of 114-126 g/m² and minimum arrival times of 0.6 days (14 hrs).

High contact probabilities (57%) were predicted at the Gascoyne AMP, with maximum time-averaged surface oil concentrations of 126 g/m² and minimum arrival time of 2.7 days.

Moderate contact probabilities (11-29%) are predicted for the Ningaloo Region, the Ningaloo SMP and the Ningaloo AMP. Maximum time-averaged surface oil concentrations ranged between 85 and 153 g/m² at these receptors, with minimum arrival times of 2.3-4.6 days.

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

A summary of the surface oil predictions at moderate and high thresholds for an unmitigated 69-day WCD LOWC scenario is presented in Table 8-12.

Dissolved Hydrocarbons

Low exposure (>10 ppb)

Dissolved hydrocarbons at the low threshold (10 ppb) were predicted to occur within a limited area up to ~100 km from the spill site.

There were no predicted exceedances of the moderate (50 ppb) or high (400 ppb) thresholds anywhere within the model domain. The relatively low flow rate and low proportion of soluble components within the crude oil is insufficient to generate dissolved hydrocarbon concentrations at or above the moderate threshold.

Total Submerged Hydrocarbons (entrained plus dissolved)

Low exposure (>10 ppb)

Total submerged oil at the low threshold (10 ppb) was predicted to occur up to ~2,100 km to the northwest, ~1,600 km to the west and ~1,700 km to the northeast.

High exposure (>100 ppb)

Total submerged oil at the high threshold (100 ppb) was predicted to occur up to ~1,600 km to the north and south, and ~1,200 km to the west.

At the high threshold (100 ppb), a 100% contact probability was predicted at the CSDFC KEF, the Exmouth Plateau KEF, the Canyons KEF and the Gascoyne AMP, with maximum time-averaged concentrations of 467 to 628.2 ppb. The Gascoyne AMP, the CSDFC KEF and the Canyons KEF all had short minimum arrival times of between 0.1 and 0.5 days, while the Exmouth Plateau KEF had a longer minimum arrival time of 3.2 days. Very high contact probabilities (72-97%) were predicted at the Ningaloo AMP, the Commonwealth Waters adjacent to Ningaloo Reef KEF, Western demersal slope and associated fisheries KEF, Ningaloo SMP, Carnarvon Canyon AMP, Ancient coastline KEF and Abrolhos AMP, with maximum time-averaged concentrations of 370 ppb to 489 ppb. Ningaloo AMP, Commonwealth Waters adjacent to Ningaloo Reef KEF, Ningaloo SMP and Ancient coastline KEF had short minimum arrival times of 1.1-2.0 days, while the other three receptors had minimum arrival times of between 12.9 and 18.4 days. Moderate contact probabilities (36-64%) were predicted at the Ningaloo Region, the Argo-Rowley Terrace AMP, the Shark Bay AMP, the Montebello AMP, the Muiron Islands SMP and the Onslow Region. These receptors received maximum predicted total submerged oil concentrations of 269.9 ppb to 439 ppb, with minimum arrival times of 2.8-9 days for all receptors except Argo-Rowley Terrace AMP, which had a longer minimum arrival time of 23.8 days. Low contact probabilities (10-32%) were predicted at 15 of the receptors: Wallaby Saddle KEF, Muiron Islands, Perth Canyon and adjacent shelf break and other west coast canyons KEF, Barrow Island SMP, Barrow Island, Western rock lobster KEF, Commonwealth marine environment surrounding the Houtman Abrolhos Islands KEF, Glomar Shoals KEF, Montebello Islands SMP, Perth Canyon AMP, Montebello Islands, Mermaid Reef and Commonwealth waters surrounding Rowley Shoals KEF, Lowendal Islands, South-west Corner AMP and Dampier Archipelago. Maximum time-averaged concentrations at these receptors were predicted to be between 129.8 ppb and 561.7 ppb, with minimum arrival times of 4-48 days. Very low to low contact probabilities (<6%) were predicted at the remaining receptors, with maximum time-averaged concentrations of 92-295 ppb and minimum arrival times of 9.2 – 86.2 days.

A summary of the extent of potential moderate to high threshold submerged hydrocarbons for an unmitigated 69-day WCD LOWC scenario is presented in Table 8-13.

Shoreline Accumulated Hydrocarbons

Low exposure (>10 g/m²)

Shoreline loading above the low threshold (>10 g/m²) was predicted to occur between the Esperance Region (~1,900 km to the southeast), and East Nusa Tenggara (~1,900 km to the northeast).

Moderate exposure (>100 g/m²)

At the moderate threshold (100 g/m²), predicted shoreline accumulation occurred up to ~1,600 km to the southeast at Albany Region and ~1,900 km to the northeast at East Nusa Tenggara.

At the moderate threshold (100 g/m²), a very high contact probability was predicted for the Ningaloo Region (99.3%) and Muiron Islands (84.7%). Maximum accumulated shoreline loads of 10,797 tonnes and 372 tonnes were predicted for these locations, with minimum arrival times of 1.7 and 0.9 days and maximum oiled shoreline lengths of 392 km and 8.5 km, respectively. Moderate-high contact probabilities (34-57%) were predicted for Barrow Island, the Onslow Region, the Montebello Islands, Imperieuse Reef, the Carnarvon Region, Thevenard Island and Dirk Hartog Island. Maximum accumulated shoreline loads ranged from 44.9 tonnes (Dirk Hartog Island) to 4,922.5 tonnes (Onslow Region) and minimum arrival times from 2.4 days to 25.5 days. Moderate contact probabilities (10-30%) were predicted for the Geraldton Region, the Shark Bay Region, the Abrolhos Islands, Bernier Island, Dorre Island, the Perth Region, the Dampier Archipelago, Clerke Reef, the Dampier Region, the Hedland Region and the Albany Region. Maximum accumulated shoreline loads ranged between 20 tonnes and 5,593 tonnes, with maximum oiled shoreline lengths between 25 km and 273 km. Minimum arrival times at these locations were between 5 days (Dampier Region) and 55 days (Albany Region). A low contact probability (<10%) was predicted for the remaining receptors, with maximum accumulated shoreline loads between 10 and 230 tonnes at each receptor, maximum oiled shoreline lengths of 8.5 to 51.1 km and minimum arrival times of 20 days at the Exmouth Region, and 38 to 88 days at the remaining receptors. Across all shorelines combined, the predicted probability of contact at the moderate threshold is 100%, with a maximum accumulated oil mass of 18,125 tonnes and a minimum arrival time of 0.9 days (Muiron Islands).

High exposure (>1,000 g/m²)

Shoreline contact at the high threshold (1,000 g/m²) was predicted to reach ~1,450 km to the south, extending up to ~1,550 km to the north.

At the high threshold (1,000 g/m²), a very high contact probability was predicted for the Ningaloo Region (94.7%) and Muiron Islands (71.3%). Maximum accumulated shoreline loads of 10,778 tonnes and 372 tonnes were predicted for these locations, with minimum arrival times of 1.7 and 0.9 days and maximum oiled shoreline lengths of 375 km and 8.5 km, respectively. Moderate-high contact probabilities of 42% were predicted for Barrow Island and Onslow Region, and 37.3% at Montebello Islands. Maximum accumulated shoreline loads ranged from 787 to 4,922.5 tonnes (Onslow Region) and minimum arrival times from 2.4 days to 5 days. Low-moderate contact probabilities (10 to 25.3%) were predicted for Thevenard Island, Dampier Archipelago, Dampier Region, Imperieuse Reef and Hedland Region. Maximum accumulated shoreline loads ranged between 351 tonnes and 5,593 tonnes, with maximum oiled shoreline lengths between 8.5 km and 273 km. Minimum arrival times at these locations were between 5.7 days (Dampier Region) and 23.9 days (Hedland Region). Finally, a low contact probability (<7.5%) was predicted for the remaining receptors, with maximum accumulated shoreline loads between 16 and 334 tonnes at each receptor, maximum oiled shoreline lengths of 8.5 to 34.1 km and minimum arrival times of 17 to 90 days.

A summary of the extent of potential moderate to high shoreline loading threshold for an unmitigated 69-day WCD LOWC scenario is presented in Table 8-11.

Table 8-11: Summary of potential shoreline contact (all seasons) at moderate & high thresholds: 156,774 m³ crude release over 69-days

Receptor Name	Maximum Accumulated Oil Concentration (g/m ²)		Maximum Total Accumulated Oil Ashore (tonnes)		Minimum Arrival Time (days)		Maximum Length of Oiled Shoreline (km)	
	>100 g/m ²	>1,000 g/m ²	>100 g/m ²	>1,000 g/m ²	>100 g/m ²	>1,000 g/m ²	>100 g/m ²	>1,000 g/m ²
(Intertidal) Islands and Reefs								
Java	2,465.5	2,465.5	137.6	98.3	74.2	84.5	51.1	25.6
Bali	903.2	NC	28.7	NC	78.4	NC	17.0	NC
East Nusa Tenggara	926.4	NC	15.8	NC	88.0	NC	8.5	NC
Palau Lombok	1,521.2	1,521.2	53.3	25.9	70.4	86.7	34.1	8.5
West Nusa Tenggara	3,729.3	3,729.3	116.4	97.0	79.4	79.4	34.1	17.0
Palau Sumba	1,795.2	1,795.2	30.6	30.6	83.5	89.7	17.0	8.5
Minor Indonesian Islands	1,887.0	1,887.0	62.1	32.2	74.2	75.5	25.6	8.5
Christmas Island	612.6	NC	10.4	NC	65.0	NC	8.5	NC
Ashmore Reef	1,065.8	1,065.8	18.2	18.2	78.5	78.5	8.5	8.5
Seringapatam Reef	1,076.8	1,076.8	18.4	18.4	68.8	73.4	8.5	8.5
Scott Reef	850.7	NC	25.2	NC	72.4	NC	25.6	NC
Clerke Reef	8,555.6	8,555.6	333.6	333.6	33.1	33.1	25.6	25.6
Imperieuse Reef	9,175.6	9,175.6	355.4	355.4	25.5	25.5	42.6	42.6
Montebello Islands	23,356.5	23,356.5	787.5	787.5	5.0	5.0	17.0	17.0
Dampier Archipelago	27,483.9	27,483.9	3,283.5	3,278.0	12.0	12.0	102.3	102.3
Barrow Island	23,000.8	23,000.8	2,664.6	2,664.6	2.4	2.4	76.7	76.7
Thevenard Island	20,606.1	20,606.1	351.3	351.3	7.2	7.2	8.5	8.5
Muiron Islands	21,816.9	21,816.9	371.9	371.9	0.9	0.9	8.5	8.5
Bernier Island	4,618.0	4,618.0	230.4	230.4	14.2	25.6	34.1	34.1
Dorre Island	5,576.4	5,576.4	114.3	114.3	24.1	25.8	34.1	34.1
Dirk Hartog Island	2,337.6	2,337.6	44.9	42.6	17.4	17.4	25.6	17.0

Receptor Name	Maximum Accumulated Oil Concentration (g/m ²)		Maximum Total Accumulated Oil Ashore (tonnes)		Minimum Arrival Time (days)		Maximum Length of Oiled Shoreline (km)	
	>100 g/m ²	>1,000 g/m ²	>100 g/m ²	>1,000 g/m ²	>100 g/m ²	>1,000 g/m ²	>100 g/m ²	>1,000 g/m ²
Abrolhos Islands	1,307.0	1,307.0	39.1	39.1	35.7	36.3	25.6	17.0
Rottneest Island	654.9	NC	11.2	NC	56.2	NC	8.5	NC
(Intertidal) Mainland Regions								
Broome Region	1,480.9	1,480.9	47.4	25.2	38.2	38.2	34.1	8.5
Eighty Mile Beach Region	1,945.5	1,945.5	62.9	37.3	37.6	48.7	34.1	17.0
Hedland Region	14,853.2	14,853.2	2,319.1	2,229.3	23.9	23.9	179.0	127.9
Dampier Region	20,547.1	20,547.1	5,592.4	5,592.4	5.7	5.7	272.8	272.8
Onslow Region	20,971.2	20,971.2	4,922.5	4,922.5	2.6	2.6	247.2	247.2
Exmouth Region	13,456.6	13,456.6	229.4	229.4	20.8	20.8	8.5	8.5
Ningaloo Region	21,013.2	21,013.2	10,797.3	10,778.0	1.7	1.7	392.1	375.1
Carnarvon Region	2,736.4	2,736.4	46.6	46.6	16.9	29.7	34.1	17.0
Shark Bay Region	1,173.3	1,173.3	56.5	54.7	27.5	27.5	34.1	25.6
Geraldton Region	640.0	NC	20.9	NC	38.5	NC	34.1	NC
Perth Region	591.9	NC	38.0	NC	39.0	NC	59.7	NC
Esperance Region	NC	NC	NC	NC	NC	NC	NC	NC
Albany Region	987.8	987.8	25.0	16.8	54.9	54.9	25.6	8.5
All Shorelines	27,483.9	27,483.9	18,125.0	17,973.9	0.9	0.9	937.6	758.6

Table 8-12: Summary of potential surface oil exposure at moderate & high thresholds: 156,774 m³ crude release over 69-days

Receptor Name	Maximum Time-averaged Oil Concentration (g/m ²)		Minimum Arrival Time (days)	
	>10 g/m ²	>50 g/m ²	>10 g/m ²	>50 g/m ²
Waters Surrounding Islands and Reefs				
Mermaid Reef	NC	NC	NC	NC
Clerke Reef	NC	NC	NC	NC
Imperieuse Reef	NC	NC	NC	NC
Montebello Islands	20.5	NC	6.4	NC
Dampier Archipelago	19.1	NC	14.1	NC
Lowendal Islands	25.9	NC	5.9	NC
Barrow Island	25.6	59.3	4.8	17.6
Thevenard Island	17.3	NC	11.3	NC
Muiron Islands	54.2	62.7	2.7	10.2
Bernier Island	NC	NC	NC	NC
Waters Adjacent to Mainland Regions				
Hedland Region	NC	NC	NC	NC
Dampier Region	18.7	NC	13.4	NC
Onslow Region	51.0	73.1	3.5	10.5
Exmouth Region	43.0	57.3	6.3	8.8
Ningaloo Region	64.0	84.6	1.9	4.6
State Marine Parks				
Rowley Shoals	NC	NC	NC	NC
Montebello Islands	20.5	NC	6.4	NC
Barrow Island	27.1	59.3	5.3	17.6
Thevenard Island	NC	NC	NC	NC
Muiron Islands	54.2	72.8	1.1	9.8

Receptor Name	Maximum Time-averaged Oil Concentration (g/m ²)		Minimum Arrival Time (days)	
	>10 g/m ²	>50 g/m ²	>10 g/m ²	>50 g/m ²
Ningaloo	110.3	152.9	1.8	3.1
Australian Marine Parks				
Kimberley	NC	NC	NC	NC
Argo-Rowley Terrace	NC	NC	NC	NC
Mermaid Reef	NC	NC	NC	NC
Eighty Mile Beach	NC	NC	NC	NC
Montebello	23.4	NC	4.8	NC
Dampier	11.3	NC	59.2	NC
Gascoyne	78.4	126.1	0.7	2.7
Ningaloo	56.9	109.4	0.6	2.3
Carnarvon Canyon	NC	NC	NC	NC
Shark Bay	NC	NC	NC	NC
Abrolhos	NC	NC	NC	NC
Key Ecological Features				
Canyons linking the Argo Abyssal Plain with the Scott Plateau	NC	NC	NC	NC
Continental Slope Demersal Fish Communities	70.1	126.1	0.2	0.6
Mermaid Reef and Commonwealth waters surrounding Rowley Shoals	NC	NC	NC	NC
Ancient coastline at 125 m depth contour	44.3	76.3	1.4	5.2
Glomar Shoals	NC	NC	NC	NC
Exmouth Plateau	63.4	81.5	2.7	7.3
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	78.4	113.6	0.2	0.6
Commonwealth waters adjacent to Ningaloo Reef	56.9	109.4	0.6	2.3
Wallaby Saddle	NC	NC	NC	NC
Western demersal slope and associated fish communities	NC	NC	NC	NC

Receptor Name	Maximum Time-averaged Oil Concentration (g/m ²)		Minimum Arrival Time (days)	
	>10 g/m ²	>50 g/m ²	>10 g/m ²	>50 g/m ²
All Ocean	110.3	152.9	0.2	0.6

Table 8-13: Summary of potential submerged (entrained) exposure at moderate & high thresholds: 156,774 m³ crude release over 69-days

Receptor Name	Maximum Time-averaged Concentration (ppb)		Minimum Arrival Time (days)	
	Total Submerged Oil >10 ppb	Total Submerged Oil >100 ppb	Total Submerged Oil >10 ppb	Total Submerged Oil >100 ppb
Waters Surrounding Islands and Reefs				
Java	37.7	NC	89.4	NC
Bali	30.9	NC	93.7	NC
Palau Lombok	38.9	NC	82.7	NC
West Nusa Tenggara	17.3	NC	83.5	NC
Palau Sumba	19.9	NC	77.7	NC
Minor Indonesian Islands	105.9	105.9	73.9	86.2
Christmas Island	11.8	NC	95.8	NC
Ashmore Reef	11.2	NC	97.9	NC
Seringapatam Reef	12.1	NC	69.4	NC
Scott Reef	54.3	NC	67.8	NC
Mermaid Reef	125.0	156.2	40.5	45.0
Clerke Reef	109.4	118.8	29.1	54.2
Imperieuse Reef	121.4	231.5	26.3	29.3
Montebello Islands	214.2	311.7	6.1	6.3
Dampier Archipelago	149.1	561.7	11.8	14.8
Lowendal Islands	130.7	301.0	6.3	11.5
Barrow Island	308.0	314.1	5.2	5.2
Thevenard Island	120.9	272.9	10.6	11.5
Muiron Islands	170.9	357.3	3.3	4.8
Bernier Island	25.8	NC	14.1	NC

Receptor Name	Maximum Time-averaged Concentration (ppb)		Minimum Arrival Time (days)	
	Total Submerged Oil >10 ppb	Total Submerged Oil >100 ppb	Total Submerged Oil >10 ppb	Total Submerged Oil >100 ppb
Dorre Island	44.8	NC	43.8	NC
Dirk Hartog Island	63.3	116.3	25.1	64.8
Abrolhos Islands	82.6	NC	39.9	NC
Rottneest Island	28.8	NC	56.1	NC
Waters Adjacent to Mainland Regions				
Broome Region	18.7	NC	49.3	NC
Eighty Mile Beach Region	46.7	NC	40.6	NC
Hedland Region	89.0	139.1	24.6	38.3
Dampier Region	249.4	294.5	9.0	18.3
Onslow Region	277.3	326.3	4.7	5.4
Exmouth Region	106.0	259.1	4.8	9.2
Ningaloo Region	218.8	413.9	2.0	2.8
Carnarvon Region	58.9	NC	30.7	NC
Geraldton Region	44.7	NC	55.7	NC
Perth Region	101.9	101.9	57.8	57.8
Albany Region	63.5	NC	67.8	NC
State Marine Parks				
Rowley Shoals	164.5	164.5	29.0	43.5
Eighty Mile Beach	46.7	NC	40.6	NC
Nyangumarta Warrarn	15.9	NC	59.1	NC
Montebello Islands	214.2	311.7	5.9	6.3
Barrow Island	208.6	317.0	2.8	6.0

Receptor Name	Maximum Time-averaged Concentration (ppb)		Minimum Arrival Time (days)	
	Total Submerged Oil >10 ppb	Total Submerged Oil >100 ppb	Total Submerged Oil >10 ppb	Total Submerged Oil >100 ppb
Thevenard Island	91.5	160.3	11.6	48.6
Muiron Islands	236.9	357.4	1.2	4.8
Ningaloo	218.8	413.9	1.7	1.8
Abrolhos Islands	139.7	139.7	35.5	36.3
Jurien Bay	92.3	92.3	57.8	57.8
Ngari Capes	63.5	NC	67.8	NC
Australian Marine Parks				
Kimberley	210.1	210.1	43.8	53.0
Argo-Rowley Terrace	251.9	269.9	15.0	23.8
Mermaid Reef	170.4	170.4	40.8	51.4
Roebuck	19.6	NC	56.8	NC
Eighty Mile Beach	177.4	195.2	24.3	35.8
Montebello	154.2	285.4	3.1	5.5
Dampier	92.6	250.5	15.9	22.9
Gascoyne	294.1	628.2	0.4	0.5
Ningaloo	192.6	489.0	0.5	1.1
Carnarvon Canyon	226.9	487.2	10.3	14.0
Shark Bay	197.6	439.0	6.7	9.0
Abrolhos	218.8	370.3	14.6	18.4
Jurien	84.4	135.1	36.0	39.0
Two Rocks	124.4	124.4	41.3	74.9
Perth Canyon	132.0	134.9	36.2	46.2

Receptor Name	Maximum Time-averaged Concentration (ppb)		Minimum Arrival Time (days)	
	Total Submerged Oil >10 ppb	Total Submerged Oil >100 ppb	Total Submerged Oil >10 ppb	Total Submerged Oil >100 ppb
Geographe	38.1	NC	99.5	NC
Bremer	11.1	NC	66.9	NC
South-west Corner	105.4	129.8	40.9	47.7
Key Ecological Features				
Ancient coastline at 90-120 m depth	133.8	135.6	28.4	28.4
Ashmore Reef and Cartier Island and surrounding Commonwealth waters	11.2	NC	97.9	NC
Seringapatam Reef and Commonwealth waters in the Scott Reef Complex	89.3	NC	67.8	NC
Canyons linking the Argo Abyssal Plain with the Scott Plateau	128.6	167.8	40.3	57.3
Continental Slope Demersal Fish Communities	236.3	499.4	0.1	0.2
Mermaid Reef and Commonwealth waters surrounding Rowley Shoals	219.1	231.5	25.6	25.6
Ancient coastline at 125 m depth contour	201.4	462.6	1.3	2.0
Glomar Shoals	87.9	269.5	11.3	16.2
Exmouth Plateau	220.0	507.1	2.2	3.2
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	186.3	467.4	0.1	0.1
Commonwealth waters adjacent to Ningaloo Reef	192.6	489.0	0.5	1.1
Wallaby Saddle	218.8	218.8	16.5	19.6
Western demersal slope and associated fish communities	230.2	370.3	9.0	12.9
Commonwealth marine environment surrounding the Houtman Abrolhos Islands	147.9	147.9	27.2	35.6
Commonwealth marine environment within and adjacent to the west coast inshore lagoons	82.5	NC	50.3	NC
Perth Canyon and adjacent shelf break and other west coast canyons	188.6	268.1	17.3	20.9
Western rock lobster	162.7	162.7	25.0	28.4

Receptor Name	Maximum Time-averaged Concentration (ppb)		Minimum Arrival Time (days)	
	Total Submerged Oil >10 ppb	Total Submerged Oil >100 ppb	Total Submerged Oil >10 ppb	Total Submerged Oil >100 ppb
Cape Mentelle upwelling	103.8	113.1	45.2	59.2
Naturaliste Plateau	108.9	108.9	48.8	52.5
Commonwealth marine environment surrounding the Recherche Archipelago	60.4	NC	83.9	NC
Albany Canyons group and adjacent shelf break	56.8	NC	57.0	NC
Diamantina Fracture Zone	67.0	NC	56.1	NC
All Ocean	308.0	628.2	0.1	0.1

Deterministic Modelling Results

Whilst the combined 150 stochastic LOWC realisations present the overall geographic area of potential hydrocarbon contact, four individual realisations were selected on the basis of the following criteria for detailed deterministic modelling:

- Greatest accumulation of oil on shorelines above 100 g/m²
- Greatest accumulation of oil above 100 g/m² at the high sensitivity area of the Ningaloo Region
- Minimum arrival time of oil to shorelines above 100 g/m²
- Highest total surface oil mass above 50 g/m²

The above realisations provide a greater understanding of the environment with the highest potential to be impacted at a moderate to significant level by a single WCD scenario during the activity and also helps to inform the *Pyrenees Phase 4 OPEP: Basis of Design & Field Capability Assessment* (BHPB-04PY-N950-0002) for spill response preparedness.

All four deterministic simulations were run without the inclusion of mitigative spill responses. Additionally, two of the four deterministic simulations were run with the inclusion of various mitigative spill responses as follows:

- A source control response in which the well is successfully killed by 25 days of flow (i.e. well successfully killed by the end of day 24);
- A subsea dispersant injection (SSDI) scenario beginning from day 8 onwards;
- A surface dispersant application (SDA) vessel and aircraft response beginning from 12 hours after LOWC; and
- All three responses above combined (i.e. SDA after 12 hours, SSDI from day 7 and source control by day 25)

Whilst actual response timing may vary, the above provide an indication of effectiveness of mitigative response options either undertaken in isolation or in combination.

Figure 8-3 provides a representation for the potential extent of hydrocarbon exposure at moderate to high thresholds at the high sensitivity area of the Ningaloo Region, both from a mitigated and unmitigated (69-day) LOWC scenario.

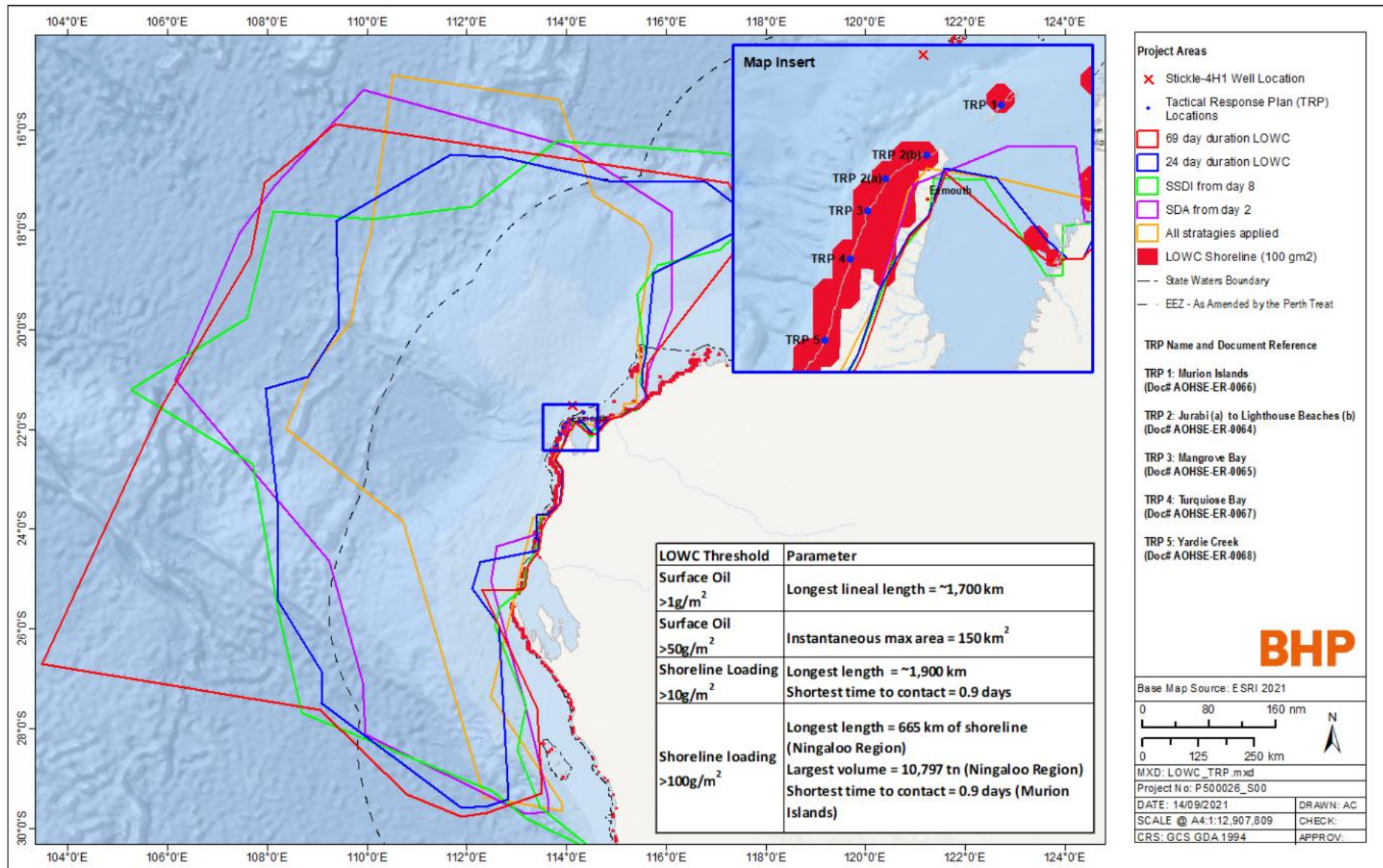


Figure 8-3: Loss of well control crude WCD modelling results (unmitigated & mitigated) for Ningaloo Region

8.3.3 Environmental Impact Assessment

The following environmental impact assessment is based on potential impacts and risks to the physical environment and biological and socio-economic receptors within the area affected by hydrocarbons at the moderate exposure values. Potential impacts to environmental values, sensitivities and receptors within the spill EMBA from exposure to hydrocarbons are described in previous Table 8-10.

Local Fauna and Threatened and Migratory Fauna

Potential sensitive receptors in the vicinity of the spill area will include fish, marine mammals, marine reptiles and seabirds at the sea surface, which may come into contact with the crude oil leading to potential impacts as described in previous Table 8-10. Each of these receptors is discussed below.

Marine Mammals

At the moderate exposure values for hydrocarbons, a number of threatened and migratory mammals are considered at risk of impact from contact with surface and water column hydrocarbons including sei, pygmy blue, fin, southern right, humpback, Antarctic minke, Bryde's, pygmy right and sperm whales; orcas, Indo-Pacific humpback dolphin, Australian snubfin dolphin, dusky dolphin spotted bottlenose dolphins, dugongs and Australian sea lion. Of these, the humpback whale (migration and resting), pygmy blue whale (distribution, foraging and migration), sperm whale (foraging), Southern right whale (calving buffer & seasonal calving habitat), Australian sea lion (haul out, breeding & foraging), and dugong (nursing, breeding, calving and foraging) BIAs overlap the moderate exposure value area. An unplanned release of crude oil is not expected to interfere with their migration activity. There is the potential for behaviour disruption to the local population and individuals that traverse the spill area. Physical contact with hydrocarbons in the water column and on the sea surface is likely to have biological consequences to individuals.

Surface oil at a moderate threshold has the potential to travel up to 600 km from the release location, and high thresholds up to 200 km from the release location, albeit at low probability of exposure at those distances. Spill modelling indicates a ~50% probability of moderate surface thresholds extending up to 40 km from the release site potentially intercepting several AMPs and KEFs (refer Table 8-12 and Table 8-13) that list several threatened and migratory whale species as identified values. However, deterministic spill modelling indicates moderate levels of surface oiling would be localised in nature, therefore impacts are not predicted at a population level.

Moderate thresholds of submerged oil have the potential to contact some island and reefs and open-water surrounding the release location, including those within State and Commonwealth Marine Parks and foraging, migration, resting and calving BIAs for some marine mammals. Depending on seasonality and the distribution of species within these areas at the time of a release, there may be some impact to marine mammals at a population level.

Marine Reptiles

While marine turtle nesting beaches may be contacted by crude oil, turtles will always nest above the high tide mark and any crude oil moving through the beach profile is not predicted to come into contact with nests. Should an unplanned crude spill coincide with marine turtle nesting or young emerging from the nests, adults and hatchlings would be at risk of exposure to crude oil that accumulates on nesting beaches.

At the moderate exposure values for hydrocarbons, a number of threatened and migratory marine reptile species are considered at risk of impact from contact with surface and water column hydrocarbons including flatback, green, hawksbill, loggerhead, leatherback and olive ridley turtles; and snort-nosed seasnakes. Of these, all of the marine turtles listed have BIAs (inter-nesting and nesting) that overlap the moderate exposure value area. There is the potential for impacts to individuals that traverse the spill area. Physical contact with hydrocarbons in the water column and on the sea surface is likely to have biological consequences to individuals while hydrocarbons accumulated on beaches used by nesting turtles may have biological consequences at a population level.

Fish (including Sharks and Rays and Commercial Species)

At the moderate exposure values for hydrocarbons, a number of threatened and migratory fish species are considered at risk of impact from contact with surface and water column hydrocarbons including grey nurse, white, shortfin and longfin mako sharks, porbeagle, northern river, oceanic whitetip and whale sharks; reef and giant manta rays; and sawfish (dwarf, green, freshwater and narrow). Of these, dwarf sawfish (foraging, nursing & pupping areas), green sawfish (foraging, nursing & pupping areas), freshwater sawfish (foraging), white shark (foraging), and whale shark (foraging) BIAs overlap the moderate exposure value area. Key aggregations of whale sharks occur off the Ningaloo coast (March to June) associated with high density prey, with largest numbers generally recorded in April. There is the potential for feeding behaviour disruption to the local population and individuals that traverse the spill area should the timing of the spill coincide with timing of whale shark aggregations.

In the offshore environment, pelagic fish and sharks are expected to move away from areas affected by hydrocarbon spills, such that impacts are expected to be limited to behaviour responses/ displacement. Some mortality and sub-lethal effects may impact individuals located close to the release location, however, overall impacts are not predicted at the population level.

Marine Birds

While marine seabirds may come into contact with crude oil on the sea surface in the offshore environment, migratory shorebirds (and those seabirds that come to shore to breed) are at risk of contact with crude oil that reaches and accumulates on shorelines such as Muiron Islands, the Ningaloo and Onslow Regions, and Barrow Island. Shorebirds are at risk of contact with shoreline accumulated hydrocarbons as they roost, feed and breed on shorelines, although they tend to roost and nest above the high water mark.

At the moderate exposure values for hydrocarbons, a number of threatened and migratory bird species are considered at risk of impact from contact with surface and water column hydrocarbons (refer to Table 4-11) including but not limited to petrels (southern giant, soft-plumaged), terns (Caspian, roseate, crested and fairy), shearwaters (wedge-tailed, streaked and flesh-footed), albatrosses (Indian yellow-nosed, Campbell, Amsterdam, Tristan, southern and northern royal, black-browed, white-capped, wandering, sooty and shy), lesser frigatebird, common noddy and osprey.

The follow species have BIAs that overlap the moderate exposure value area:

- Australian lesser noddy – Foraging (provisioning young);
- Soft-plumaged petrel – Foraging (in high numbers);
- Fairy tern – Breeding and foraging (in high numbers);
- Indian yellow-nosed albatross – Foraging (in high numbers);
- Common noddy – Foraging (provisioning young) and foraging;
- Flesh-footed shearwater – Foraging (in high numbers) and aggregation;
- Wedge-tailed shearwater – Breeding and foraging (in high numbers);
- Lesser frigatebird – Breeding;
- Greater frigatebird – Breeding;
- Caspian tern – Foraging (provisioning young);
- Bridled tern – Foraging (in high numbers);
- White-tailed tropicbird – Breeding;
- Roseate tern – Breeding, resting and foraging (provisioning young);
- Little tern – Breeding and resting;
- Brown booby – Breeding;

- Red-footed booby – Breeding;
- Great-winged petrel – Foraging (provisioning young);
- Lesser crested tern – Breeding;
- Little penguin – Foraging (provisioning young);
- Little shearwater – Foraging (in high numbers);
- Pacific gull – Foraging (in high numbers);
- Sooty tern – Foraging;
- White-faced storm petrel – Foraging (in high numbers); and
- Short-tailed shearwater – Foraging (in high numbers).

Impacts are expected to marine seabirds and shorebirds that come into contact with crude oil as well from as indirect effects from localised reduction of prey abundance. Given the potential extent of moderate to high surface and shoreline exposure within BIAs for listed, threatened and migratory species, impacts may occur at the population level.

Benthic Habitats

Potential sensitive receptors in the vicinity of the spill area will include shallow water benthic habitats which come into contact with hydrocarbons in the water column, and shoreline habitats from hydrocarbons that contact and accumulate on shorelines leading to potential impacts as described in previous Table 8-10. Further activity-specific information on the impacts and risks to these receptors is discussed below.

Shallow Water Benthic Habitats: Coral Reefs, Macroalgal Beds and Seagrass Beds

In the highly unlikely event of a subsea release from a loss of well control, the stochastic spill modelling predicted no exceedances of dissolved hydrocarbons at the moderate (50 ppb) or the high (400 ppb) exposure values.

Total submerged oil at the high threshold (100 ppb) was predicted to occur up to ~1,600 km to the north and south, and ~1,200 km to the west. Very high contact probabilities were predicted at the Ningaloo AMP, and Abrolhos AMP, Moderate contact probabilities were predicted at the Ningaloo Region, the Shark Bay AMP, the Montebello AMP, the Muiron Islands SMP and the Onslow Region. Low contact probabilities were predicted at Muiron Islands, Barrow Island, and Montebello Islands.

In-water hydrocarbons that reach nearshore environments have the potential to impact shallow water benthic habitats, such as coral reefs and other nearshore benthic habitats such as sponge communities that are values of State and Commonwealth Marine Parks including the Ningaloo Marine Park and Ningaloo Coast World Heritage Area. The Ningaloo Coast contains part of the largest fringing reef in Australia with examples of lagoonal, intertidal and subtidal coral communities reaching from the tip of the North West Cape south to Coral Bay. The Ningaloo Coast World Heritage Area has over 300 documented coral species and 155 species of sponges.

Within the EMBA, corals on reef fronts, reef edges and in deeper lagoonal areas will come into contact with entrained oil through dispersion or by dissolution of toxic hydrocarbons into the water column. At Ningaloo, there is an extensive lagoon system along the western side of the North West Cape, comprising a variety of habitats including coral bombies. The reef flats are extensive shallow areas that may be several hundreds of meters in width in places, with varying cover of rubble deposits and life coral. Compared to other coral habitats, intertidal reef flat habitat in general has less coral cover and diversity than subtidal coral reefs. This is due to the naturally harsh conditions they endure such as wave action, periodic tidal exposure and disturbance from cyclonic events.

Macroalgae beds along the Ningaloo coastline are generally found on the shallow limestone lagoonal platforms and occupy a significant proportion (~2,200 ha) of the Ningaloo Marine Park and the Muiron Islands Management Area.

Macroalgae are important contributors to primary productivity and nutrient cycling in the region. Subtidal macroalgae on reef fronts and reef edges would not be exposed to direct oiling, but may experience exposure to entrained oil or by stranded oil on shorelines that becomes remobilised and entrained in the water column due to periodical tidal and wave action exposure and during cyclone events. The effect of hydrocarbons on macroalgae, particularly on intertidal shores, is largely dependent on the degree of direct exposure, the shoreline exposure (degree of wave and tidal action) and how much of the hydrocarbon adheres to the algae. Macroalgae on exposed shores is predicted to recover quicker than sheltered shores as a result of wind, wave and tidal driven coastal processes naturally 'flushing' hydrocarbons from the shoreline.

Potential direct impacts to seagrasses from hydrocarbons include mortality due to smothering and chemical toxicity. Indirect impacts may occur due to reduced light attenuation, which would restrict the seagrasses ability to photosynthesis, leading to reduced growth rates and reduced flowering capability. Entrained oil may also adhere to seagrass in shallower areas, inhibiting respiration. The susceptibility of seagrass to hydrocarbons will depend largely on their distribution, with communities in deeper water are less likely to be affected, whereas seagrass beds in shallower waters are more likely to be affected by entrained oil droplets. Impacts to seagrass beds may present secondary impacts to species reliant on the habitat such as dugongs and turtles.

Shoreline Habitats: Mangroves, Sandy Beaches and Rocky Shores

At the moderate threshold (100 g/m²), predicted shoreline accumulation occurred up to ~1600 km to the southeast at Albany Region and ~1900 km to the northeast at East Nusa Tenggara. Stochastic modelling indicates that at the moderate threshold (100 g/m²), a very high contact probability was predicted for the Ningaloo Region (99.3%) and Muiron Islands (84.7%). Moderate-high contact probabilities (34-57%) were predicted for Barrow Island, Onslow Region, Montebello Islands, Imperieuse Reef, Carnarvon Region, Thevenard Island and Dirk Hartog Island. Moderate contact probabilities (10-30%) were predicted for Geraldton Region, Shark Bay Region, Abrolhos Islands, Bernier Island, Dorre Island, Perth Region, Dampier Archipelago, Clerke Reef, Dampier Region, Hedland Region and Albany Region.

Stochastic modelling indicates the highest accumulated shoreline mass above the moderate threshold (100 g/m²) of 18,370 tonnes across all shorelines and the highest accumulated shoreline loading at Ningaloo Region above moderate threshold of 10,797 tonnes.

However, deterministic modelling of a single simulation demonstrated a more realistic spatial extent for a 69-day spill, based on low threshold values, is presenting in Figure 8-3. The deterministic EMBA shown is based on low hydrocarbon threshold values.

Given the predictive modelling results, the following shoreline habitats are considered at high risk:

- Stands of mangroves associated with the Ningaloo Marine Parks tidal creek systems, notably at Mangrove Bay and at Yardie Creek. The isolated stands of mangroves at Mangrove Bay, although relatively small, are of high ecological importance because they are one of the few stands of mangroves on the western coast of the Ningaloo Marine Park.
- Sandy beaches and intertidal sediment that occur extensively along the Ningaloo Coast, the offshore the Muiron Islands and Barrow Island, as well as the Onslow mainland region. Many of these sandy beaches and intertidal sediments are biologically important nesting areas for turtles and also breeding/feeding/roosting areas for breeding seabirds and migratory wading birds.
- Rocky shore habitats are common along the Ningaloo coastline and the Muiron Islands. These rocky shore habitats and limestone pavements provide a range of habitat niches and as such have a high biodiversity of associated fauna and flora.

Given the potential volumes of stranded hydrocarbons and the values associated with shorelines potentially at risk of exposure, potential impacts are considered substantial to serious.

Protected Areas

Numerous protected areas, including KEFs, State Marine Parks, Australian Marine Parks and the Ningaloo World Heritage Area have the potential to be contacted by moderate to high thresholds of hydrocarbons. The environmental values and sensitivities of these protected areas are described in Section 4 and the potential impacts to these are described in previous Table 8-10. Due to the nature, widespread distribution and levels of hydrocarbon loading from a potential WCD, the consequence to these protected areas is considered substantial to serious.

Socio-Economic Receptors

There is the potential for hydrocarbons to temporarily disrupt fishing activities if surface or water column hydrocarbons move through fishing areas. Fishing grounds may be temporarily closed, which would have an impact through loss of income. Market value/ demand for fish may also be impacted due to actual or perceived tainting of catches. Potential impacts to fish stock could be extensive given the high degree of emulsification and the persistent nature of the crude oil. Potential direct impacts to fish and planktonic fish larvae are described in previous Table 8-10.

Offshore petroleum activities are likely to be predicted to be affected due to temporary exclusion zones that could be enforced as a safety or navigation control measure, thereby restricting vessels from operating in the area. However, impacts are predicted to be temporary.

Shipping operations are not predicted to be affected by a crude spill. However, response activities may result in temporary diversions from normal shipping routes.

Tourism and recreation could be affected by a crude spill, either from reductions in water quality and shoreline oiling resulting in temporary loss of access or reduction in aesthetic value of the area.

Defence activities are not predicted to be affected by a crude oil spill they are designated for aerial training as opposed to maritime. Any crude oil that reaches shorelines has potential to impact on registered sites and indigenous heritage places along the coastline. In the highly unlikely event of an oil spill, shoreline accumulated oil may effect sensitive artefacts or areas, which could damage their heritage value.

Based on the above assessment, a subsea release of crude oil from a loss of well control has the potential to impact an array of receptors. The residual risk associated with a loss of well control scenario has been assessed to be Tolerable.

Species Recovery Plans and Approved Conservation Advice

BHP has considered information contained in recovery plans and approved conservation advice and threat abatement plans (refer to previous Table 4-12). This includes the Recovery Plan for Marine Turtles in Australia (DoEE, 2017).

The overarching objective of the Recovery Plan for Marine Turtles in Australia is to reduce detrimental impacts on Australian populations of marine turtles and hence promote their recovery in the wild. Four species of turtle may occur and have BIAs that intercept the moderate exposure value area within the crude spill EMBA. In addition, the EMBA intercepts inter-nesting habitat identified as habitat critical to the survival for four of these species (green, flatback, hawksbill and loggerhead turtles).

Deteriorating water quality and habitat degradation from pollution, oil spills and chemical discharges is identified as a potential threat to turtles in the Recovery Plan, as well as conservation advice and recovery plans for a number of cetacean, shark and bird species (Table 4-12). The activity will be undertaken with control measures in place to minimise the risk of marine oil pollution events which are consistent with legislative codes, standards and good oil field practice, and recovery plans and approved conservation advice for relevant threatened species. The combination of the preventative control measures (to reduce the likelihood of the event occurring) and spill response strategies (which are aimed at reducing the consequence of the event) together reduce the potential for habitat degradation and/or modification from spill events.

The *Pyrenees Phase 4 Oil Pollution Emergency Plan (OPEP)* (BHPB-04PY-N950-0022) (Appendix G) and response strategies include oiled wildlife response and management measures for marine fauna and their habitats. Implementation of these measures is prioritised based on the relative sensitivities and conservation

significance of the fauna involved. Therefore the OPEP includes management for conservation species and their habitats, consistent with the requirements of the relevant recovery plans and approved conservation advice.

8.3.4 Control Measures

A potential LOWC scenario from the *Pyrenees Phase 4 Infill Drilling Program* is considered a ‘Type B’ (higher order) risk based upon the Decision Context described in Section 6.1.1 of this EP. The clearly defined regulatory, corporate and industry (good practice) preventative controls accepted by BHP to manage the risks associated with a potential LOWC event are detailed in Table 8-14 below:

Table 8-14: Loss of well control – control measures

Control Measure	Source of Requirement / Good Practice
Preventative Controls	
BHP WOMP (NOPSEMA accepted)	Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011 BHP procedures and standards
MODU Safety Case (NOPSEMA accepted)	Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009 MODU Operator system & procedures
BHP MODU Safety Case Revision	BHP procedures and standards
Well Control Training	BHP procedures and standards BHP Well & Seismic Delivery (WSD) Organisation, Development and Training Standard (DR-STD-PET-DC-0123) API Standard RP59
Blowout Preventer (BOP)	BHP procedures and standards BHP Petroleum Well Control Standard (DR-STD-PET-DC-0211) API Standard 16A
BOP Pressure and Function Testing	BHP procedures and standards BHP Petroleum Well Control Standard (DR-STD-PET-DC-0211); API Standard API 53

8.3.5 Demonstration of ALARP

Given a potential LOWC scenario represents a higher order risk, and consistent with the Demonstration of ALARP for higher order risks as described in Section 6.1.3, BHP have undertaken a detailed engineering risk assessment to evaluate alternate, additional or improved controls according to their feasibility, reasonableness, and practicability to implement to further reduce the potential for risks associated with this event.

Table 8-15 below details the cost benefit analysis of proposed controls based upon both feasibility and cost (safety / time / effort / financial), with those preventative controls considered feasible and reasonably practicable to implement being adopted, and those considered not feasible or not reasonably practicable to implement rejected. The assessment applies the hierarchy of controls as illustrated in Figure 6-2.

A detailed environmental impact and risk assessment for spill response activities and detailed ALARP assessment including the evaluation of alternate, additional, or improved response controls for a LOWC scenario is presented in the *Pyrenees Phase 4 OPEP: Basis of Design & Field Capability Assessment* (BHPB-04PY-N950-0002)

Table 8-15: Detailed engineering assessment – loss of well control

Hierarchy of Control	Control Measure	Accept/Reject	Reason
Preventative Controls			
Eliminate	Do not undertake activity	Reject	By not undertaking either infill drilling or well intervention activities, all existing well barriers remain <i>in situ</i> and the risk of a LOWC event is eliminated, thereby eliminating environmental risk. BHP does not consider this control as feasible, as the premise for field development requires these activities to occur. Additionally, if the field is not further developed, BHP would incur significant financial cost and eventually render the Pyrenees Development unviable.
Substitute	None identified	N/A	N/A
Engineer	None identified	N/A	All detailed engineering is planned in accordance with relevant BHP Critical Control and Well Planning Performance Standards. All standards align with industry good practice for well design and well barriers.
Separate	Restrict timing of activity to reduce potential risks to marine fauna during environmentally sensitive periods	Reject	The risk to all fauna cannot be eliminated due to variability in timing of environmentally sensitive periods and the unpredictable presence of some species. Given the multiple layers of preventative controls, the risk of a loss of well control is considered very low. Restricting timing or duration of the activity is not considered feasible given availability of a suitable MODU to undertake the activity. MODU contracting arrangements are reliant on the schedules of multiple regional Titleholders.
Administrative	None identified	N/A	All required and good practice administrative controls have been adopted by BHP, both preventative and spill response.
Monitoring	None identified	N/A	All required controls to monitor for potential LOWC events whilst undertaking the activity have been adopted.
Response Controls			
Pollution Control & Contingency Planning	Pyrenees Phase 4 OPEP: Basis of Design & Field Capability Assessment (BHPB-04PY-N950-0002)		
Monitoring	Post incident monitoring programs have been established as presented within the BHP Pyrenees Field Operational and Scientific Monitoring Bridging Implementation Plan (BHPB-04PY-N950-0023).		

Based upon BHP adopting all relevant regulatory, corporate and industry (good practice) controls in relation to prevention of, and response to, a potential LOWC scenario and the application of a detailed engineering assessment alternate, additional or improved controls, BHP considers the potential risk associated with a LOWC have been managed to ALARP.

8.3.6 Demonstration of Acceptability

The potential for a LOWC event occurring during the *Pyrenees Phase 4 Infill Drilling Program* is considered a ‘Type B’ (higher order) risk, that has been considered acceptable by BHP based upon:

- The risk has been deemed ALARP via a detailed engineering assessment (see Section 8.3.5 above);
- There have been no objections or claims made by relevant stakeholders for this aspect of the activity;
- There is sufficient regulatory control, BHP corporate procedures and standards and industry good practice guidance to inform the development of robust preventative control measures and these measures have been evaluated by internal BHP subject matter experts during the ENVID process and reflected within this EP;

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

- By undertaking the activity, there is no contravention of any relevant Plan of Management for a World Heritage place, National Heritage place or Ramsar wetland identified within the EMBA;
- Consideration of listed species recovery plans, conservation advice and threat abatement plans relevant to chemical discharge/oil spills, marine pollution, and habitat degradation/modification (Table 4-12) have informed the development of control measures.
- The valuation principle of Ecologically Sustainable Development (ESD) (as defined within Section 3A of the EPBC Act) has been considered with respect to potential costs incurred for a LOWC event. This principle has not been compromised given mitigative controls have been adopted to reduce potential impacts and risks in the event of an unplanned spill, and BHP has committed to fully funding any and all remedial costs associated with an emergency oil pollution event; and
- BHP is satisfied that when the accepted controls are implemented the environmental performance outcome (EPO) of “No accidental release of chemicals or hydrocarbons to the marine environment” will be met.

Given all of the above criteria for acceptability have been met, BHP considers the risks associated with a LOWC event during *Pyrenees Phase 4 Infill Drilling Program* have been managed to an acceptable level.

8.4 Hydrocarbon Release – Loss of Flowline Inventory

8.4.1 Summary of Risk Assessment and Evaluation

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Decision Context	Acceptability
Loss of inventory (flowline) from dropped object or anchor drag	Loss of hydrocarbons (crude oil) to the marine environment.	Reduction in water quality with potential for toxicity effects to marine fauna and flora (including potential mortality), oiling of offshore, nearshore and shoreline habitats (smothering). Disruption to biologically important behaviours (feeding / breeding / migration). Hypothermia due to hydrocarbon exposure. Impacts to socio-economic receptors.	10	Highly Unlikely (0.03)	0.3	Type B Higher Order Risk	Tolerable

8.4.2 Source of Risk

During the activity, the MODU will be operating in the proximity of operationally active subsea infrastructure. Consequently, there is the potential for loss of inventory from a single or multiple flowlines resulting in a subsea release of hydrocarbons (crude oil). A release of crude oil from subsea infrastructure may be caused by a dropped object or a loss of mooring resulting in anchor drag.

A review of the subsea infrastructure in the operational area identified the following WCD scenarios caused by a dropped object:

- Crosby: 176 m³ from 10" Line 'A' rounded up to ~200 m³ to allow for emergency shut-down time lag;
- Stickle-4H1: 1.915m³ from 6" production jumper 'PJ3' or 'PJ4' rounded up to ~2 m³;

Both scenarios have >90% water-cut and therefore WCD is ~20 m³ or ~0.2 m³ crude release respectively.

The worst-case subsea crude release from a dropped object is defined as a loss of the entire inventory of the 10" Crosby production flowline 'Line A' (~20 m³ crude). This scenario is an instantaneous release based on complete severing of the flowline and assumes that only the inventory of the flowline and riser is released due to activation of the isolation at the Ravensworth 2 manifold.

An analysis of subsea infrastructure in areas surrounding the MODU mooring locations identified the following WCD scenarios caused by a loss of mooring:

- Crosby: anchor drag on N.E. vector intersecting (and simultaneously rupturing) production flowlines A, C, D, E, G, F, I, J, & W culminating in a ~773 m³ subsea release;
- Stickle-4H1: anchor drag on N.E. vector intersecting (and simultaneously rupturing) production flowlines F, J, & W culminating in a ~178 m³ subsea release;

Both scenarios have >90% water-cut and therefore WCD ~77 m³ or ~18 m³ crude release respectively.

The analysis of a potential subsea release caused by anchor drag is considered highly conservative given each scenario considers the simultaneous rupture of all flowlines within the path of potential anchor drag – this being exceedingly unlikely.

Industry Statistics

A review of international data provided the International Oil and Gas Producers *Riser & Pipeline Release Frequencies – Risk Assessment Data Directory Report* (IOGP, 2019) was undertaken to provide an understanding of historical event frequency of offshore flowlines on production wells. The failure frequency provided do not necessarily relate directly to a loss of containment due to a dropped object or anchor drag, but do relate to pipelines within the ‘safety zone’ (Segment I) as is the case with Pyrenees flowlines.

The data reported for failures in offshore pipelines within Segment I and of a diameter of >6” to 10” are the most analogous statistics to apply to infill drilling activities in the Pyrenees Field. The data demonstrates the very low likelihood of a release during development drilling activities:

- Probability, reported as failure frequency per km per year, of a >6” to 10” pipeline within Segment I is 7.5×10^{-3} (based on North Sea data).

A low probability of flowline failure is further supported by AMSA within the DET NORSKE VERITAS Report for Australian Maritime Safety Authority Model of Offshore Oil Spill Risks (14 December 2011). Whilst applying data from 2010, AMSA suggest low potential failure frequencies are consistent with the occurrence of two flowline leaks in the AMSA data from 1982-2010, one of which had a spill quantity over 1 tonne.

8.4.3 Environmental Impact Assessment

The potential volume of release due to a rupture of subsea infrastructure is less than the scenario of 156,774 m³ from a loss of well control (Section 8.3); hence environmental impacts of this scenario are covered in the worst-case EMBA and not discussed further here.

8.4.4 Control Measures

A potential loss of flowline inventory scenario from the *Pyrenees Phase 4 Infill Drilling Program* is considered a ‘Type B’ (higher order) risk based upon the Decision Context described in Section 6.1.1 of this EP. The clearly defined regulatory, corporate and industry (good practice) preventative controls accepted by BHP to manage the risks associated with a potential flowline rupture are detailed in Table 8-16 below:

Table 8-16: Loss of flowline inventory – control measures

Control Measure	Source of Requirement / Good Practice
Rig Mooring & Positioning Plan	API RP 2SK – mooring analysis
MODU Safety Case (NOPSEMA accepted)	Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009 MODU Operator system & procedures
Preventative Maintenance System (PMS)	MODU Safety Case & Management System Preventative Management System
Well Handover Process	BHP procedures and standards – Well Handover Process Document (PET-GDC00-DR-PLN-00008)

8.4.5 Demonstration of ALARP

Given a potential for a rupture of a flowline represents a higher order risk, and consistent with the Demonstration of ALARP for higher order risks as described in Section 6.1.3, BHP have undertaken a detailed engineering risk assessment to evaluate alternate, additional or improved controls according to their feasibility, reasonableness, and practicability to implement to further reduce the potential for risks associated with this event.

Table 8-17 below details the cost benefit analysis of proposed controls based upon both feasibility and cost (safety / time / effort / financial), with those preventative controls considered feasible and reasonably

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practicable to implement being adopted, and those considered not feasible or not reasonably practicable to implement rejected. The assessment applies the hierarchy of controls as illustrated in Figure 6-2.

A detailed environmental impact and risk assessment for spill response activities and detailed ALARP assessment including the evaluation of alternate, additional, or improved response controls for a flowline rupture scenario is presented in the *Pyrenees Phase 4 OPEP: Basis of Design & Field Capability Assessment* (BHPB-04PY-N950-0002)

Table 8-17: Detailed engineering assessment – loss of flowline inventory

Hierarchy of Control	Control Measure	Accept/Reject	Reason
Preventative Controls			
Eliminate	Do not undertake activity	Reject	Given the nature of the drilling activity, vertical re-entry into existing well bores is required to fulfil the scope of work. Therefore, positioning the MODU above well centres cannot be eliminated.
	Eliminate lifting in the field	Reject	This control would eliminate the risk of dropped objects from the MODU; however, lifting is an essential component of the activities and cannot be eliminated.
	Use DP MODU	Reject	This control would eliminate the risk of potential anchor drag across subsea infrastructure, however, given the water depth of the field (~200 m) and the contracted MODU being a being a moored semi-submersible, this control is not feasible.
Substitute	None identified	N/A	N/A
Engineer	None identified	N/A	Existing engineering controls provide for the isolation of flowline inventories, the prevention of dropped objects onto flowlines and the secure mooring of the MODU on location. No further engineering controls have been identified.
Separate	Pre-flushing of production jumpers with gas back to FPSO	Reject	Pre-flushing of jumper(s) would minimise oil volumes released in the event of a dropped object compromising production jumper integrity. Based on the low risk and low release volume from production jumpers, this control is considered not practicable for the low environmental benefit.
	Shut-off adjacent producing wells during anchor handling activities	Accept	Reduces volume of hydrocarbons released in the highly unlikely event of a dropped object landing on production flowline. This would require production to cease and significant production downtime. Based on the low risk and significant cost to production, this control is considered not reasonably practicable.
Administrative	None identified	N/A	All required and good practice administrative controls have been adopted by BHP, both preventative and spill response.
Monitoring	None identified	N/A	All required controls to monitor for potential spill events whilst undertaking the activity have been adopted.
Response Controls			
Pollution Control & Contingency Planning	Pyrenees Phase 4 OPEP: Basis of Design & Field Capability Assessment (BHPB-04PY-N950-0002)		
Monitoring	Post incident monitoring programs have been established as presented within the BHP Pyrenees Field Operational and Scientific Monitoring Bridging Implementation Plan (BHPB-04PY-N950-0023).		

Based upon BHP adopting all relevant regulatory, corporate and industry (good practice) controls in relation to prevention of, and response to, a potential flowline rupture scenario and the application of a detailed engineering assessment alternate, additional or improved controls, BHP considers the potential risk associated with the activity have been managed to ALARP.

8.4.6 Demonstration of Acceptability

The potential for a flowline rupture during the *Pyrenees Phase 4 Infill Drilling Program* is considered a 'Type B' (higher order) risk, that has been considered acceptable by BHP based upon:

- The risk has been deemed ALARP via a detailed engineering assessment (see Section 8.4.5 above);
- There have been no objections or claims made by relevant stakeholders for this aspect of the activity;
- There is sufficient regulatory control, BHP corporate procedures and standards and industry good practice guidance to inform the development of robust preventative control measures and these measures have been evaluated by internal BHP subject matter experts during the ENVID process and reflected within this EP;
- By undertaking the activity, there is no there is no contravention of any relevant Plan of Management for a World Heritage place, National Heritage place or Ramsar wetland identified within the EMBA;
- Consideration of listed species recovery plans, conservation advice and threat abatement plans relevant to chemical discharge/oil spills, marine pollution, and habitat degradation/modification (Table 4-12) have informed the development of control measures.
- The valuation principle of Ecologically Sustainable Development (ESD) (as defined within Section 3A of the EPBC Act) has been considered with respect to potential costs incurred for a loss of flowline event. This principle has not been compromised given mitigative controls have been adopted to reduce potential impacts and risks in the event of an unplanned spill, and BHP has committed to fully funding any and all remedial costs associated with an emergency oil pollution event; and
- BHP is satisfied that when the accepted controls are implemented the environmental performance outcome (EPO) of "No accidental release of chemicals or hydrocarbons to the marine environment" will be met; and

Given all of the above criteria for acceptability have been met, BHP considers the risks associated with a flowline rupture event during *Pyrenees Phase 4 Infill Drilling Program* have been managed to an acceptable level.

8.5 Hydrocarbon Release – Vessel Collision

8.5.1 Summary of Risk Assessment and Evaluation

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Decision Context	Acceptability
Vessel collision resulting in fuel tank rupture	Loss of hydrocarbons (marine diesel oil) to the marine environment.	Reduction in water quality with potential for toxicity effects to marine fauna and flora (including potential mortality), oiling of offshore, nearshore and shoreline habitats (smothering). Disruption to biologically important behaviours (feeding / breeding / migration). Hypothermia due to hydrocarbon exposure. Impacts to socio-economic receptors.	30	Highly Unlikely (0.03)	0.9	Type A Lower Order Risk	Tolerable

8.5.2 Source of Risk

The presence of the MODU in the operational area for the duration of the activity (approx. 3-4 months) presents a navigational hazard to third-party vessels. A collision between AHTS vessels or with passing third-party vessels has also been identified as a credible risk. A vessel collision could occur due to poor weather, human error or vessel navigation/equipment failure.

A vessel collision has the potential to result in the rupture of a vessel fuel tank and the release of marine diesel oil. A review of the potentially active commercial fisheries (Section 4.11.2) along with consultation undertaken during the development of this EP (Section 4), determined a low likelihood of active commercial fishing in the area, as such, there is a very low risk of a vessel collision with a commercial fishing vessel.

The AMSA *Technical Guidelines for Preparing Contingency Plans for Marine and Coastal Facilities* (2015) has been applied to determine the credible WCD associated with an in-field vessel collision event.

For the identified AHTS vessels anticipated to support the MODU during the activity, the largest single fuel oil (FO) tank is 247.6 m³. Generally, FO tanks are filled to 80% of total capacity (maintaining 20% ullage) whilst undertaking offshore operations. To allow for an appropriately conservative environmental impact and risk assessment, or for a vessel with larger-than-anticipated FO capacity to support the activity, a total potential marine diesel oil (MDO) release volume of 330 m³ has been modelled as the WCD for a vessel collision scenario.

Industry Statistics

A review of the Annual Overview of Marine Incidents (AMSA, 2019) (covering the period from January 2016 to December 2019) indicates that ‘very serious marine incidents’, which may include loss of a vessel and serious pollution, accounted for a small portion (0.05%) of the overall reported marine incidents during the reporting period. Based upon this report, and reports from previous years, this would indicate a vessel collision resulting in a loss of 330 m³ MDO would be considered a highly unlikely event.

Oil Spill Modelling Results

Hydrocarbon Weathering Behaviour

MDO is a moderate weight, moderately persistent oil in the marine environment. Further information on the MDO properties incorporated into the oil spill modelling is provided in Section 8.2.3 and Table 8-5.

Results of the weathering analysis are shown in Figure 8-4 and are summarised as follows. Under low winds (1 m/s), 60% of the surface slick is predicted to remain after 120 hours (5 days). Under moderate winds (5 m/s), 40% of the initial surface slick is predicted to remain after 24 hours, decreasing further to approximately 10% after 48 hours and ~1% after 72 hours. With high winds (10 m/s), the surface slick is predicted to be almost entirely evaporated and dispersed after 12 hours. The MDO has a very low tendency for emulsion formation, with only ~1% water contained entrained into the surface slick after 120 hours for all wind conditions assessed (Figure 8-4).

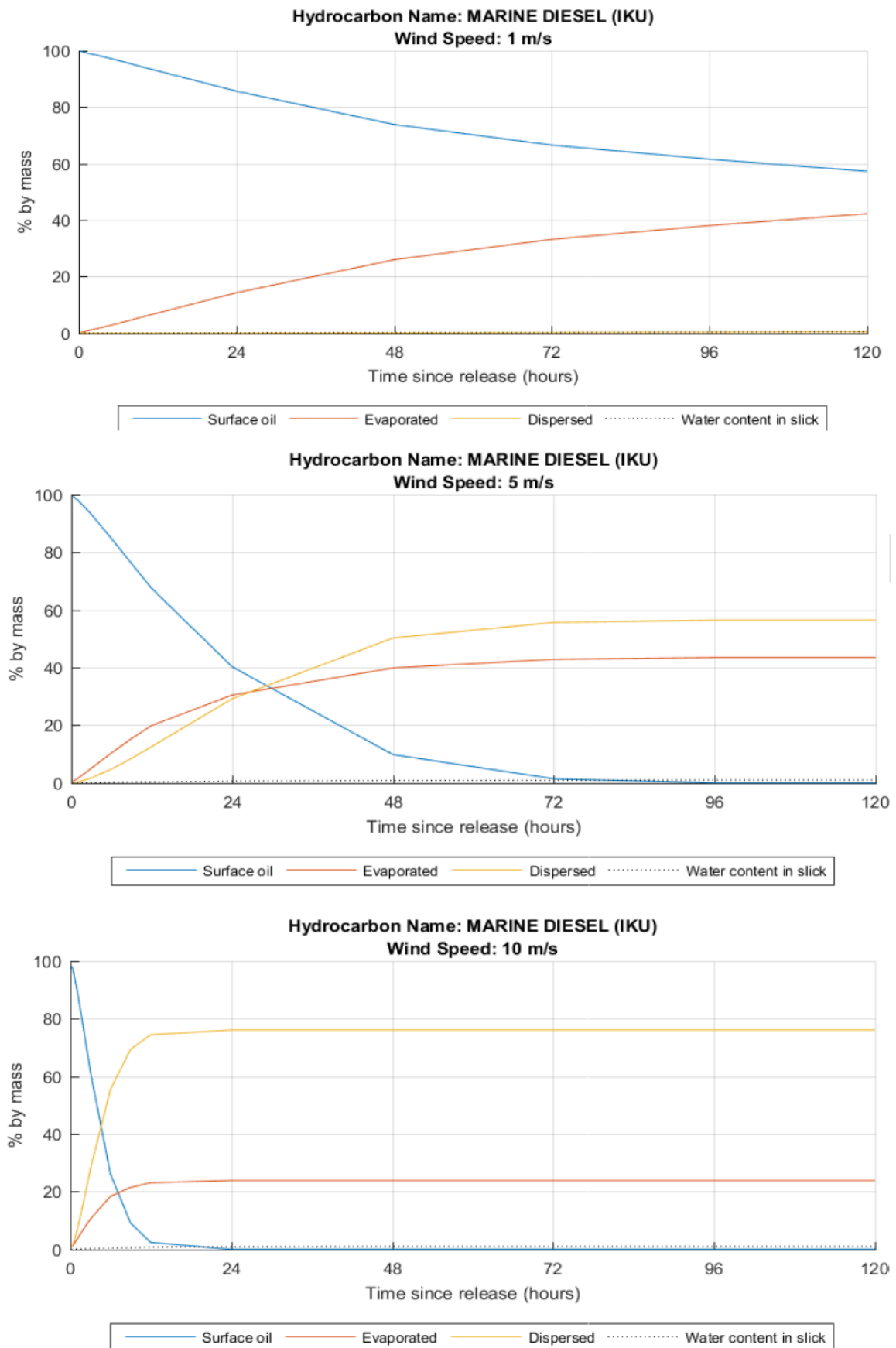


Figure 8-4: Simulated weathering of the SINTEF marine diesel (IKU) hydrocarbon for constant wind speeds of 1 m/s (top), 5 m/s (middle) and 10 m/s (bottom) (GHD, 2021)

The modelling results are presented for the fate hydrocarbons at the hydrocarbon exposure values defined in Section 8.2.5. The spatial extent of the MDO release is presented in Figure 4-1. The outer extent of the MDO EMBA shown is derived from the oil spill modelling defined using the low exposure values (Table 8-9) and is based on the combined area of contact for all hydrocarbon phases (surface oil, dissolved oil, total submerged oil and shoreline accumulated oil).

Sea Surface Hydrocarbons

Low exposure (>1 g/m²)

Surface oil above the low threshold (1 g/m²) was predicted to extend up to ~360 km to the west and northeast and ~280 km southwest of the spill location

Moderate exposure (>10 g/m²)

At the moderate threshold (10 g/m²), surface oiling was reduced in spatial extent to within ~250 km to the west and southwest and ~160 km to the north and northeast.

High exposure (>50 g/m²)

Exceedances of the high threshold (50 g/m²) were limited in spatial extent to ~170 km southwest and ~130 km northeast of the release location.

Low-moderate contact probabilities were predicted for the Gascoyne AMP (38.3%), the Ningaloo AMP (12.3%) and the Commonwealth waters adjacent to Ningaloo Reef KEF (12.3%). These receptors received maximum time-averaged surface oil concentrations of 248-261.4 g/m² with minimum arrival times of 0.2 days (5 hours) for all three receptors. Refer Table 8-19.

Dissolved Hydrocarbons

Low exposure (>10 ppb)

Dissolved hydrocarbons at the low threshold (10 ppb) were predicted to extend a maximum distance of ~280 km to the west and southwest and ~200 km to the north and northeast.

Moderate exposure (>50 ppb)

At the moderate threshold (50 ppb), the spatial extent was within ~240 km to the west and ~150 km to the northeast.

High exposure (>400 ppb)

Exceedance of the high threshold (400 ppb) was limited to within 80 km of the release location.

Low-moderate contact probabilities were predicted for the Gascoyne AMP (37.5%), the Ningaloo AMP (14.3%) and the Commonwealth waters adjacent to Ningaloo Reef KEF (14.3%). Maximum time-averaged concentrations of 366 ppb occurred at the Ningaloo AMP and the Commonwealth waters adjacent to Ningaloo Reef KEF, while the maximum at the Gascoyne AMP was 536.7 ppb. Minimum arrival times of 0.2 days (5 hours) were predicted at all three receptors. Refer Table 8-21.

Total Submerged Hydrocarbons (entrained plus dissolved)

Low exposure (>10 ppb)

Total submerged oil at the low threshold (10 ppb) was predicted within a maximum distance of ~380 km to the west, ~290 km to the southwest and ~250 km to the northeast.

High exposure (>100 ppb)

Exceedances of the high threshold (100 ppb) were predicted to be limited in spatial extent to within 250 km west and southwest and within 200 km of the release site in all other directions.

Low-moderate contact probabilities were predicted at the Gascoyne AMP (37.8%), the Ningaloo AMP (15.3%) and the Commonwealth waters adjacent to Ningaloo Reef KEF (15.3%). Maximum time-averaged concentrations of 944.3 ppb occurred at the Commonwealth waters adjacent to Ningaloo Reef KEF and the Ningaloo AMP, while the maximum at the Gascoyne AMP was 1,434 ppb. Minimum arrival times of 0.2 days (5 hours) were predicted at all three receptors. Refer Table 8-20.

Shoreline Accumulated Hydrocarbons

Low exposure (>10 g/m²)

Shoreline loading above the low threshold (>10 g/m²) was predicted to occur between the Ningaloo Region (~160 km to the south-southwest) and the Montebello Islands (~ 210 km to the northeast).

Moderate exposure (>100 g/m²)

At the moderate threshold (100 g/m²), predicted shoreline accumulation occurred up to ~140 km to the south-southwest at Ningaloo Region, and ~170 km to the northeast at Barrow Island.

At the moderate threshold (100 g/m²), low contact probabilities of 4%, 1.3% and 0.8% were predicted for the Ningaloo Region, Barrow Island and the Muiron Islands, respectively. Maximum predicted shoreline accumulation at Barrow Island was substantially lower at 6.1 tonnes than the Muiron Islands (125.9 tonnes) and Ningaloo Region (202.1 tonnes). Similar minimum arrival times of 0.9 days at the Muiron Islands and 0.7 days at Ningaloo Region were predicted, though Barrow Island had a longer predicted minimum arrival time of 3.5 days. The maximum oiled shoreline lengths were between 21.2 km (Ningaloo Region) and 4.2 km (Muiron Islands). No other receptor regions were contacted by shoreline accumulation above the moderate threshold. Across all shorelines combined, the predicted probability of contact at the moderate threshold is 6% with a maximum accumulated oil mass of 202.1 tonnes (entirely at Ningaloo Region) and a minimum arrival time of 0.7 days. Refer Table 8-18.

High exposure (>1,000 g/m²)

Shoreline contact at the high threshold (1,000 g/m²) was limited to ~120 km to the south-southwest in the Ningaloo Region, and one model cell at the southern tip of Barrow Island ~160 km to the northeast.

Table 8-18: Summary of potential shoreline contact (all seasons) at moderate & high thresholds: 330 m³ MDO spill scenario

Receptor Name	Maximum Accumulated Oil Concentration (g/m ²)		Maximum Total Accumulated Oil Ashore (tonnes)		Minimum Arrival Time (days)		Maximum Length of Oiled Shoreline (km)	
	>100 g/m ²	>1,000 g/m ²	>100 g/m ²	>1,000 g/m ²	>100 g/m ²	>1,000 g/m ²	>100 g/m ²	>1,000 g/m ²
(Intertidal) Islands and Reefs								
Montebello Islands	NC	NC	NC	NC	NC	NC	NC	NC
Barrow Island	1,586.1	1,586.1	6.1	4.5	3.5	4.7	5.7	1.4
Muiron Islands	18,818.8	18,818.8	125.9	125.9	0.9	0.9	4.2	4.2
(Intertidal) Mainland Regions								
Ningaloo Region	19,091.2	19,091.2	202.1	202.1	0.7	0.7	21.2	12.7
All Shorelines	19,091.2	19,091.2	202.1	202.1	0.7	0.7	21.2	12.7

Table 8-19: Summary of potential surface exposure at moderate & high thresholds: 330 m³ MDO spill scenario

Receptor Name	Maximum Time-averaged Oil Concentration (g/m ²)		Minimum Arrival Time (days)	
	>10 g/m ²	>50 g/m ²	>10 g/m ²	>50 g/m ²
Waters Surrounding Islands and Reefs				
Barrow Island	NC	NC	NC	NC
Muiron Islands	226.8	226.8	0.8	0.8
Waters Adjacent to Mainland Regions				
Onslow Region	182.9	182.9	1.8	2.3
Ningaloo Region	214.6	214.6	0.5	0.5
State Marine Parks				
Barrow Island	NC	NC	NC	NC
Muiron Islands	226.8	226.8	0.8	0.8
Ningaloo	230.1	230.1	0.4	0.5

Receptor Name	Maximum Time-averaged Oil Concentration (g/m ²)		Minimum Arrival Time (days)	
	>10 g/m ²	>50 g/m ²	>10 g/m ²	>50 g/m ²
Australian Marine Parks				
Montebello	11.3	NC	4.0	NC
Gascoyne	248.0	248.0	0.2	0.3
Ningaloo	261.4	261.4	0.2	0.2
Key Ecological Features				
Continental Slope Demersal Fish Communities	430.0	430.0	0.1	0.1
Ancient coastline at 125 m depth contour	241.4	241.4	0.2	0.3
Exmouth Plateau	98.5	98.5	2.8	2.8
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	284.2	284.2	0.1	0.1
Commonwealth waters adjacent to Ningaloo Reef	261.4	261.4	0.2	0.2
All Ocean	430.0	430.0	0.1	0.1

Table 8-20: Summary of potential submerged (entrained) exposure at low & high thresholds: 330 m³ MDO spill scenario

Receptor Name	Maximum Time-averaged Concentration (ppb)		Minimum Arrival Time (days)	
	Total Submerged Oil >10 ppb	Total Submerged Oil >100 ppb	Total Submerged Oil >10 ppb	Total Submerged Oil >100 ppb
Waters Surrounding Islands and Reefs				
Barrow Island	24.4	NC	3.3	NC
Muiron Islands	658.1	658.1	0.8	0.8
Waters Adjacent to Mainland Regions				
Onslow Region	192.7	350.9	1.7	2.3
Ningaloo Region	218.1	560.1	0.4	0.5
State Marine Parks				

Receptor Name	Maximum Time-averaged Concentration (ppb)		Minimum Arrival Time (days)	
	Total Submerged Oil >10 ppb	Total Submerged Oil >100 ppb	Total Submerged Oil >10 ppb	Total Submerged Oil >100 ppb
Barrow Island	18.5	NC	3.4	NC
Muiron Islands	658.1	658.1	0.8	0.8
Ningaloo	218.1	560.1	0.4	0.4
Australian Marine Parks				
Montebello	72.5	NC	3.3	NC
Gascoyne	1,434.0	1,434.0	0.2	0.2
Ningaloo	944.3	944.3	0.2	0.2
Key Ecological Features				
Continental Slope Demersal Fish Communities	959.8	1,050.6	0.1	0.1
Ancient coastline at 125 m depth contour	235.0	515.8	0.2	0.3
Exmouth Plateau	263.4	324.4	2.3	2.8
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	900.8	1,248.6	0.1	0.1
Commonwealth waters adjacent to Ningaloo Reef	944.3	944.3	0.2	0.2
All Ocean	1,434.0	1,434.0	0.1	0.1

Table 8-21: Summary of potential dissolved hydrocarbon exposure at moderate & high thresholds: 330 m³ MDO spill scenario

Receptor Name	Maximum Time-averaged Concentration (ppb)		Minimum Arrival Time (days)	
	Dissolved Hydrocarbons >50 ppb	Dissolved Hydrocarbons >400 ppb	Dissolved Hydrocarbons >50 ppb	Dissolved Hydrocarbons >400 ppb
Waters Surrounding Islands and Reefs				
Barrow Island	NC	NC	NC	NC
Muiron Islands	304.7	NC	0.8	NC

Receptor Name	Maximum Time-averaged Concentration (ppb)		Minimum Arrival Time (days)	
	Dissolved Hydrocarbons >50 ppb	Dissolved Hydrocarbons >400 ppb	Dissolved Hydrocarbons >50 ppb	Dissolved Hydrocarbons >400 ppb
Waters Adjacent to Mainland Regions				
Onslow Region	160.1	NC	2.3	NC
Ningaloo Region	193.0	NC	0.5	NC
State Marine Parks				
Muiron Islands	304.7	NC	0.8	NC
Ningaloo	203.0	NC	0.4	NC
Australian Marine Parks				
Montebello	NC	NC	NC	NC
Gascoyne	536.7	536.7	0.2	1.0
Ningaloo	365.9	NC	0.2	NC
Key Ecological Features				
Continental Slope Demersal Fish Communities	377.2	430.1	0.1	1.8
Ancient coastline at 125 m depth contour	206.5	NC	0.3	NC
Exmouth Plateau	147.4	NC	2.8	NC
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	490.2	486.6	0.1	2.1
Commonwealth waters adjacent to Ningaloo Reef	365.9	NC	0.2	NC
All Ocean	536.7	536.7	0.1	1.0

8.5.3 Environmental Impact Assessment

A loss of MDO to the marine environment would result in a localised and temporary reduction in water quality in the upper surface waters of the water column. While MDOs are generally considered to be non-persistent oils, many contain a small present by volume of hydrocarbons that are classified as present.

When spilt at sea, MDOs will spread and thin out quickly and more than half of the volume can be lost to evaporation. Due to their higher solubility and ease of entrainment, MDO spills can have a greater ecological impact in comparison to other floating oils slicks. There is a low probability (10.3%) of a maximum of approximately 202 tonnes of oil accumulating on shorelines within the Ningaloo Region at the low exposure value. The probability of moderate thresholds oil accumulation on the shorelines of Barrow Island and the Muiron Islands is 1.3% and 0.8% respectively.

The following environmental impact assessment is based on potential impacts and risks to the physical environment and biological and socio-economic receptors within the area affected by hydrocarbons at the moderate exposure value.

Local Fauna and Threatened and Migratory Fauna

Marine Mammals

Whales and dolphins spend a significant time at the sea surface in search of food and to breathe, as such if they are in the vicinity of the spill location, they are likely to come into contact with MDO. However, as they are smooth skinned, hairless mammals, MDO tends not to adhere to their skin, limiting the potential impacts of oiling.

Whales and dolphins are not predicted to be impacted by entrained/dissolved hydrocarbons in the water column since they are mobile species and not likely to be constantly exposed for extended durations that would be required to cause any major toxic effects. Given the size of the spill and expected rapid evaporation and dispersion rate, impacts to marine mammals are expected to be low.

At the moderate exposure level, a number of threatened and migratory mammals are considered at risk of impact from contact with surface and water column hydrocarbons including sei, pygmy blue, southern right, humpback, sperm whales, Indo-Pacific humpback and bottlenose dolphins, Australian snubfin dolphins and dugongs. Of these, the humpback whale (migration and resting), pygmy blue whale (distribution, foraging and migration) and dugong (nursing, breeding, calving and foraging) BIAs overlap the moderate exposure value area. An unplanned release of MDO is not expected to interfere with their migration activity. There is the potential for behaviour disruption to the local population and individuals that traverse the spill area. Owing to the rapid dispersion and evaporation of MDO, impacts are not predicted at the population level.

Marine Reptiles

Marine reptiles (turtles and seasnakes) may be exposed to surface and water column hydrocarbons through direct contact resulting in eye and skin damage, ingestion, consumption of contaminated prey items and prolonged inhalation of diesel vapour. Ingestion can subsequently lead to physiological effects including internal organ damage. Coasting of their body surface can cause irritation of mucous membranes in the nose through and eyes that can result in inflammation and infection.

Due to the weathering nature of MDO, a spill rapidly and thinly consequently marine reptiles are not expected to ingest significant volumes or result in persistent oiling. Most evaporation of MDO is within the first 48 hours, hence exposure timeframes to vapours is short.

While marine turtle nesting beaches may be contacted by MDO, turtles will always nest above the high tide mark and any MDO moving through the beach profile is not predicted to come into contact with nests. Should an unplanned MDO spill coincide with marine turtle nesting or young emerging from the nests, adults and hatchlings would be at risk of exposure to MDO that accumulates on nesting beaches. At the moderate exposure level, the maximum volumes of MDO predicted to accumulate on shorelines at Barrow Island, the Muiron Islands and Ningaloo Region are 6.1 tonnes, 125.9 tonnes and 202.1 tonnes respectively.

At the moderate exposure level, a number of threatened and migratory marine reptile species are considered at risk of impact from contact with surface and water column hydrocarbons including flatback, green, hawksbill, loggerhead and leatherback turtles; and snort-nosed seasnakes. Of these, all of the marine turtles listed have BIAs (inter-nesting and nesting) that overlap the moderate exposure value area. There is the potential for impacts to individuals that traverse the spill area. Owing to the rapid dispersion and evaporation of MDO, impacts are not predicted at the population level.

Fish (including Sharks and Rays and Commercial Species)

Pelagic fish that spend their time in the upper water column will be at greatest risk of impact from surface and water column hydrocarbons. Pelagic fish are highly mobile and species likely to be include predatory species such as tuna, billfish, mackerel and sharks, as well as rays and sawfish.

Fish near the sea surface are thought to be able to detect and avoid contact with surface slicks and mortalities rarely occur in the event of a hydrocarbon spill in open waters. Those fish that do come into contact with surface and water column hydrocarbons will be affected by smothering through coating of gill structure leading to suffocation or through ingestion leading to potential infection and internal organ or tissue damage.

At the moderate exposure level, a number of threatened and migratory fish species are considered at risk of impact from contact with surface and water column hydrocarbons including grey nurse, white, shortfin, longfin mako, and whale sharks; reef and giant manta rays; and sawfish (dwarf, green and narrow). Of these, whale shark (foraging) BIAs overlap the moderate exposure value area. Key aggregations occur off the Ningaloo coast (March to June) associated with high density prey, with largest numbers generally recorded in April. There is the potential for feeding behaviour disruption to the local population and individuals that traverse the spill area should the timing of the spill coincide with timing of whale shark aggregations. Owing to the rapid dispersion and evaporation of MDO, impacts are not predicted at the population level.

Marine Birds

Marine birds are at risk of exposure to MDO from diving to obtain food or resting on the sea surface. Impact pathways arise from direct oiling, exposure to oil vapours, and direct or indirect ingestion of oil and contaminated food prey. Ingestion can lead to intestinal damage and reproductive effects. Oiling of feathers can affect the bird's ability to thermo-regulate (IPIECA-IOGP, 2017). Due to the weathering nature of MDO, surface oil spreads rapidly and thinly, and hence marine birds are not expected to ingest significant volumes or result in persistent heavy oiling.

While marine seabirds may be contacted by MDO in the offshore environment, migratory shorebirds are at risk of contact with moderate thresholds of MDO that accumulate on shorelines at Barrow Island, the Muiron Islands and the Ningaloo Region. Shorebirds are at risk of contact with accumulated hydrocarbons as they roost, feed and breed on shorelines, although they tend to roost and nest above the high water mark.

At the moderate exposure level, a number of threatened and migratory bird species are considered at risk of impact from contact with surface and water column hydrocarbons including petrels (southern giant, soft-plumaged), terns (roseate and fairy), shearwaters (wedge-tailed, streaked), Campbell albatross, lesser frigatebird, common noddy and osprey. Of these, wedge-tailed shearwater (breeding), roseate and fairy terns (breeding), and lesser crested tern (breeding) BIAs overlap the moderate exposure value area.

At the moderate exposure level, a number of threatened and migratory species are also considered at risk of impact from contact with shoreline accumulated hydrocarbons that includes red knot, godwits (bar-tailed, Northern Siberian bar-tailed), eastern curlew, sandpipers (common, curlew, pectoral, sharp-tailed), oriental plover, oriental pratincole, Australian painted snipe, fork-tailed swift, and common greenshank.

Protected Areas

Several protected areas and key ecological features (KEFs) overlap with the moderate hydrocarbon exposure area:

- State Marine Parks: Barrow Island, Muiron Islands and Ningaloo
- Australian Marine Parks: Montebello, Gascoyne and Ningaloo

- Key ecological features:
 - Continental slope demersal fish communities;
 - Ancient coastline at 125-m depth contour;
 - Exmouth Plateau;
 - Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula; and
 - Commonwealth waters adjacent to Ningaloo Reef.

Socio-Economic Receptors

There is the potential for hydrocarbons to temporarily disrupt fishing activities if surface or water column hydrocarbons move through fishing areas. Fishing grounds may be temporarily closed, which would have an impact through loss of income. Market value/ demand for fish may also be impacted due to actual or perceived tainting of catches. Any impacts to fish stock are predicted to be low and temporary due to the low volume of MDO released and the rapid dispersal and evaporation of MDO. Potential direct impacts to fish and planktonic fish larvae are described in relevant previous sections.

Offshore petroleum activities are not predicted to be affected by a MDO spill. Given the nature of the spill, it is plausible that temporary exclusion zones could be enforced as a safety or navigation control measure, thereby restricting vessels from operating in the area. However, given the rapid dispersion and evaporation of MDO impacts are predicted to be temporary.

Shipping operations are not predicted to be affected by a MDO spill. However, response activities may result in temporary diversions from normal shipping routes.

Tourism and recreation could be affected by a MDO spill, either from reductions in water quality and shoreline oiling resulting in temporary loss of access or reduction in aesthetic value of the area.

Defence activities, as well as maritime and indigenous heritage are not predicted to be affected by an MDO spill.

8.5.4 Control Measures

The clearly defined regulatory, corporate and industry (good practice) preventative controls accepted by BHP to manage the risks associated with vessel collision are detailed below:

Table 8-22: Vessel collision – control measures

Control Measure	Source of Requirement / Good Practice
Navigation Equipment	Navigation Act 2012; International Convention of the Safety of Life at Sea (SOLAS) Marine Order Part 30: Prevention of Collisions, Issue 8 Marine Order 21, Issue 8 (Safety of Navigation and Emergency Procedures)
Automatic Identification System (AIS)	Navigation Act 2012; International Convention of the Safety of Life at Sea (SOLAS): Regulation 19-1 of Chapter V of SOLAS.
Notice to Mariners and AUSCOAST warning	Navigation Act 2012; International Convention of the Safety of Life at Sea (SOLAS) BHP procedures and standards
Stakeholder Communication	OPGGS(E) Regs (11A) BHP WA APU Community Stakeholder Management Plan BHP APU Community Concerns, Inquiries and Complaints Procedure (WA) (AOEA-CR-0003)
Rig Safety Exclusion Zone	MODU Safety Case BHP Petroleum HSE Standard (PET-HSE00-HX-STD-00001)
Training & Competency	AMSA Marine Order Part 3: Seagoing Qualifications
SIMOPs Plan	BHP Petroleum HSE Standard (PET-HSE00-HX-STD-00001):

Control Measure	Source of Requirement / Good Practice
	SIMOPS Plan <i>Pyrenees Venture</i> FPSO.
Additional Opportunistic Controls	
Restrict timing of activity to reduce potential risks to marine fauna during environmentally sensitive periods.	The risk to all fauna cannot be eliminated due to variability in timing of environmentally sensitive periods and the unpredictable presence of some species. Due to the short duration of petroleum activity (approximately 3-4 months), the risk of a vessel collision is considered very low. Restricting timing or duration of the activity is not considered feasible given AHTS vessel contracting arrangements. Given the low risk of vessel collision and even lower risk of a vessel collision resulting in a diesel spill, even if feasible, the control is deemed grossly disproportionate to any potential environmental benefit.

8.5.5 Demonstration of ALARP

The potential for a vessel collision resulting in a release of MDO during the *Pyrenees Phase 4 Infill Drilling Program* is considered a ‘Type A’ (lower order) risk based upon the Decision Context described in Section 6.1.1 of this EP. Given the routine nature of vessel operations and the controls detailed above being consistent with both regulatory requirements and industry good practice, BHP considers the impact has been managed to ALARP and no further detailed engineering evaluation of alternate, additional or improved controls is required. Additional opportunistic controls have also been evaluated but deemed not reasonably practicable to implement.

8.5.6 Demonstration of Acceptability

BHP is satisfied that when the accepted controls detailed above are implemented the environmental performance outcome (EPO) of “No accidental release of chemicals or hydrocarbons to the marine environment” will be met, therefore BHP considers the impact to be managed to an acceptable level. Additionally, consideration of listed species recovery plans, conservation advice and threat abatement plans relevant to chemical discharge/oil spills, marine pollution, and habitat degradation/modification (Table 4-12) have informed the development of control measures.

No concerns or objections regarding the potential for vessel collision during the activity have been raised by relevant stakeholders.

8.6 Unplanned Discharges – Chemicals and Minor Hydrocarbon Spills

8.6.1 Summary of Risk Assessment and Evaluation

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Decision Context	Acceptability
Accidental discharge of chemicals and hydrocarbons	Minor spills / leaks of chemicals or hydrocarbons to the marine environment.	Reduction in water quality adjacent to the discharge point associated with hydrocarbon or chemical contaminants with potential for toxicity effects to marine species.	10	Unlikely (0.1)	1	Type A Lower Order Risk	Tolerable

8.6.2 Source of Risk

During the activity, the transfer, handling, use and storage of chemicals and hydrocarbons will be required, which may include, but not limited to:

- MDO;
- Cement;
- Drill chemicals including biocides;
- Hydraulic fluids/ oils;
- Subsea control fluids; and
- Corrosion inhibitors

Accidental loss of such chemicals from the MODU or AHTS vessels to the marine environment could occur as a result of spillage during handling, inadequate bunding and/ or storage, inadequate method of securing or tank/ pipework failure, leak from equipment or rupture or failure of ROV hydraulic hoses whilst underwater.

MDO is stored aboard the MODU in dedicated fuel oil tanks house within the pontoons of the MODU.

Inventories of bulk liquid chemicals are stored within mud pits aboard the MODU, with bulk dry chemicals stored within the sack room. Each of these location have sealed drainage systems for chemical containment.

Given the quantities of chemicals used aboard the deck of the MODU are limited in volume to single containers, the volume of chemical potentially released from a leak or spillage on deck into the marine environment, and based on a review of past incidents and possible causes, is less than 80 L.

Bulk supplies of liquid chemicals and hydrocarbons are bunkered from the project support vessels onto the MODU during the activity. Whilst unlikely, spills may occur during bunkering operations.

The AMSA Technical guidelines for preparing contingency plans for Marine and Coastal Facilities (2015) has been applied to determine the credible WCD associated with bunkering operations that are subject to continuous supervision. The potential causes and credible WCD have been identified as:

- Failure of the hoses during pumping: the maximum credible spill that would occur from total failure of a diesel transfer hose is approximately 450 L (volume of 100 m of 75 mm diameter hose) plus allowance for time to shut down the pump (accounting for 15 min of flow). The potential WCD (assuming an average pumping rate of 225 m³ per hour) is 56.7 m³ diesel.

- Failure of connections or valves at disconnection: valves are dry break but if a valve was to fail at disconnection worst-case would result in contents of the hose, approximately 450 L, being released to sea.

Leaks or rupture of ROV hydraulic hoses may occur through equipment malfunction or line pinches which would lead to the loss of small volumes of hydraulic fluids directly to the marine environment. ROVs on the MODU or AHTS vessels are fitted with leak alarms generally set at 5 L.

8.6.3 Environmental Impact Assessment

The accidental discharge of chemicals and hydrocarbons has the potential to cause localised toxic effects on marine fauna (pelagic fish, cetaceans and marine reptiles) and flora (phytoplankton) and a localised reduction in water quality. The potential impacts would most likely be highly localised and restricted to the immediate area in the footprint of the spill. Pelagic fish, cetaceans, marine reptiles will be able to move out of the spill area and any accidental spills is therefore not predicted to result in fatalities. Phytoplankton entrained in the spill will be impacted, however, the rapid dilution and dispersal that will result at the oceanic locations, the environmental effects will be temporary and localised, with significant impacts not expected owing to the short exposure timeframe.

Habitat degradation for marine pollution and chemical discharges are highlighted as threats to marine turtles, whales, and a number of migratory shorebirds in relevant recovery plans and approved conservation advice (refer to previous Table 4-12). The plans and conservation advice provide recovery objective and action to help combat these threats.

In particular, the Recovery Plan for Marine Turtles in Australia (DoEE, 2017) identifies chemical discharge as a relevant threat to marine turtles. Five species of turtle may occur within the operational area (Section 4.5.8), of which the flatback turtle has an inter-nesting BIA that intercepts the operational area. In addition, the operational area intercepts inter-nesting habitat identified as habitat critical to the survival of the species (all waters within a 60 km radius of nesting areas on Thevenard Island, the Muiron Islands and Pilbara coast). Management measures listed in the Recovery Plan in relation to chemical discharges include implementation of best practices to minimise impacts to marine turtles and marine turtle habitat; and ensure spill risk strategies and response plans adequately include management for marine turtles and their habitats.

It is possible that individual turtles may come into contact with accidental chemical and hydrocarbon spills, however, considering the water depths of the operational area and the distances to nearest nesting beaches, large numbers of inter-nesting turtles are not predicted and significant impacts to populations will not occur. Impacts may occur to a small number of individuals should they be traversing the area when an accidental release occurs.

With the proposed controls in place, BHP considers the potential impacts and risk to marine fauna including turtles from changes in water quality from unplanned discharges of chemicals and hydrocarbons are low. The proposed activity is not inconsistent with recovery plan for marine turtles, as impacts and risks associated with unplanned discharges of chemicals and hydrocarbons were considered in the Environmental Risk Assessment, and a range of control measures were identified and adopted during the ALARP assessments, as detailed below.

8.6.4 Control Measures

The clearly defined regulatory, corporate and industry (good practice) preventative controls accepted by BHP to manage the risks associated with the unplanned discharge of chemicals and minor volumes of hydrocarbons are detailed below:

Table 8-23: Unplanned chemical and hydrocarbon discharge – control measures

Control Measure	Source of Requirement / Good Practice
Preventative Controls	
Bundling of equipment & chemicals	MODU Operator system & procedures

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Control Measure	Source of Requirement / Good Practice
	BHP procedures and standards
Spill clean-up equipment	MODU Operator system & procedures BHP procedures and standards
Preventative Maintenance System (PMS)	MODU Safety Case & Management System Vessel Preventative Maintenance System
Diesel / liquid chemical bunkering checklist	EPBC 2005/2034 condition 1 (a)iii; and BHP procedures and standards – Drilling and Completions Marine Standard (DR-STD-PET-DC-0209)
Additional Opportunistic Controls	
None identified	-

8.6.5 Demonstration of ALARP

The potential for an unplanned discharge of chemicals or a minor spill during the *Pyrenees Phase 4 Infill Drilling Program* is considered a ‘Type A’ (lower order) risk based upon the Decision Context described in Section 6.1.1 of this EP. Given the routine nature of hydrocarbon and chemical handling aboard the MODU and AHTS vessel and the controls detailed above being consistent with both regulatory requirements (including EPBC 2005/2034 condition 1 (a)iii) and industry good practice, BHP considers the impact has been managed to ALARP and no further detailed engineering evaluation of alternate, additional or improved controls are required.

8.6.6 Demonstration of Acceptability

BHP is satisfied that when the accepted controls detailed above are implemented the environmental performance outcome (EPO) of “No accidental release of chemicals or hydrocarbons to the marine environment” will be met, therefore BHP considers the impact to be managed to an acceptable level. Additionally, consideration of listed species recovery plans, conservation advice and threat abatement plans relevant to chemical discharge/oil spills, marine pollution, and habitat degradation/modification (Table 4-12) have informed the development of control measures.

No concerns or objections regarding the potential for minor chemical or hydrocarbon spills during the activity have been raised by relevant stakeholders.

8.7 Unplanned Discharges – Solids

8.7.1 Summary of Risk Assessment and Evaluation

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Decision Context	Acceptability
Accidental release of solid objects overboard	Loss of solid waste or equipment overboard due to improper waste management or handling error.	Impacts to marine fauna (e.g. ingestion, entanglement) and seabed disturbance if object heavy enough to sink to the seabed. Dropped objects can occur (albeit highly unlikely) during cargo transfer operations.	10	Unlikely (0.1)	1	Type A Lower Order Risk	Tolerable

8.7.2 Source of Risk

The handling and storage of solid materials and waste on-board the MODU and AHTS vessels has the potential for accidental overboard release. In the normal course of operations, solid waste will be stored on the vessel until it is transported via port facilities for appropriate disposal at licensed on shore facilities. However, accidental releases to the marine environment are a possibility, especially in rough ocean conditions and high winds, when items have the potential to roll off or be blown off the deck, if not appropriately stored or secured.

General non-hazardous waste include general domestic and galley waste and recyclables such as scrap materials, cardboard packaging, wood, paper and empty containers. Volumes of non-hazardous waste generated on the vessels are generally low. Hazardous wastes are defined those wastes that are or contain ingredients harmful to health or the environment. Hazardous wastes likely to be generated on-board the vessel includes oil contaminated materials (e.g., sorbents, filters and rags), chemical containers and batteries, medical wastes, paints and aerosol cans. The volumes of hazardous wastes generated are relatively small.

Solid objects/ equipment has the potential to be accidentally released overboard from manual handling errors or unsecure/ unbalance loads during lifts. All non-buoyant solid waste material or dropped objects/ equipment are expected to remain within the operational area as they sink through the water column and settle on the seabed. Buoyant waste material lost overboard could potentially be carried by ocean currents beyond the operational area.

8.7.3 Environmental Impact Assessment

The known and potential impacts to the marine environment from the accidental release of hazardous solid waste/ materials and dropped objects include:

- Marine pollution and contamination (and a temporary and localised reduction in water quality);
- Ecotoxicological effects, injury or fatality of marine fauna through ingestion of, and entanglement in marine debris;
- Smothering of benthic habitats, if dropped object is heavy enough to sink to the seabed.

Heavier solid hazardous materials and objects/ equipment accidentally released overboard would sink to the seabed in the operational area. The area of impact would be limited to the footprint (size) of the object with physical disturbance to the benthic sediments and communities beneath the object. Unless retrieved, the disturbance would remain until the object eventually breaks down and disintegrates, which could potentially be many years, dependent on the waste material. There are no sensitive or unique marine habitats in the

operational area and the consequence to benthic habitats and invertebrate communities is considered to be highly localised and negligible.

Marine debris is one of the world’s five major marine pollutants (ANZECC, 1995) and is increasing worldwide. Harmful marine debris refers to all land-source garbage, plastics and floating non-biodegradable material that may cause harm to vertebrate marine species, including marine turtles, birds, marine mammals, fish, sharks and rays. During the infill drilling activities, there is the potential for impacts on marine fauna that come into contact with buoyant solid objects, such as packaging, plastic objects, etc. accidentally released overboard. Such objects could potentially be carried by ocean currents beyond the operational area.

Injury and fatality to vertebrate marine life caused by ingestion of, or entanglement in harmful debris was listed as a key threatening process under the EPBC Act in August 2003. Floating non-biodegradable marine debris has been highlighted as a threat to marine turtles, whales, whale sharks, albatrosses and giant petrels in the relevant recovery plans and approved conservation advice (refer to previous Table 4-12). The plans, conservation advice and the *Threat Abatement Plan for the Impacts of Marine Debris on the Vertebrate Wildlife of Australia’s Coasts and Oceans* (DoEE, 2018) have specified a number of recovery objectives and actions to help combat this threat.

The disposal of plastic materials at sea is totally prohibited by the International Convention for the Prevention of Pollution from Ships (MARPOL) to which Australia is a signatory. Given the typically small volumes of solid wastes that may be accidentally released during any given event, potential impacts to sensitive species are expected to be restricted to individual animals. Many of the vertebrate species considered vulnerable to marine debris occur seasonally or expected to occur in low densities (transiting the operational area).

8.7.4 Control Measures

The clearly defined regulatory, corporate and industry (good practice) preventative controls accepted by BHP to manage the risks associated with the unplanned discharge of solids are detailed below:

Table 8-24: Unplanned solids discharge – control measures

Control Measure	Source of Requirement / Good Practice
Preventative Controls	
Preventative Maintenance System (PMS)	MODU Safety Case & Management System Vessel Preventative Management System
MODU Safety Case (NOPSEMA accepted)	Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009; MODU Operator system & procedures
BHP Waste Management Plan	MARPOL 73/78 Annex III and V: Marine Order 94 (Packaged Harmful Substances) & Marine Order 95 (Garbage); and BHP procedures and standards
Additional Opportunistic Controls	
None identified	-

8.7.5 Demonstration of ALARP

The potential for an unplanned release of solid waste or objects during the *Pyrenees Phase 4 Infill Drilling Program* is considered a ‘Type A’ (lower order) risk based upon the Decision Context described in Section 6.1.1 of this EP. Given the routine nature of lifting and transfer operations aboard the MODU and AHTS vessel and the controls detailed above being consistent with both regulatory requirements and industry good practice, BHP considers the impact has been managed to ALARP and no further detailed engineering evaluation of alternate, additional or improved controls are required.

8.7.6 Demonstration of Acceptability

BHP is satisfied that when the accepted controls detailed above are implemented the environmental performance outcome (EPO) of “No unplanned release of solid waste or objects to the marine environment” will be met, therefore BHP considers the impact to be managed to an acceptable level. Additionally, consideration of listed species recovery plans, conservation advice and threat abatement plans relevant to the impacts of marine debris (Table 4-12) have informed the development of control measures.

No concerns or objections regarding the potential for the unplanned release of solid waste or objects during the activity have been raised by relevant stakeholders.

8.8 Marine Fauna Interaction

8.8.1 Summary of Risk Assessment and Evaluation

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Decision Context	Acceptability
Interaction with marine fauna	Accidental collision between AHTS vessels and marine fauna	Potential lethal impact or injury to protected marine species.	10	Highly Unlikely (0.03)	0.3	Type A Lower Order Risk	Tolerable

8.8.2 Source of Risk

The physical presence and/ or movements of the AHTS vessels in and around the operational area may present a potential hazard to slow moving marine megafauna (cetaceans, marine turtles or whale sharks). Vessel movements can result in collisions between the vessel (hull, propellers) and marine fauna, with potential impacts ranging from minor behavioural interferences (e.g. avoidance) to severe impacts such as injury and mortality through vessel strikes. Potential behavioural responses to underwater noise emissions during the petroleum activity are discussed in Section 7.6.

The AHTS vessels will be either stationary or moving at low speeds when supporting the MODU. The risk period is restricted to the duration that a vessel is on location in the operational area (intermittently over 3-4 months).

8.8.3 Environmental Impact Assessment

Considering the limited vessel movements associated with supporting the infill drilling activity and the low vessel speeds in the operational area, it is unlikely that the activity will have a significant impact on migratory fauna species or other transiting marine fauna that may be present. In the highly unlikely event of a whale or turtle mortality, the effect is not likely to be significant (as defined by EPBC Act significance impact guidelines) at the population level.

Vessel collisions have been known to contribute to the mortality of marine fauna including resident and migrating turtles (Hazel and Gyuris, 2006; Hazel *et al.*, 2007) and migratory whales (Laist *et al.*, 2001; Jensen and Silber, 2003). For both whales and turtles, the risk of lethal collision is a function of abundance of animals in the area of operations, probability of a collision and the probability of that collision being fatal.

Cetaceans

The Conservation Management Plan (CMP) for the Blue Whale (DoE, 2015a) identifies vessel disturbance as a potential threat to the blue whale. The CMP states, vessel disturbance can occur in the form of collisions or by disrupting the behaviour of animals. Vessel collision can lead to mortality or significant injury, and could impede recovery of blue whale populations. Vessel disturbance or collisions can result from industrial, recreational or commercial activities including whale watching.

The likelihood of vessel-whale collision being lethal is influenced by vessel speed. The risk of a collision causing mortality of the whale increases as the vessel speed increases (Laist *et al.*, 2001; Jensen and Silber, 2003). Vanderlaan and Taggart (2007) found that the chance of lethal injury to a large whale as a result of a vessel strike declines from 80% at 15 knots to about 20 % at 8.6 knots.

The AHTS vessels are either stationary or moving slowly (~4 knots) in the operational area, hence the chance of a vessel-whale collision resulting in lethal outcome within these waters is much reduced. According to the data of Vanderlaan and Taggart (2007), it is estimated that the risk is less than 10% at a speed of 4 knots. Vessel-whale collisions at this speed are uncommon and, based on reported data contained in the US National Ocean and Atmospheric Administration database (Jensen and Silber, 2003) there only two known instances of collisions when the vessel was travelling at less than 6 knots, both of these were from whale watching vessels that were deliberately placed amongst whales.

The reaction of whales to the approach of a vessel is quite variable. Some species remain motionless when in the vicinity of a vessel while others are known to be curious and often approach vessels that have stopped or are slow moving, although they generally do not approach, and sometimes avoid, faster moving vessels (Richardson *et al.*, 1995).

Four threatened species of cetacean were identified as potentially occurring in, or have habitat in the operational area: the sei whale, pygmy blue whale, fin whale, and Southern right whale. A further four migratory species were identified as potentially occurring in the operational area: the Orca, Bryde's whale, humpback whale and Sperm whale. The operational area intercepts BIAs for the pygmy blue whale (part of the migratory corridor) and the humpback whale (migratory corridor). The worst-case consequence from a vessel strike would be the fatality of a single EPBC Act-listed individual species, however as they would represent an individual within the local population it is not expected that it would result in a decreased population size. However, considering the low vessel movements and low vessel speeds in the operational area, it is unlikely there would be a significant impact on cetaceans at the population level.

Whale Sharks

Whale sharks are at risk from vessel strikes as they spend time feeding at the sea surface. Whale sharks may traverse offshore NWS waters including the operational area during their migrations to and from aggregation areas along the Ningaloo coast and the operational area intercepts the foraging BIA for the species. Seasonal aggregations along the Ningaloo coast can be variable although usually between March and July, with peak numbers recorded in April and May (Sleeman *et al.*, 2010). Outside of this period, individual may still be present.

Turtles

There is no available data on factors affecting the likelihood of a vessel-turtle collision being lethal. It is reasonable to assume that the higher the speed of collision, the greater the risk of mortality, but contact with the propeller would be lethal at almost all speeds. Studies have shown that turtles are less likely to flee from a fast moving vessel, presumably because of poor hearing and visual senses than from a slow-moving vessel (Hazel *et al.*, 2007).

Five listed threatened and migratory species of marine turtle were identified as potentially occurring in, or have habitat in the operational area: green, flatback, hawksbill, leatherback and loggerhead turtles. Marine turtles are predominantly oceanic species except in the nesting season when they come ashore. There are no shorelines near the operational area, but marine turtles may transit the operational area to forage on nearby reefs with the closest nesting areas >27 km away (Muiron Islands and North West Cape: green, hawksbill and loggerhead turtles). In addition, the operational area intercepts BIAs for green, hawksbill, loggerhead and flatback turtles, and critical habitat (inter-nesting) for flatback turtles.

Considering the limited vessel movements and the low speeds in the operational area, it is unlikely that presence of the vessel will have a significant impact on turtles at the population level.

Species Recovery Plans and Approved Conservation Advice

BHP has considered information contained in relevant recovery plans and approved conservation advice for cetaceans and marine turtles that identify vessel strike as a threat (Table 4-12).

BHP has evaluated the impacts and risks associated with vessel strike and vessel disturbance. BHP considers the proposed activity is not inconsistent with recovery plans for cetaceans, the Conservation Management Plan (CMP) for the Blue Whale or recovery plans for marine turtles, as impacts and risks associated with

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marine fauna interaction were considered in the Environmental Risk Assessment, and a range of preventative controls were identified and adopted during the ALARP assessments, as detailed below.

8.8.4 Control Measures

The clearly defined regulatory, corporate and industry (good practice) preventative controls accepted by BHP to manage the risks associated with unplanned marine fauna interactions are detailed below:

Table 8-25: Unplanned marine fauna interactions – control measures

Control Measure	Source of Requirement / Good Practice
Project Induction	EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans (modified to include whale sharks and turtles*); and EPBC 2005/2034 condition 1 (a) iv
BHP APU Whale, Dolphin and Whale Shark Sightings Cards	EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans (modified to include whale sharks and turtles*); EPBC 2005/2034 condition 1 (a) v: and NOPSEMA Bulletin – ‘Recording and Reporting MMO Data’ *Extend to turtles a modified version of the avoidance procedure in place for whales. The procedure would prohibit intentionally travelling greater than 6 knots within 50 m of a turtle and not knowingly approach closer than 25 m to a turtle (note difference in distance compared to whales is due to practical limitation on sighting turtles in the open ocean). These additional control measures would not incur any additional cost, except on occasions when turtles approach within the caution zone. Conservation Management Plan (CMP) for the Blue Whale (Action Area A.4)
Additional Opportunistic Controls	
Avoid periods of marine fauna sensitivity (e.g. whale migration)	No specific requirements identified. The benefit that may accrue from avoiding periods of peak whale density is considered to be negligible based on the simple observation that even with all the oil and gas development (and associated vessel movements) occurring in the Exmouth Basin over the last ten years the humpback whale population (Stock IV) has grown at an estimated 10% per year to the point where IUCN have removed the humpback whales from the threatened category and there have been no recorded cases of whale-vessel collisions. As discussed previously, Bejder <i>et al.</i> (2015) found the population abundance of eastern and western Australian humpback whales has recovered to more than approximately 50% of their pre-whaling abundance and argued that, based on meeting the eligibility criteria for removing a species from any category in the list of threatened species under the EPBC Act, the available scientific evidence does not support the listing of humpback whale populations on the EPBC Act list of Threatened species. Further, population estimates indicate blue whale populations have been recovering despite current levels of industry and shipping inside foraging BIAs (McCauley <i>et al.</i> 2018). The Australian Government removed the humpback whale from the threatened species list in February 2022, however the species remains protected under the EPBC Act. The cost that would be associated with avoiding periods of peak whale density is highly variable ranging from no cost, should it happen coincide with vessel availability, to several millions of dollars if it requires placing contracted vessels on stand-by. Given that the procedures proposed for preventing vessel-whale collisions have been demonstrated to be effective it is considered that the potential cost of additional control of varying the timing of the activities to avoid peak whale abundance is grossly disproportionate to the negligible benefit that may accrue. Control rejected.
Passive acoustic monitoring to detect cetaceans in the vicinity of the vessels	The cost of a PAM system has been estimated to be unacceptably high and would require several permanent mooring locations in the operational area with real time monitoring and analysis. Given that AHTS vessels would be stationary for the most part or moving slowly within the operational area (hence little chance of strike) it is considered that the cost is grossly disproportionate to the benefit that may gained. Control rejected.
In field marine mammal observations	Marine mammal observation undertaken within the permit area during the mobilisation of the MODU to and from the operational area would assist in detecting the potential presence of cetaceans within the operational area and further reduce the risk of vessel strike. Additionally, opportunistic marine mammal observations undertaken by the MODU and vessel crews for the duration of the activity may assist in detecting cetaceans potentially entering the operational area.

Control Measure	Source of Requirement / Good Practice
	The cost and effort associated with allocating existing crew members to undertake and record marine mammal observations whilst in field is considered both reasonable and practicable. Control accepted.

8.8.5 Demonstration of ALARP

The potential for an unplanned marine fauna interactions during the *Pyrenees Phase 4 Infill Drilling Program* is considered a ‘Type A’ (lower order) risk based upon the Decision Context described in Section 6.1.1 of this EP. Given the routine nature of AHTS vessel operations and the controls detailed above being consistent with both regulatory requirements (including EPBC 2005/2034 condition 1 (a) iv) and industry good practice, BHP considers the impact has been managed to ALARP and no further detailed engineering evaluation of alternate, additional or improved controls are required. Additional opportunistic controls have been considered but not adopted.

8.8.6 Demonstration of Acceptability

BHP is satisfied that when the accepted controls detailed above are implemented the environmental performance outcome (EPO) of “No physical and/or observable biologically significant behavioural disturbance on protected species (including breeding, foraging, resting or migration)” will be met, therefore BHP considers the impact to be managed to an acceptable level. Additionally, consideration of listed species recovery plans, conservation advice and threat abatement plans relevant to the impacts of Vessel disturbance/ strike (Table 4-12) have informed the development of control measures.

No concerns or objections regarding the potential for marine fauna interaction during the activity have been raised by relevant stakeholders.

8.9 Introduction of Invasive Marine Species

8.9.1 Summary of Risk Assessment and Evaluation

Aspect	Source of Risk	Potential Impact	Severity Factor	Likelihood Factor	Residual Risk	Decision Context	Acceptability
Introduced marine species	Movement of MODU, AHTS vessels and immersible equipment from known high invasive marine species risk areas	Introduction of invasive marine species to area leading to major impact to native species.	100	Highly Unlikely (0.03)	3	Type A Low Order Risk	Tolerable

8.9.2 Source of Risk

Biofouling on immersed surfaces (e.g. ship hulls), floating/ immersible equipment and within internal seawater circulation systems, as well as ballast water, are potential pathways for invasive marine species (IMS) to translocate on offshore vessels.

There is the potential for the transfer of IMS from international waters into the operational area, however, given the water depths it is unlikely that IMS would establish in the local environment. There is a smaller risk of transfer of IMS from Australian waters.

The contracted MODU is located within the North-West shelf region and will remain in Australian waters prior to the commencement of the activity. Likewise, it is likely that the AHTS vessels would be mobilised to site from within the region.

Ballast Water

The Commonwealth Department of Agriculture, Water and the Environment (DAWE) is the lead agency for management of ballast water, with responsibility (formerly the Department of Agriculture). Vessels manage ballast water in accordance with International Maritime Organisation (IMO) Ballast Water Management (BWM) Convention, IMO Guidelines, the mandatory Australian Ballast Water Management Requirements (Rev 8) are enforced under the *Biosecurity Act 2015* and associated local measures intended to minimise the risk of transplanting harmful aquatic organisms and pathogens from ships' ballast water and associated sediments, while maintaining ships safety. Contracted vessels have individual Ballast Water Management Plans.

Vessels arriving from overseas, intending to discharge trim or ballast water in coastal Australian waters are required to have undertaken a ballast water exchange in accordance with Department of Agriculture, Water Resources requirements. The Australian Ballast Water Management Requirements (Rev 8) are now aligned with the (BWM) Convention:

- All vessels must carry a valid Ballast Water Management Plan;
- Vessels with a ballast water management system (BWMS) should also carry a Type Approval Certificate specific to the type of BWMS;
- All vessels must submit a Ballast Water Report. Vessels intending to discharge ballast are obligated to report;
- International vessels can submit a Ballast Water Report through the Maritime Arrivals Reporting;
- System (MARS) at least 12 hours prior to arrival;
- All vessels must maintain a complete and accurate record of all ballast water movements; and

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- Domestic trading vessels can request a low risk exemption through a Domestic Risk Assessment. All applications must be submitted through MARS.

From September 2019, all vessels that use ballast water are required to meet the Regulation D2 discharge standard of the International Convention for the Control and Management of Ships' Ballast Water and Sediments (the Convention) at their next renewal survey. Vessels using ballast water exchange as their primary ballast water management method are required to phase out this management method and meet the Regulation D2 discharge standard. Vessels may meet this standard by installing an International Maritime Organisation (IMO) Type Approved ballast water management system, or as specified within the Convention. The contracted MODU has an exemption to postpone the installation of the Ballast Water Treatment System to meet Regulation D2, and currently holds a Ballast Water Management Certificate verifying compliance with Regulation D1. Upgrades to the MODU are scheduled following the completion of the Pyrenees Infill Drilling Program and once the MODU exits Australian Commonwealth waters.

The AHTS vessels will exchange ballast water outside ports where possible.

The proposed control measures for IMS introduced by ballast water are consistent with the Australian Ballast Water Management Requirements (Rev 8). They are also consistent with good oilfield practice.

Biofouling

Biofouling on vessel hulls, external niche areas and immersible equipment pose a potential risk of IMS in Australian waters. Under the National Biofouling Management Guidelines for the Petroleum Production and Exploration Industry and IMO Guidelines for the control and management of ships' biofouling to minimise the transfer of invasive aquatic species (resolution MEPC.207(62), DAWR and DoEE guidelines and APU IMS Management Procedure a risk assessment approach is applied to manage biofouling.

The BHP APU IMS Management Procedure outlines:

- Regulatory Framework for management of IMS;
- Identify BHP's marine activities at risk of facilitating introduction/translocation of IMS into WA and Commonwealth waters;
- BHP and Contractors roles and responsibilities;
- The BHP IMS Risk Assessment & Approval Procedure (AOHSE-E-0018-001) for assessing vessel and immersible equipment for IMS risk that is in alignment with NOPSEMA's Information Paper (IP1899) on '*Reducing Marine Pest Biosecurity Risks through Good Practice Biofouling Management*' (NOPSEMA, 2020). The BHP IMS Risk Assessment & Approval Procedure (AOHSE-E-0018-001) considers the following variables:
 - History of the vessel, including destination and time spent in last port of call;
 - Equipment deployment and cleaning history;
 - Status of anti-fouling coating and marine growth protection system;
 - Independent biofouling inspection results and timing; and
 - Ballast water management including water exchange and origin.
- Management and mitigation measures to prevent IMS incursions and manage identified bio-fouling pre hire and post-mobilisation.
 - All contracted vessels are required to complete the BHP IMS risk assessment process described in this procedure. The IMS risk assessment assigns a final risk category of low, moderate, uncertain or high) to vessels based on a range of information listed above. If a risk category of moderate, uncertain or high is scored, a range of management options are available including inspections, cleaning or treatment of internal seawater systems.
 - Provide all documentation to BHP during the Marine Management Process prior to hire; and
 - Any vessel contracted for greater than 12 months will be audited annually.

8.9.3 Environmental Impact Assessment

The present knowledge base is inadequate to produce a detailed character profile of all marine organisms that may be translocated by shipping beyond their natural range. Ruiz *et al.* (2000) have analysed the common factors influencing success of translocated marine pests. The majority of marine pest species appear to have planktotrophic larvae, however oviparous species are included. Many of them are epibenthic fouling species but some are soft substratum burrowers or planktonic. It seems likely that many of them are transported as ship bottom fouling organisms rather than as propagules in ballast water.

Assessment of environmental risk has considered the probability of introduction of marine pest species between the source and destination and the similarity of source and discharge habitats:

- The probability of introduced species from the Central Indo-West Pacific Province surviving in the area is low, but if they were to be dispersed to the coastal habitats the probability of survival would be high.
- The potential ecological effect of this relatively high survival potential may be mitigated by the similarity of the marine species of the region; and
- The probability of introduced species from the more distant South Japan, East African, North Indian and Pacific Islands Provinces surviving in the area also is low. If they were dispersed to coastal habitats the impact would be moderate to major, given the greater number of sister and analogue species that could damage the receiving ecosystems.

IMS may also be economically damaging, including direct damage to assets (fouling of vessel hulls and infrastructure), depletion of commercial marine species, and damage to recreational values of the area (tourism and recreational fishing). Furthermore, once introduced to an area, eradication or control of introduced species may be difficult, expensive and disruptive or damaging to other marine life.

8.9.4 Control Measures

Given the offshore location in water depths of approximately 200 m, the potential introduction of invasive marine species during the *Pyrenees Phase 4 Infill Drilling Program* is considered a 'Type A' (lower order) risk based upon the Decision Context described in Section 6.1.1 of this EP. The clearly defined regulatory, corporate and industry (good practice) controls accepted by BHP to manage the risks associated with the introduction of invasive marine species are detailed below:

Table 8-26: Introduction of invasive marine species – control measures

Control Measure	Source of Requirement / Good Practice
International Anti-Fouling System Certificate for each AHTS vessel	Marine Orders 8 - Part 98: Marine Pollution - Anti-fouling Systems: International Convention on the Control of Harmful Anti-fouling Systems on Ships (IMO, 2001).
MODU and AHTS vessels have: Ballast Water Management Plan: Exchange ballast water outside 12 nmi from the nearest land in water depths greater than 50 m or treat ballast water using approved ballast water treatment system	<i>Biosecurity Act 2015</i> , Biosecurity (Ballast Water and Sediment) Determination 2017 Australian Ballast Water Management Requirements (Rev 8)
MODU and AHTS vessels have: Ballast Water Management Certificate	
Ballast Water Record System with a minimum of 2 years records retained on board	

Control Measure	Source of Requirement / Good Practice
AHTS vessels have: Biofouling Management Plan and record book consistent with IMO Biofouling Guidelines.	Australian Biofouling Management Requirements (Proposed) consistent with International Maritime Organization (IMO) 2011 Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species
Cleaning of Submersible Equipment Submersible equipment cleaned of biofouling prior to entry to operational area	National Biofouling Management Guidelines for the Petroleum Production and Exploration Industry (Marine Pest Sectoral Committee, 2018)
BHP Introduced Marine Species Risk Assessment and Approval Procedure (AOHSE-E-0018-001)	BHP procedures and standards consistent with IMO Guidelines
Additional Opportunistic Controls	
None identified	-

8.9.5 Demonstration of ALARP

Given the potential introduction of invasive marine species during the *Pyrenees Phase 4 Infill Drilling Program* is considered a 'Type A' (lower order) risk and there are clearly defined and applicable regulatory, corporate and industry good practice controls to manage the risk, BHP considers the risk has been managed to ALARP and no further detailed engineering evaluation of alternate, additional or improved controls is required.

8.9.6 Demonstration of Acceptability

All identified regulatory, corporate and industry good practice controls have been accepted for implementation. Consideration of actions prescribed in list species recovery plans, conservation advice and threat abatement plans (Table 4-12) have been assessed. While a number of these consider the threat of habitat degradation and modification, none are specifically relevant to the potential introduction and establishment of invasive marine species within the operational area. Other aspects of the activity relevant to these plans and advices are detailed within subsequent sections of this EP.

BHP is satisfied that when the accepted controls are implemented the environmental performance outcome (EPO) of "No introduction of invasive marine species" will be met, therefore BHP considers the impact to be managed to an acceptable level.

9 Environmental Performance

The following EPOs, EPSs and measurement criteria have been established to manage the environmental impacts and risks associated with the activity assuming the implementation of the accepted control measures detailed in Sections 7 & 8.

9.1 Environmental Performance: Planned Activities

Table 9-1: Environmental performance – physical presence

Physical Presence			
Environmental Performance Outcome	EPO 01: No unplanned vessel interactions (including collision) or interference with defence activities.		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 01	Navigation equipment (including lighting, compass/radar), bridge and communication equipment will be compliant with appropriate marine navigation and vessel safety requirements.	Completed Vessel Assurance Questionnaire for each vessel prior to entering field demonstrating compliance with relevant Marine Orders and confirming functioning navigation equipment.	BHP Logistics Supervisor
EPS 02	Automatic Identification System (AIS) shall be fitted aboard both the MODU and AHTS vessels and maintained in accordance with Regulation 19-1 of Chapter V of SOLAS.	Completed Vessel Assurance Questionnaire for each vessel prior to entering field demonstrating compliance Regulation 19-1 of Chapter V of SOLAS.	Vessel Master / MODU Operator
EPS 03.1	Stakeholder Communication: The following notifications shall be issued:	Documented notification to AHO and AMSA’s JRCC within required timeframes prior to undertaking the activity.	MODU OIM / BHP Drilling Superintendent

Physical Presence			
Environmental Performance Outcome	EPO 01: No unplanned vessel interactions (including collision) or interference with defence activities.		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
	<ul style="list-style-type: none"> Australian Hydrographic Office (AHO) shall be notified no less than four working weeks prior to commencement of activity in order to promulgate 'Notice to Mariners' to be published; AMSA's JRCC will be notified at least 24-48 hours prior to commencement of the activity to enable AMSA to distribute an AUSCOAST warning. Notification shall include: MODU's details (including name, callsign and Maritime Mobile Service Identity), satellite communications details (including INMARSAT-C and satellite telephone), and location of activity / operational area (500 m RSEZ & 2 km cautionary zone). Department of Mines, Industry Regulation and Safety (DMIRS) pre-start notification confirming the start date of the proposed activity and a cessation notification to inform DMIRS upon completion of the activity; and Department of Defence at least 5 weeks prior to the commencement of activities via Offshore.Petroleum@defence.gov.au 		
EPS 03.2	<p>Stakeholder Communication:</p> <p>Prior to undertaking the activity, relevant Stakeholders shall be notified of the proposed activity location, scope and timing including:</p> <ul style="list-style-type: none"> The Community Reference Group (CRG); The DPIRD (Western Australia) (formally the WA Department of Fisheries); Other relevant or interested Stakeholders identified via Stakeholder consultation 	<p>Consultation records confirm relevant Stakeholder informed of proposed activity scope and timing prior to undertaking the activity.</p> <p>Meeting minute records maintained of CRG meetings, which includes summary of proposed activities.</p>	BHP HSE Specialist
EPS 03.3	<p>Stakeholder Communication:</p> <p>Relevant Stakeholders requiring ongoing consultation regarding the physical presence of the MODU during the activity shall be supplied information</p>	<p>Consultation records confirm ongoing consultation with</p>	BHP HSE Specialist

Physical Presence			
Environmental Performance Outcome	EPO 01: No unplanned vessel interactions (including collision) or interference with defence activities.		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
	consistent with requirements identified during the Stakeholder consultation process (as detailed in Section 5 and 10.5.1 of this EP).	relevant Stakeholders undertaken during the activity.	
EPS 04	<p>Rig Safety Exclusion Zone:</p> <p>When moored on location within the operational area:</p> <ul style="list-style-type: none"> A 500-m rig safety exclusion zone (RSEZ) shall be established and monitored around the MODU; and Entry into the RSEZ shall be managed via the Control Room aboard the MODU. 	<p>MODU Marine Logbook records demonstrating:</p> <ul style="list-style-type: none"> Managed & safe entry of AHTS vessels into RSEZ 	MODU OIM (or delegate)
EPS 05.1	<p>Training & Competency:</p> <p>AHTS vessels' and MODU crew undertaking vessel bridge-watch shall be qualified in accordance AMSA Marine Order Part 3: Seagoing Qualifications or certified training equivalent.</p>	Completed Vessel Assurance Questionnaire for each vessel prior to entering field demonstrating compliance with AMSA Marine Order Part 3: Seagoing Qualifications	Vessel Master / MODU OIM (or delegate)
EPS 06	<p>SIMOPs Plan:</p> <p>A Pyrenees field simultaneous operations (SIMOPS) Plan shall be in place during the proposed activities to manage potential vessel interactions between other project vessels servicing the Pyrenees Venture FPSO or undertaking other field activities. The SIMOPS Plan shall detail the requirement for Permit to Work (PTW) system for all activities with the potential to interact within the Pyrenees. within the safety zone</p>	PTW records demonstrate potential SIMOPS interactions approved and signed by the Ultimate Work Authority.	Pyrenees Field Manager (Ultimate Work Authority)

Table 9-2: Environmental performance – benthic habitat disturbance

Benthic Habitat Disturbance			
Environmental Performance Outcome	EPO 02: Benthic habitat and biota disturbance limited to operational area		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 07.1	<p>Rig Mooring & Positioning Plan:</p> <p>Consistent with EPBC 2005/2034 condition 1 (b)ii Prior to mobilisation, a Rig Move and Positioning Plan shall be developed inclusive of:</p> <ul style="list-style-type: none"> • A site-specific mooring analysis consistent with API RP 2SK – ‘Mooring Analysis’ identifying the type, number and size of mooring equipment required to secure the MODU on location; • Provision for mooring tension monitoring aboard the MODU consistent with ISO 19901-7:2013 – ‘mooring tensioning’; • Pre-identified mooring locations within the 2 km operational area including consideration of avoidance of existing subsea infrastructure; • Evaluation of site survey results considering the avoidance of benthic assemblages prior to positioning mooring equipment on the sea floor and the potential for UXO when undertaking a detailed mooring safety risk assessment prior to MODU mobilisation.; • Consistent with the requirements of section 572 of the OPGGS Act, all mooring equipment shall be removed from the seabed upon completion of the infill drilling activity. 	<p>Documented Rig Move and Positioning Plan inclusive of identified performance standards.</p> <p>MODU control room logbook documenting monitoring of mooring tensions or validate of electronic monitoring via MODU inspection;</p> <p>Site survey evaluation records and final deployment location considering benthic assemblages;</p> <p>Mooring safety risk assessment records considering potential UXO risk;</p> <p>Drilling Report confirming removal of all mooring equipment following activity completion.</p>	BHP Drilling Superintendent / MODU OIM (or delegate)

Table 9-3: Environmental performance – noise emissions

Noise Emissions			
Environmental Performance Outcome	EPO 03: No physical and/or observable biologically important behavioural disturbance on protected species (including breeding, foraging, resting or migration)		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 08.1	<p>Project Induction: Contracted Vessel Crew shall undertake a project-specific induction covering EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans (modified to include whale sharks and turtles) to inform the following requirements for AHTS vessel whilst conducting activities in the operational area:</p> <ul style="list-style-type: none"> • Vessels shall not knowingly travel greater than 6 knots within 300 m of a cetacean, whale shark or turtle (caution zone) and minimise noise; • Vessels shall not knowingly approach closer than 100 m for a large whale or whale shark, or 50 m of a dolphin or turtle (except for bow riding); • Vessel Masters identifying a cetacean/ whale shark showing signs of being disturbed, shall immediately withdraw from the caution zone at a constant speed of less than 6 knots; and • Vessels shall move at a constant slow speed and with minimal noise away from a cetacean that is approaching so that the vessel remains at least 300 m from the cetacean. 	Environment induction attendance records demonstrate vessel crews are aware EPBC Regulations 2000 Part 8 Division 8.1 (and EPBC 2005/2034 condition 1 (a) iv).	BHP HSE Specialist / Logistics Supervisor
EPS 08.2	<p>Project Induction: Contracted aircraft service providers shall be provided a project-specific induction material covering EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans (modified to include whale sharks and turtles) to inform the following requirement for aircraft transiting to and from the MODU: Whilst entering or departing the operational area helicopters shall not fly lower than 1,650 ft when within 500 m horizontal distance of a cetacean except when landing or taking off and shall not approach a cetacean from head on.</p>	Records confirming EPBC Regulations 2000 Part 8 Division 8.1 (and EPBC 2005/2034 condition 1 (a) iv) relating to helicopter flight requirements relayed to aircraft service providers.	BHP HSE Specialist / Logistics Supervisor

Noise Emissions			
Environmental Performance Outcome	EPO 03: No physical and/or observable biologically important behavioural disturbance on protected species (including breeding, foraging, resting or migration)		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 09	<p>BHP APU Whale, Dolphin and Whale Shark Sightings Cards:</p> <p>Whilst undertaking petroleum activities AHTS Vessel and MODU Crew shall be requested to complete and submit BHP APU Whale, Dolphin and Whale Shark Sightings Cards upon sighting cetaceans and whale sharks. The completed cards are to be consolidated by the Vessel Master / MODU OIM (or delegate) and forwarded to the BHP APU HSE Team for reporting to DAWE.</p>	Completed BHP APU Whale, Dolphin and Whale Shark Sightings Cards consolidated and reported to DAWE.	<p>BHP HSE Specialist</p> <p>Vessel Master (or delegate)</p> <p>MODU OIM (or delegate)</p>
EPS 10.1	<p>Preventative Maintenance System (PMS):</p> <p>Whilst undertaking the activity, all engines, compressors and machinery aboard the MODU shall be maintained in accordance with Rig Contractor PMS with the aim of limiting unnecessary noise emissions from equipment.</p>	Drilling Contractor PMS records	MODU OIM (or delegate)
EPS 10.2	<p>Preventative Maintenance System (PMS):</p> <p>Whilst undertaking the activity, all engines, compressors and machinery aboard the AHTS vessels shall be maintained in accordance with Vessel Operator PMS with the aim of limiting unnecessary noise emissions from equipment.</p>	Vessel Operator PMS records	Vessel Master (or delegate)
EPS 11.1	<p>Marine Mammal Observations</p> <p>Marine mammal observation shall be undertaken aboard both the MODU and AHTS vessels within the permit boundaries during the mobilisation of the MODU to and from the operational area and prior to flaring operations with any detection of cetaceans within the operational area used to inform adaptive management controls to avoid physical and/or biologically important behavioural disturbance.</p>	<p>Completed BHP APU Whale, Dolphin and Whale Shark Sightings Cards.</p> <p>Vessel and MODU logbooks.</p>	<p>Vessel Master (or delegate)</p> <p>MODU OIM (or delegate)</p>
EPS 12	<p>Adaptive Management</p> <p>Upon the detection of a cetacean within the operational area, the following adaptive management controls shall be implemented:</p>	<p>Vessel and MODU logbooks.</p> <p>Daily drilling report inclusive of flaring operations log.</p>	<p>Vessel Master (or delegate)</p> <p>MODU OIM (or delegate)</p>

Noise Emissions			
Environmental Performance Outcome	EPO 03: No physical and/or observable biologically important behavioural disturbance on protected species (including breeding, foraging, resting or migration)		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
	<p>Mobilisation of the MODU to / from the well location shall be ceased until no cetacean has been detected within 500 m of the mooring location for a period of 30 minutes;</p> <p>Flaring operations shall be ceased (is safe to do so) until no cetacean has been detected within 500 m of the mooring location for a period of 30 minutes; and</p> <p>AHTS vessels shall comply with EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans (modified to include whale sharks and turtles) (refer EPS 08.1).</p>		

Table 9-4: Environmental performance – atmospheric emissions

Routine and Non-Routine Atmospheric Emissions			
Environmental Performance Outcome	EPO 04: Planned atmospheric emissions limited to those necessary to undertake the activity and maintain well integrity.		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 13.1	<p>Well Operations Management Plan (WOMP) (NOPSEMA accepted):</p> <p>Pyrenees wells shall be managed in accordance with a NOPSEMA accepted WOMP, which includes well integrity management to prevent the risk of unplanned hydrocarbon releases and subsequent atmospheric emissions.</p>	Acceptance letter from NOPSEMA demonstrated WOMP accepted prior to commencement of activities.	BHP Drilling Superintendent
EPS 14.1	<p>MODU Safety Case (NOPSEMA accepted):</p> <p>Includes standard operating procedures for venting / flaring gas and waste incineration requirements onboard the MODU.</p>	Inspection records confirm standard operating procedure for venting off hydrocarbon gas volumes as required under	MODU OIM (or delegate)

Routine and Non-Routine Atmospheric Emissions			
Environmental Performance Outcome	EPO 04: Planned atmospheric emissions limited to those necessary to undertake the activity and maintain well integrity.		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
		NOPSEMA accepted MODU Safety Case.	
EPS 15	<p>Marine Order 97 (Marine Pollution Prevention – Air Pollution (as applicable to vessel class)): During the activities the follow shall apply:</p> <ul style="list-style-type: none"> • Very low sulphur fuel oil (VLSFO) (e.g. maximum 0.50% S VLSFO-DM, maximum 0.50% S VLSFO-RM) shall be used in AHTS vessels and for power generation aboard the MODU. • AHTS vessels shall hold a current International Air Pollution Prevention (IAPP) Certificate, as appropriate to vessel class. • AHTS vessels shall implement their Ship Energy Efficiency Management Plan (SEEMP) to monitor and reduce air emissions (as appropriate to vessel class). • Any equipment containing ozone-depleting substances (ODS) shall be maintained and, in the case of a vessel having rechargeable systems containing ODS, an ODS Record Book shall be maintained on board • There shall be no discharge of ODS. • No waste shall be incineration onboard the MODU. 	<p>Fuel bunkering receipts indicate only very low sulphur fuel used.</p> <p>Completed Vessel Assurance Questionnaire for each vessel prior to entering field demonstrating each vessel has:</p> <ul style="list-style-type: none"> • Valid International Air Pollution Prevention Certificate (IAPP); • Documented SEEMP and • An ODS Record Book (where applicable) is current and maintained. <p>No waste incineration recorded in the MODUs Garbage Record Book.</p>	BHP Logistics Supervisor / Vessel Master / MODU OIM (or delegate)
EPS 10.3	<p>Preventative Maintenance System (PMS):</p> <p>Whilst undertaking the activity, all engines, compressors and machinery aboard the MODU shall be maintained in accordance with Rig Contractor PMS with the aim of optimising fuel efficiency of equipment.</p>	Drilling Contractor PMS records	MODU OIM (or delegate)
EPS 10.4	<p>Preventative Maintenance System (PMS):</p>	Vessel Operator PMS records	Vessel Master (or delegate)

Routine and Non-Routine Atmospheric Emissions			
Environmental Performance Outcome	EPO 04: Planned atmospheric emissions limited to those necessary to undertake the activity and maintain well integrity.		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
	Whilst undertaking the activity, all engines, compressors and machinery aboard the AHTS vessels shall be maintained in accordance with Vessel Operator PMS with the aim of with the aim of optimising fuel efficiency of equipment.		
EPS 16	<p>Vessel Tender Process:</p> <p>BHP shall include the following within the vessel tendering (procurement) process for the infill drilling program and priority shall be afforded to:</p> <ul style="list-style-type: none"> • battery-assisted vessel options if minimum performance capacity can be demonstrated; • vessels with ‘drop-down’ thrusters; and • vessels with inbuilt fuel oil flow monitoring equipment to enable real-time fuel use monitoring; and • Vessel Operators adopting measurable fuel efficiency KPIs within vessel contracts, linked to objectives of Vessel Emission Reduction Plans (see item below). 	<p>Vessel tender records</p> <p>Vessel contract records</p>	BHP Drilling Superintendent
EPS 17	<p>Vessel Emissions Reduction Plan:</p> <p>BHP shall develop a vessel emissions reduction plan. The plan shall be developed in consultation with the vessel Operator and Master with the aim of reducing overall fuel oil consumption during the activity and include:</p> <ul style="list-style-type: none"> • a Daily Vessel Report (DVR) for monitoring vessel fuel oil consumption; • a process for review of data via the DVR; • a feedback process whereby recommendations of vessel power management systems for optimisation of the optimisation of fuel oil consumption when working in-field except whilst working within the MODU 500m RSEZ, station keeping or in port limits. 	<p>Daily Vessel Report (DVR) records</p> <p>Fuel use optimisation feedback recommendation records</p> <p>Vessel fuel consumption records</p>	BHP Drilling Superintendent / Vessel Master
EPS 18	NGER Reporting:	BHP Emission Records	BHP HSE Specialist

Routine and Non-Routine Atmospheric Emissions			
Environmental Performance Outcome	EPO 04: Planned atmospheric emissions limited to those necessary to undertake the activity and maintain well integrity.		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
	BHP will monitor atmospheric emission from the activity consistent with the National Greenhouse and Energy Reporting Act and report these emissions to the Climate Change Regulator on an annual basis.		
EPS 19	Emissions Monitoring: BHP shall monitor and record emissions from the activity to enable the tracking of performance against BHP Corporate emissions reductions targets.	BHP Emission Records	BHP HSE Specialist

Table 9-5: Environmental performance – marine discharges

Routine and Non-Routine Marine Discharges			
Environmental Performance Outcome	EPO 05: Impacts to water quality from planned discharges reduced to ALARP		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 20	<p>Macerator for putrescible waste:</p> <p>Whilst undertaking the activity putrescible and other food waste discharge from the MODU shall be macerated to ≤25 mm prior to overboard discharge and discharged >12 nmi from the territorial baseline.</p>	<p>Records confirm that putrescible waste macerated to ≤25mm within operational area.</p> <p>Maintenance records demonstrate that there is a functioning macerator onboard the MODU.</p>	MODU OIM (or delegate)
EPS 21	<p>IOPP Certificate:</p> <p>Prior to mobilisation to the operational area, BHP shall confirm that both the MODU and AHTS vessels hold current IOPP certificate.</p>	<p>MODU inspection records and completed Vessel Assurance Questionnaire for each vessel prior to entering field demonstrating each vessel holds a current IOPP certificate accordance with Marine Order 91.</p>	BHP Logistics Supervisor
EPS 22	<p>MARPOL-compliant oily water filter system:</p> <ul style="list-style-type: none"> Liquids with oil in water content exceeding 15 ppm must be contained and disposed of at a licensed onshore reception facility or to a carrier licensed to receive waste; and Liquid from drains may only be discharged if the oil in water content does not exceed 15 ppm after treatment in a MARPOL-compliant oily water filter system. 	<p>Oil in water meter must be operational as evidenced by record of calibrations prior to discharge.</p> <p>Oil Record Book is in place in accordance with Marine Order 91.</p> <p>Documented use of oil record book to record all oil requiring disposal onshore.</p>	Vessel Master / MODU OIM (or delegate)
EPS 23	<p>ISPP Certificate & Sewage Treatment Plant (STP):</p>	<p>MODU inspection records and completed Vessel Assurance Questionnaire for each vessel prior to entering field</p>	BHP Logistics Supervisor

Routine and Non-Routine Marine Discharges			
Environmental Performance Outcome	EPO 05: Impacts to water quality from planned discharges reduced to ALARP		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
	Prior to mobilisation to the operational area, BHP shall confirm that both the MODU and AHTS vessels hold current ISPP certificate and have functioning sewage treatment plants (STP).	demonstrating each vessel has a valid International Sewage Pollution Prevention (ISPP) Certificate in accordance with MARPOL Annex IV and Marine Order 96.	
EPS 24	<p>Discharge Location:</p> <p>Whilst undertaking the activity there shall be:</p> <ul style="list-style-type: none"> No discharge of untreated sewage within 12 nmi of the territorial baseline. No discharge of treated sewage within 3 nmi of the territorial baseline. No discharge of sewage to cause discoloration or visible solids. 	<p>Inspection records confirm:</p> <ul style="list-style-type: none"> No discharge of untreated sewage within 12 nmi of territorial baseline; and No discharge of treated sewage within 3 nmi of the territorial baseline. No discharge of sewage to cause discoloration or visible solids. 	Vessel Master
EPS 25	<p>Chemical Assessment Process:</p> <p>Consistent with EPBC 2005/2034 condition 1 (a) i, drilling fluids, cement products and other chemicals that may be discharged to the marine environment shall be assessed based upon the following criteria:</p> <p>Drilling fluids, cement products and other chemicals that may be discharged to the marine environment shall be assessed based upon the following criteria:</p> <p>Where Offshore Chemical Notification Scheme (OCNS) rating of D or E or a CHARM rating of Silver or Gold rated chemicals with no substitution warning intended for liquid discharge are used, no further control required;</p> <p>If other non-rated chemicals intended for liquid discharge are used, or rated chemicals with a substitution warning, chemical selection procedures</p>	<p>Documentation showing that chemicals discharged to the marine environment are ranked D or better on OCNS ranked list or Silver or better on CHARM rating with no substitution warning.</p> <p>Where chemicals are to be discharged to the marine environment are not D/ E rated through OCNS or Gold/ Silver rated through CHARM, or rated chemicals with a substitution warning, then documented evidence to show that Hazardous</p>	BHP HSE Specialist

Routine and Non-Routine Marine Discharges			
Environmental Performance Outcome	EPO 05: Impacts to water quality from planned discharges reduced to ALARP		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
	<p>described in Hazardous Materials Acquisition Environmental Supplement (AO-HSE S-0002) shall be followed; and</p> <p>No synthetic-based drilling fluids/muds (SBM) shall be used during the activity.</p> <p>Additionally, deck cleaning products planned to be released to sea from the vessel meet the criteria for not being harmful to the marine environment according to MARPOL Annex II</p>	<p>Material Procedure has been followed.</p> <p>Drill report confirms no SBM used during the activity.</p> <p>Inspection records show deck cleaning products meet MARPOL Annex II requirements.</p>	
EPS 26	<p>Drill Fluid Testing</p> <p>The drill fluid Service Contractor engaged by BHP perform quality control testing as outlined in American Petroleum Institute (API) Specification 13A: Drilling Fluid Materials.</p>	Drill fluid test results	BHP Drilling Engineer
EPS 27	<p>Mercury (Hg) & Cadmium (Cd) limits in stock barite</p> <p>Concentrations of heavy metals within stock barite used during the activity shall not exceed:</p> <ul style="list-style-type: none"> Mercury (Hg): max 1 mg/kg (<1ppm) dry weight in stock barite Cadmium (Cd): max 3 mg/kg (<3ppm) dry weight in stock barite 	Barite test results	BHP Drilling Engineer
EPS 28	<p>Drill Cuttings Management:</p> <p>Consistent with EPBC 2005/2034 condition 1 (a) ii, drill cuttings shall be managed in accordance with the BHP Drilling Engineering and Planning Guidelines, including:</p> <ul style="list-style-type: none"> For drilling when riser is in place: pre-calculations of volumes of cuttings to be discharged; The use and monitoring of solids control equipment aboard the MODU for the treatment of drill cuttings prior to overboard discharge; and A sheen test carried out by onboard consultant before discharge of drilling fluids. Settling and skimming carried out if sheen test fails. 	<p>For drilling when riser is in place: record of pre-calculation of cuttings to be discharged.</p> <p>Record of inspection of SCE and containment measures by containment specialist on location.</p> <p>Result of sheen test (and settling and skimming should sheen test fail) recorded in daily mud report.</p>	BHP Drilling Engineer
EPS 29	<p>Cement Management:</p>	Records of cement calculations done prior to the cement job.	BHP Drilling Engineer

Routine and Non-Routine Marine Discharges			
Environmental Performance Outcome	EPO 05: Impacts to water quality from planned discharges reduced to ALARP		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
	<ul style="list-style-type: none"> Cement volume requirements shall be calculated to determine the required volume of cement to reduce the potential for overboard discharge of surplus cement (dry or slurry); and Records of cement volumes used and discharged shall be maintained. 	Well cement report documents volumes of cement used and discharged.	

Table 9-6: Environmental performance – waste management

Waste Management			
Environmental Performance Outcome	EPO 06: No unplanned release of solid waste or objects to the marine environment		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 30	<p>Waste Management: Whilst undertaking the activity the following shall apply:</p> <ul style="list-style-type: none"> all solid, liquid and hazardous waste (other than sewage, grey water, putrescible wastes and surplus cement) generated during the activity shall be sent ashore for recycling, disposal or treatment; machinery space oily water exceeding 15 ppm must be contained and disposed of at a licensed onshore reception facility or to a carrier licensed to receive waste. Waste to be stored in clearly marked and covered waste containers and inspected by containment specialist; and Dropped objects or waste lost overboard shall be recovered where safe and practicable to do so. 	<p>Waste records for the MODU and AHTS vessels maintained in Garbage Record Book or manifests, including transport, treatment, recycling and disposal.</p> <p>Fate of dropped objects documented.</p>	MODU OIM (or delegate) / Vessel Master

Waste Management			
Environmental Performance Outcome	EPO 06: No unplanned release of solid waste or objects to the marine environment		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 08.3	<p>Project Induction: MODU & contracted Vessel Crew shall undertake a project-specific induction covering waste management requirements for the project.</p>	Environment induction attendance records demonstrate MODU & vessel crews are aware of project waste management requirements.	BHP HSE Specialist

9.2 Environmental Performance: Unplanned Events

Table 9-7: Environmental performance – loss of well control

Hydrocarbon Release – Loss of Well Control			
Environmental Performance Outcome	EPO 08: No accidental release of chemicals or hydrocarbons to the marine environment		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 13.2	<p>BHP WOMP (NOPSEMA accepted) demonstrating compliance with:</p> <ul style="list-style-type: none"> Regulatory requirements; BHP Petroleum Well Integrity Standard (DR-STD-PET-DC-0193); Pyrenees Well Integrity Management System (PYAIMS-PS-0005-0002); BHP Petroleum Well Control Standard (DR-STD-PET-DC-0211); BHP Well & Seismic Delivery (WSD) Organisation, Development and Training Standard (DR-STD-PET-DC-0123); and BHP Petroleum Cementing Standard (DR-PET-STD-DC-0142). 	Acceptance letter from NOPSEMA demonstrates WOMP accepted prior to commencement of activities.	BHP Drilling Superintendent
EPS 14.2	<p>MODU Safety Case (NOPSEMA accepted):</p> <p>Demonstrating compliance with regulatory requirements & MODU Operator systems & procedures inclusive of well control arrangements.</p>	Records confirm NOPSEMA accepted MODU Safety Case.	MODU OIM (or delegate)
EPS 31	<p>BHP MODU Safety Case Revision consistent with:</p> <ul style="list-style-type: none"> MODU Operator systems & procedures; BHP Incident Management Plan AOHSE-ER-0001; and Critical Control Performance Standard: Weather Monitoring and Planning (PET-GDC20-DR-PRD-00061) 	Records confirm BHP MODU Safety Case Revision in place prior to undertaking the activity.	BHP Drilling Superintendent
EPS 05.2	<p>Training and Competency:</p> <p>Supervisors involved in well control, shall have a valid supervisory-level certificate from a well control accredited program (IWCF or IADC WellSharp) renewed every two years.</p> <p>No one shall relieve the Driller/Operator without the appropriate well control certification.</p> <p>Driller and Assistant Drillers shall hold a valid Driller-level Well Control Certificate, renewed every two years.</p>	Well control training records confirm minimum well control training standards for relevant personnel.	BHP Head of Drilling & Completions (D&C) Australia (or delegate)

Hydrocarbon Release – Loss of Well Control			
Environmental Performance Outcome	EPO 08: No accidental release of chemicals or hydrocarbons to the marine environment		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 32	<p>Blowout Preventer (BOP): As a minimum, the BOP is required to contain at least one annular sealing element and one blind-shear ram capable of shearing and then sealing the wellbore; and contain at least four rams, one of which shall have shear capability.</p>	BOP design specifications confirm adherence to minimum design standards.	MODU OIM (or delegate) / BHP Drilling Superintendent (or delegate)
EPS 33	<p>BOP Pressure and Function Testing: The following tests shall be performed after the subsea BOP stack is initially installed on each well:</p> <ul style="list-style-type: none"> • A BOP function-test, and wellhead connector pressure-test; and • A full pressure-test no later than 21 days from previous BOP pressure test <p>After the initial test, and for the duration of the drilling activity, all BOP components (excluding hydraulic connectors and shear rams) shall be function tested every seven (7) days and pressure tested at intervals not exceeding 21 days.</p>	BOP pressure and function test records.	MODU OIM (or delegate) / BHP Drilling Supervisor

Table 9-8: Environmental performance – loss of flowline inventory

Hydrocarbon Release – Loss of Flowline Inventory			
Environmental Performance Outcome	EPO 08: No accidental release of chemicals or hydrocarbons to the marine environment		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 07.2	<p>Rig Mooring & Positioning Plan:</p> <p>Consistent with EPBC 2005/2034 condition 1 (b)ii Prior to mobilisation, a Rig Move and Positioning Plan shall be developed inclusive of:</p> <ul style="list-style-type: none"> • A site-specific mooring analysis consistent with API RP 2SK – ‘Mooring Analysis’ identifying the type, number and size of mooring equipment required to secure the MODU on location; • Provision for mooring tension monitoring aboard the MODU consistent with ISO 19901-7:2013 – ‘mooring tensioning’; and • Pre-identified mooring locations within the 2 km operational area including consideration of avoidance of existing subsea infrastructure. 	<p>Documented Rig Move and Positioning Plan inclusive of identified performance standards.</p> <p>MODU control room logbook documenting monitoring of mooring tensions or validate of electronic monitoring via MODU inspection.</p>	MODU OIM (or delegate) / BHP Drilling Superintendent (or delegate)
EPS 10.5	<p>Preventative Maintenance System (PMS):</p> <p>Whilst undertaking the activity, lifting equipment shall be maintained in accordance with Drilling Contractor PMS with the aim of preventing lifting equipment failure.</p>	Drilling Contractor PMS records	MODU OIM (or delegate)
EPS 14.3	<p>MODU Safety Case (NOPSEMA accepted) demonstrating compliance with regulatory requirements & MODU Operator systems & procedures: MODU Safety Case includes control measures for dropped objects:</p> <ul style="list-style-type: none"> • Lifting equipment certification and inspection; • Heavy-lift procedures; • Preventative maintenance on lifting gear (e.g. cranes); and • Crane Operator & Dogman competencies/ certification. 	Records confirm NOPSEMA accepted MODU Safety Case.	MODU OIM (or delegate)
EPS 34	<p>Shut-off adjacent producing wells during anchor handling activities</p> <p>Producing well adjacent to mooring locations shall be shut off prior to the placement of anchors or pre-lay moorings and during the retrieval of mooring equipment.</p>	Records confirm well shut-off during mooring operations.	BHP Head of Drilling & Completions (D&C) Australia (or delegate) / Pyrenees Field Manager

Hydrocarbon Release – Loss of Flowline Inventory			
Environmental Performance Outcome	EPO 08: No accidental release of chemicals or hydrocarbons to the marine environment		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 35	<p>Well Handover / Acceptance Procedure: Formal well handover and acceptance must be undertaken when handing the well from Pyrenees operations to drilling teams prior to undertaking the activity or from drilling team to production team following the activity. The handover must include the intended and actual status of well and flowline components to ensure reservoir fluids remain contained.</p>	Signed well handover / acceptance documents for both pre and post activity.	BHP Head of Drilling & Completions (D&C) Australia (or delegate) / Pyrenees Field Manager

Table 9-9: Environmental performance – vessel collision

Hydrocarbon Release – Vessel Collision			
Environmental Performance Outcome	<p>EPO 01: No unplanned vessel interactions (including collision) or interference with defence activities.</p> <p>EPO 08: No accidental release of chemicals or hydrocarbons to the marine environment</p>		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 01	<p>Navigation equipment (including lighting, compass/radar), bridge and communication equipment will be compliant with appropriate marine navigation and vessel safety requirements.</p>	<p>Completed Vessel Assurance Questionnaire for each vessel prior to entering field demonstrating compliance with relevant Marine Orders and confirming functioning navigation equipment.</p>	BHP Logistics Supervisor
EPS 02	<p>Automatic Identification System (AIS) shall be fitted aboard both the MODU and AHTS vessels and maintained in accordance with Regulation 19-1 of Chapter V of SOLAS.</p>	<p>Completed Vessel Assurance Questionnaire for each vessel prior to entering field demonstrating compliance Regulation 19-1 of Chapter V of SOLAS.</p>	Vessel Master / MODU Operator
EPS 03.1	<p>Stakeholder Communication:</p> <p>The following notifications shall be issued:</p> <ul style="list-style-type: none"> Australian Hydrographic Office (AHO) shall be notified no less than four working weeks prior to commencement of activity in order to promulgate 'Notice to Mariners' to be published; AMSA's JRCC will be notified at least 24-48 hours prior to commencement of the activity to enable AMSA to distribute an AUSCOAST warning. Notification shall include: MODU's details (including name, callsign and Maritime Mobile Service Identity), satellite communications details (including INMARSAT-C and satellite telephone), and location of activity / operational area (500 m RSEZ & 2 km cautionary zone). Department of Mines, Industry Regulation and Safety (DMIRS) pre-start notification confirming the start date of the proposed activity 	<p>Documented notification to AHO and AMSA's JRCC within required timeframes prior to undertaking the activity.</p>	MODU OIM / BHP Drilling Superintendent

Hydrocarbon Release – Vessel Collision			
Environmental Performance Outcome	<p>EPO 01: No unplanned vessel interactions (including collision) or interference with defence activities.</p> <p>EPO 08: No accidental release of chemicals or hydrocarbons to the marine environment</p>		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
	<p>and a cessation notification to inform DMIRS upon completion of the activity; and</p> <ul style="list-style-type: none"> Department of Defence at least 5 weeks prior to the commencement of activities via Offshore.Petroleum@defence.gov.au. 		
EPS 03.2	<p>Stakeholder Communication:</p> <p>Prior to undertaking the activity, relevant Stakeholders shall be notified of the proposed activity location, scope and timing including:</p> <ul style="list-style-type: none"> The Community Reference Group (CRG); The DPIRD (Western Australia) (formally the WA Department of Fisheries); Other relevant or interested Stakeholders identified via Stakeholder consultation 	<p>Consultation records confirm relevant Stakeholder informed of proposed activity scope and timing prior to undertaking the activity.</p> <p>Meeting minute records maintained of CRG meetings, which includes summary of proposed activities.</p>	BHP HSE Specialist
EPS 03.3	<p>Stakeholder Communication:</p> <p>Relevant Stakeholders requiring ongoing consultation regarding the physical presence of the MODU during the activity shall be supplied information consistent with requirements identified during the Stakeholder consultation process (as detailed in Section 5 and 10.5.1 of this EP).</p>	<p>Consultation records confirm ongoing consultation with relevant Stakeholders undertaken during the activity.</p>	BHP HSE Specialist
EPS 04	<p>Rig Safety Exclusion Zone:</p> <p>When moored on location within the operational area:</p> <ul style="list-style-type: none"> A 500-m rig safety exclusion zone (RSEZ) shall be established and monitored around the MODU; and Entry into the RSEZ shall be managed via the Control Room aboard the MODU. 	<p>MODU Marine Logbook records demonstrating:</p> <ul style="list-style-type: none"> Managed & safe entry of AHTS vessels into RSEZ 	MODU OIM (or delegate)

Hydrocarbon Release – Vessel Collision			
Environmental Performance Outcome	<p>EPO 01: No unplanned vessel interactions (including collision) or interference with defence activities.</p> <p>EPO 08: No accidental release of chemicals or hydrocarbons to the marine environment</p>		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 05.1	<p>Training & Competency:</p> <p>AHTS vessels' and MODU crew undertaking vessel bridge-watch shall be qualified in accordance AMSA Marine Order Part 3: Seagoing Qualifications or certified training equivalent.</p>	<p>Completed Vessel Assurance Questionnaire for each vessel prior to entering field demonstrating compliance with AMSA Marine Order Part 3: Seagoing Qualifications</p>	<p>Vessel Master / MODU OIM (or delegate)</p>
EPS 06	<p>SIMOPs Plan:</p> <p>A Pyrenees field simultaneous operations (SIMOPS) Plan shall be in place during the proposed activities to manage potential vessel interactions between other project vessels servicing the Pyrenees Venture FPSO or undertaking other field activities. The SIMOPS Plan shall detail the requirement for Permit to Work (PTW) system for all activities with the potential to interact within the Pyrenees. within the safety zone</p>	<p>PTW records demonstrate potential SIMOPS interactions approved and signed by the Ultimate Work Authority.</p>	<p>Pyrenees Field Manager (Ultimate Work Authority)</p>

Table 9-10: Environmental performance – chemical and minor hydrocarbon spills

Unplanned Discharges – Chemicals and Minor Hydrocarbon Spills			
Environmental Performance Outcome	EPO 08: No accidental release of chemicals or hydrocarbons to the marine environment		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 36	<p>Bundling of equipment & chemicals: The MODU shall have continuous bunding or drip trays around machinery or equipment with the potential to leak. The MODU shall have (and maintain) spill clean-up equipment and scupper plugs or equivalent deck drainage control measures located where hydrocarbons and chemicals are stored and frequently handled.</p>	Inspection confirms suitable bunding of equipment and chemicals	MODU OIM (or delegate)
EPS 37	<p>Spill clean-up equipment aboard the MODU shall be located where hydrocarbons and hazardous chemicals are frequently handled</p>	Inspection confirms spill clean-up equipment locations and content	MODU OIM (or delegate)
EPS 10.6	<p>Preventative Maintenance System (PMS): Whilst undertaking the activity, critical hoses outside bunded areas are identified and regularly inspected/ maintained/replaced aboard the MODU shall be maintained in accordance with Rig Contractor PMS with the aim of preventing spills to the marine environment.</p>	Drilling Contractor PMS records	MODU OIM (or delegate)
EPS 38	<p>Diesel / liquid chemical bunkering checklist: Consistent with EPBC 2005/2034 condition 1 (a)iii, whilst in the operational area a diesel / liquid chemical bunkering checklist shall be completed prior to each bulk liquid transfer activity during the activity including:</p> <ul style="list-style-type: none"> • Transfer type, communications protocols, alarm criteria; • Direct line of sight between vessels maintained during transfer; • Use and monitoring of buoyant bunkering hose; • Emergency shut-down/dry-break couplings and bunkering valves are in place; • Relief valves are included on bunkering pumps; • Diesel / liquid chemical transfer to commence during daytime and only if sea conditions are such that it is safe to do so; • No concurrent operations taking place during fuel bunkering from the same vessel; 	Completed diesel / chemical bunkering checklist for each bulk liquid transfer	BHP Drilling Supervisor(s) / MODU OIM (or delegate)

Unplanned Discharges – Chemicals and Minor Hydrocarbon Spills			
Environmental Performance Outcome	EPO 08: No accidental release of chemicals or hydrocarbons to the marine environment		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
	<ul style="list-style-type: none"> Bunkering area drain points plugged prior to commencement of bunkering/ transfer activities; Bunkering hoses drained at cessation of bunkering activities; Diesel storage tanks on MODU equipped with level indicators, high level alarms and automatic shutoffs to enable quick detection and response to potential overfill situations; Hose register (or PM record) will be maintained that contains details of date of manufacture, date of pressure test and test pressure and preventative maintenance and inspection; and Dry break couplings (e.g. a K LAW coupling) will be used on hoses used for bulk transfer of diesel and liquid chemicals. 		

Table 9-11: Environmental performance – unplanned discharge of solids

Unplanned Discharges – Solids			
Environmental Performance Outcome	EPO 06: No unplanned release of solid waste or objects to the marine environment		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 10.5	Preventative Maintenance System (PMS): Whilst undertaking the activity, lifting equipment shall be maintained in accordance with Drilling Contractor PMS with the aim of preventing lifting equipment failure.	Drilling Contractor PMS records	MODU OIM (or delegate)
EPS 14.3	MODU Safety Case (NOPSEMA accepted) demonstrating compliance with regulatory requirements & MODU Operator systems & procedures. MODU Safety Case includes control measures for dropped objects: <ul style="list-style-type: none"> Lifting equipment certification and inspection; Heavy-lift procedures; 	Inspection records confirm NOPSEMA accepted MODU Safety Case.	MODU OIM (or delegate)

Unplanned Discharges – Solids			
Environmental Performance Outcome	EPO 06: No unplanned release of solid waste or objects to the marine environment		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
	<ul style="list-style-type: none"> Preventative maintenance on lifting gear (e.g. cranes); and Crane Operator & Dogman competencies/ certification. 		
EPS 30	<p>Waste Management: Whilst undertaking the activity the following shall apply:</p> <ul style="list-style-type: none"> Waste to be stored in clearly marked and covered waste containers; and Dropped objects or waste lost overboard shall be recovered where safe and practicable to do so. 	Fate of dropped objects documented.	MODU OIM (or delegate) / Vessel Masters

Table 9-12: Environmental performance – marine fauna interaction

Marine Fauna Interaction			
Environmental Performance Outcome	EPO 03: No physical and/or observable biologically significant behavioural disturbance on protected species (including breeding, foraging, resting or migration)		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 08.1	<p>Project Induction: Contracted Vessel Crew shall undertake a project-specific induction covering EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans (modified to include whale sharks and turtles) to inform the following requirements for AHTS vessel whilst conducting activities in the operational area:</p> <ul style="list-style-type: none"> Vessels shall not knowingly travel greater than 6 knots within 300 m of a cetacean, whale shark or turtle (caution zone) and minimise noise; 	Environment induction attendance records demonstrate vessel crews are aware EPBC Regulations 2000 Part 8 Division 8.1 (and EPBC 2005/2034 condition 1 (a) iv).	BHP Logistics Supervisor / HSE Specialist

Marine Fauna Interaction			
Environmental Performance Outcome	EPO 03: No physical and/or observable biologically significant behavioural disturbance on protected species (including breeding, foraging, resting or migration)		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
	<ul style="list-style-type: none"> Vessels shall not knowingly approach closer than 100 m for a large whale or whale shark, or 50 m of a dolphin or turtle (except for bow riding); Vessel Masters identifying a cetacean/ whale shark showing signs of being disturbed, shall immediately withdraw from the caution zone at a constant speed of less than 6 knots; and Vessels shall move at a constant slow speed and with minimal noise away from a cetacean that is approaching so that the vessel remains at least 300 m from the cetacean. 		
EPS 08.2	<p>Project Induction:</p> <p>Contracted aircraft service providers shall be provided a project-specific induction material covering EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans (modified to include whale sharks and turtles) to inform the following requirement for aircraft transiting to and from the MODU:</p> <p>Whilst entering or departing the operational area helicopters shall not fly lower than 1650 ft when within 500 m horizontal distance of a cetacean except when landing or taking off and shall not approach a cetacean from head on.</p>	Records confirming EPBC Regulations 2000 Part 8 Division 8.1 (and EPBC 2005/2034 condition 1 (a) iv) relating to helicopter flight requirements relayed to aircraft service providers.	BHP Logistics Supervisor / HSE Specialist
EPS 09	<p>BHP APU Whale, Dolphin and Whale Shark Sightings Cards:</p> <p>Whilst undertaking petroleum activities AHTS Vessel Crew shall be requested to complete and submit BHP APU Whale, Dolphin and Whale Shark Sightings Cards upon sighting cetaceans and whale sharks. The completed cards are to be consolidated by the Vessel Master (or delegate) and forwarded to the BHP APU HSE Team for reporting to DAWE.</p>	Completed BHP APU Whale, Dolphin and Whale Shark Sightings Cards consolidated and reported to DAWE.	BHP HSE Specialist
EPS 11.2	<p>Marine Mammal Observations</p> <p>Marine mammal observation shall be undertaken aboard both the MODU and AHTS vessels within the permit boundaries during the mobilisation of the MODU to and from the operational area with any detection of cetaceans</p>	<p>Completed BHP APU Whale, Dolphin and Whale Shark Sightings Cards.</p> <p>Vessel and MODU logbooks.</p>	<p>Vessel Master (or delegate)</p> <p>MODU OIM (or delegate)</p>

Marine Fauna Interaction			
Environmental Performance Outcome	EPO 03: No physical and/or observable biologically significant behavioural disturbance on protected species (including breeding, foraging, resting or migration)		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
	within the operational area used to avoid physical and/or biologically important behavioural disturbance.		

Table 9-13: Environmental performance – introduction of invasive marine species

Introduction of Invasive Marine Species			
Environmental Performance Outcome	EPO 07: No introduction of invasive marine species		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 39	<p>BHP Introduced Marine Species Risk Assessment and Approval Procedure (AOHSE-E-0018-001):</p> <p>An IMS risk assessment shall be completed for the MODU and AHTS vessels and associated immersible equipment (e.g. mooring equipment, ROV etc) before mobilisation to operational area, as described in BHP Introduced Marine Species Management Procedure. The basis of evaluation considers:</p> <ul style="list-style-type: none"> • Vessel details including the location and risk profile of the previous port of call / region of operation; • Biofouling prevention and biofouling risk profile; • Vessel inspection and ballast water requirements; • Submersible equipment biofouling risk profile requiring equipment to be free of biofouling; and • Validation of documented vessel and submersible equipment biofouling and ballast water management systems including validation of certification, ballast water and biofouling management plans and suitable recording systems. <p>The IMS risk assessment must deem the MODU, AHTS vessels and submersible equipment 'low risk' prior to mobilisation into the operational area.</p> <p>The IMS risk assessment shall be consistent with the consistent with the National Biofouling Management Guidance for the Petroleum Production and Exploration Industry; the Australian Ballast Water Management Requirements (Rev 8); and the Australian Biofouling Management Requirements (Proposed).</p>	Completed IMS risk assessment for each vessel and MODU prior to entering field	BHP Logistics Supervisor / BHP HSE Specialist

Introduction of Invasive Marine Species			
Environmental Performance Outcome	EPO 07: No introduction of invasive marine species		
EPS #	Environmental Performance Standard	Measurement Criteria	Responsibility
EPS 40	<p>International Anti-Fouling System Certificate:</p> <p>Prior to mobilisation to the operational area, and consistent with Marine Orders 8 - Part 98: Marine Pollution - Anti-fouling Systems and International Convention on the Control of Harmful Anti-fouling Systems on Ships (IMO, 2001), Vessel Operator shall:</p> <ul style="list-style-type: none"> supply a current International Anti-Fouling System Certificate for each AHTS vessel; and confirm no harmful organotins in antifouling paints used on AHTS vessels. 	Completed IMS risk assessment for each vessel prior to entering field confirms current International Anti-Fouling System Certificate and anti-fouling systems have not used harmful organotins.	BHP Logistics Supervisor / BHP HSE Specialist
EPS 41	<p>Australian Ballast Water Management Requirements (Rev 8):</p> <p>Prior to mobilisation to the operational area, BHP shall validate that the MODU and AHTS vessels comply with the Australian Ballast water Requirements (Rev 8), specifically, ensuring they have:</p> <ul style="list-style-type: none"> a valid Ballast Water Management Plan; a ballast water management certificate; and a ballast water record system with a minimum of 2 years records retained on board; and exchange ballast water outside 12 nmi from the nearest land in water depths greater than 50 m or treat ballast water using approved ballast water treatment system (if mobilised from international waters). 	IMS risk assessment for each vessel and MODU prior to entering field confirms compliance with Australian Ballast Water Management Requirements (Rev 8).	BHP Logistics Supervisor / BHP HSE Specialist
EPS 42	<p>Biofouling Management Plan:</p> <p>Prior to mobilisation to the operational area, the Vessel Operator shall confirm that each AHTS vessel has a biofouling management plan and record book consistent with IMO Biofouling Guidelines.</p>	IMS risk assessment confirms compliance with Australian Ballast Water Management Requirements (Rev 8).	BHP Logistics Supervisor / BHP HSE Specialist

10 Implementation Strategy

In accordance with Regulation 14 of the Environment Regulations, the Environment Plan must contain an implementation strategy for the petroleum activity and monitoring, recording and reporting arrangements. The implementation strategy presented in this section provides specific practices and procedures to ensure:

- All the environmental impacts and risks of the petroleum activity will be continually identified and reduced to a level that is ALARP;
- Control measures identified in the EP are effective in reducing the environmental impacts and risks of the activity to ALARP and to acceptable levels;
- That environmental performance outcomes and environmental performance standards are met;
- Arrangements are in place to respond to, and monitor, impacts of oil pollution emergencies; and
- Arrangements for on-going consultation with relevant authorities, persons and organisations are in place and maintained through the activity.

10.1 Systems, Practices and Procedures

10.1.1 BHP Petroleum HSE Management System

The BHP Petroleum Health, Safety and Environment (HSE) Management System defines the boundaries within which all activities are conducted. It provides a structured framework to set common requirements, boundaries, expectations, governance and assurance for all activities. It also supports accountabilities and responsibilities as defined in the organisational structure. The overarching objective of the BHP Petroleum HSE Management System is to aspire to zero harm to people, communities and the environment, and achieve leading industry practice. The structure of the BHP Petroleum HSE Management System is hierarchical (Figure 10-1).



Figure 10-1: BHP Petroleum HSE Management System

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

The documents in Figure 10-1 address specific areas (e.g. corporate performance reporting, risk management, incident investigation) where it is important that activities are conducted consistently across the organisation.

The top level of the triangle shown in Figure 10-1 is the BHP Charter; a copy of the Charter is provided in Appendix A. The Charter details BHP's values and directs the approach to all activities in BHP. It includes value statements on each of sustainability, integrity, respect, performance, simplicity and accountability. It also provides a means of aligning BHP's values with strategic direction and measures of success. The Charter is supported by BHP's Code of Business Conduct and Working with Integrity. The Charter is signed by the BHP Chief Executive Officer.

The BHP Our Requirements detail and define business planning, risk management, and assurance expectations of key process areas. They also serve as audit protocol against which all groups in BHP are assessed. Categories of Our Requirements include (for example) HSE, Human Resources, Legal, Corporate Affairs, Supply, and Information Management.

Direction for environmental performance in BHP is established by the Environment and Climate Change – Our Requirements. The BHP Charter provides a public statement and commitment to zero harm through planning and execution. The Pyrenees Phase 4 Infill Drilling activities will be undertaken in accordance with the objectives of this Charter, which includes compliance or exceedance with regulatory requirements, setting of objectives and targets and continual improvement. The Charter will be available to all personnel involved in the petroleum activity through the intranet, and hard copies where appropriate.

The BHP Petroleum HSE Management System establishes the foundation for continual improvement through the application of consistent requirements across all aspects of the petroleum activity including:

- Identification of statutory obligations and commitments to ensure maintenance of licence to operate;
- Implementation of petroleum risk management processes, including this Environment Plan;
- Establish and maintain the competencies for personnel, and provision of training to promote expected behaviours;
- Management of all contractors and suppliers of petroleum goods and services; and
- Completion of reviews, and reporting outcomes of these reviews.

The BHP Petroleum HSE Standard details the mandatory HSE performance requirements as described in the HSE-related Our Requirements and are met through the HSE Management System. They address specific performance requirements that define functional and governance expectations. The controls apply to the entire lifecycle of petroleum activities, processes and products. Contractors are required to comply with the controls, and partners and suppliers are encouraged to adopt the intent and nature of the performance requirements. The controls cover the following broad areas and are regularly monitored through scheduled audit and verification activities:

- Hazards and risk management;
- Crisis and emergency management;
- Security;
- Health and hygiene;
- Aviation;
- Marine operations;
- Fatal risks;
- Environment; and
- Data reporting.

10.2 Environment Plan Organisation, Roles and Responsibilities

A defined chain of command with the roles and responsibilities for key BHP and contractor personnel in relation to Environment Plan implementation, management and review are described below in Table 10-1. It is the responsibility of all BHP employees and contractors to ensure that the BHP’s Petroleum HSE-related Our Requirements and the BHP Charter (Appendix A) are applied in their areas of responsibility.

Table 10-1: Key personnel and environmental responsibilities

Title	Environmental Responsibilities
Office-based Roles	
BHP Head of Drilling & Completions (D&C) Australia	<ul style="list-style-type: none"> • Technical Authority and Manager of team of well construction professionals to support production phase; • Ownership transfer for well construction, completion, workover, intervention and abandonment operations; • Ensure sufficient resources are provided to implement the commitments made in this EP; • Engage with the Pyrenees Field Manager in relation to well handover and in-field SIMOPS; and • Establish Source Control Section (SCS) within BHP Incident Management Team (IMT) in the event of a LOWC incident.
Pyrenees Field Manager (Ultimate Work Authority)	<ul style="list-style-type: none"> • Manage Pyrenees Field Operations including in-field SIMOPS
BHP Drilling Superintendent	<ul style="list-style-type: none"> • Supervision of D&C operations including management of change; and • Ensures compliance with company policies, standards and statutory requirements.
BHP Drilling / Completions Engineer (or equivalent)	<ul style="list-style-type: none"> • Accountable for the development of well designs and associated programs; and • Ensures compliance with company policies, standards and statutory requirements.
BHP Regional HSE Lead	<ul style="list-style-type: none"> • Ensure compliance with BHP’s Charter and Management Standards, this EP and regulatory responsibilities; and • Environmental incidents or breaches of environmental performance outcomes, standards or measurement criteria, are reported in line with BHP’s incident reporting requirements.
BHP HSE Specialist	<ul style="list-style-type: none"> • Liaise with the Drilling Superintendent to ensure compliance to legislation, procedures, standards and commitments; • Carry out environmental education and inductions; • Ensure compliance with this EP, regulatory and HSE responsibilities; • Participate in the hydrocarbon spill response drills; • Complete environmental audits to ensure compliance with this EP; and • Report environmental recordable incidents to NOPSEMA.
BHP Logistics Supervisor	<ul style="list-style-type: none"> • Liaise with Vessel Masters and aircraft operators to maintain compliance with this EP.
Field-based Roles	
BHP Drilling Supervisor (or equivalent)	<ul style="list-style-type: none"> • Responsible for management and supervision of well engineering activities at the well site; • Ensures operations are conducted according to the approved programme requirements; and • Management of change during operations.
BHP HSE Advisor	<ul style="list-style-type: none"> • Monitor and audit the activity to ensure compliance with this EP; • Ensures environmental incidents or breaches of environmental performance outcomes, standards or measurement criteria are reported and recorded in line with BHP’s incident reporting requirements; and

	<ul style="list-style-type: none"> Disseminate project-specific environmental compliance requirements to the MODU crew as required.
Offshore Installation Manager (OIM) – MODU Contractor	<ul style="list-style-type: none"> Maintains operational control of the MODU Manages the implementation of the Contractor MODU Management System and MODU procedural controls Ensures MODU personnel are appropriately trained and competent to undertake role-specific tasks Ensures MODU emergency response procedures are tested and implemented; Liaison with BHP Drilling Supervisor(s) on all aspects of drilling activities; and Report environmental incidents or breaches of environmental performance outcomes, standards or criteria on MODU, are in line with BHP’s incident reporting requirements.
Vessel Master	<ul style="list-style-type: none"> Manage activities and safety on-board vessel for the duration at sea, and operate under BHP Marine Controls, relevant Commonwealth Acts and regulations; Ensure vessel operations are undertaken as per this EP and any approval conditions; SOPEP drills are conducted as per vessel’s schedule; Report environmental incidents or breaches of environmental performance outcomes, standards or criteria on vessel, are in line with BHP’s incident reporting requirements; and Recordable incident reporting.
All crew	<ul style="list-style-type: none"> Work in accordance with accepted HSE obligations and practices; Comply with this EP, and all regulatory and project obligations applicable to their assigned role; Report any hazardous condition, near miss, unsafe act, accident or environmental incident immediately to their supervisor; Report sightings of marine fauna and marine pollution to their supervisor; Attend HSE meetings and training/ drills when required; and Understand their obligation to ‘stop-the-job’ due to HSE concerns.

10.3 Training and Competency

10.3.1 Competence, Environmental Awareness and Training

BHP’s HSE Management System Framework establishes the foundation for continual improvement through the application of consistent requirements across all aspects of petroleum activities including the establishing and maintenance of the competencies for personnel, and provision of training to promote expected behaviours.

For BHP contractors, environmental risks in contracts are managed in accordance with the requirements outlined in BHP Petroleum HSE Management Standard. As part of the contractor management process, the MODU Contractor’s Environmental Management System is assessed to ensure it is aligned with the BHP Charter, the BHP Petroleum HSE Management Standard and meets all commitments made in this EP. If, and wherever, the Contractor’s Management System is found to be deficient it will be required to be modified prior to mobilisation to site.

All personnel on the MODU and AHTS vessels are required to be competent and suitably trained to undertake their assigned positions. This may be in the form of ‘On the Job’ or external training. Contractors are responsible for identifying training needs and keeping records of training undertaken. Environmental awareness inductions (Section 10.3.2) are required to be undertaken by all offshore personnel as part of their induction to undertaking petroleum activity.

Competence in well control is a critical factor in conducting drilling and completions in a safe manner and with minimal environmental impact. The Well Operations Management Plan (WOMP) details critical positions that are required to hold a certificate of well control competency. Before drilling commences, Well Control Competency assessments will be undertaken on the MODU. Details of processes by which the competency of supervisors, employees, and contractors to operate equipment and to execute procedures will be managed are detailed within the WOMP. The OPGGS (Resource Management and Administration Regulations) require that the WOMP must adequately demonstrate (among other matters) that competency of supervisors, employees and contractors are to a level such that risks to integrity of the well are reduced to ALARP.

10.3.2 Campaign Specific Environmental Awareness

Inductions are provided to all relevant personnel before the mobilisation to or on arrival at the activity location. This induction covers the HSE requirements and environmental information specific to the location of the activities. The induction will include the following environmental information:

- General description of the activity location, including any environmentally sensitive areas;
- BHP Petroleum HSE Management System Framework – BHP Charter (Appendix A);
- Adherence to standards and procedures, and the use of Job Safety Analysis and Permit to Work hazard identification and management process;
- Incident reporting process;
- Spill management including prevention, response and clean-up, location of spill kits and reporting requirements;
- Waste management requirements and process (segregation of landfill, recycle and hazardous wastes) and location of bins;
- Reporting of vessel-to-vessel and vessel-to-MODU interactions; and
- Reporting procedure for sightings of cetaceans and whale sharks including the location of marine fauna sighting datasheets.

All personnel who undertake the induction are required to sign an attendance sheet, which is retained by the MODU and/or vessel contractor.

The MODU will hold regular HSE meetings, which cover all crews. During these meetings, environmental incidents will be reviewed and awareness material presented. All personnel are required to attend the HSE meetings and attendance sheets are retained by the MODU Contractor. Daily Meetings held onboard the MODU also serve to reinforce environmental awareness during the drilling campaign.

A copy of Environment Plan is provided to the MODU and vessel contractor prior to undertaking the activity.

10.3.3 Well Control Training

In accordance with the BHP Well & Seismic Delivery (WSD) Organisation, Development and Training Standard (DR-STD-PET-DC-0123), BHP Supervisors involved in well control, shall have a valid supervisory-level certificate from a well control accredited program (IWCF or IADC WellSharp) renewed every two years. No one shall relieve the Driller/Operator without the appropriate well control certification. Driller and Assistant Drillers (or equivalent positions for non-drilling rigs) shall hold a valid Driller-level Well Control Certificate, renewed every two years.

The Well Operations Management Plan (WOMP) details critical positions that are required to hold a certificate of well control competency. Before drilling commences, Well Control Competency assessments will be undertaken on the MODU. Details of processes by which the competency of supervisors, employees, and contractors to operate equipment and to execute procedures will be managed are detailed within the WOMP. The OPGGS (Resource Management and Administration Regulations) require that the WOMP must adequately demonstrate (among other matters) that competency of supervisors, employees and contractors are to a level such that risks to integrity of the well are reduced to ALARP.

10.3.4 Incident Management Team (IMT) and Source Control Section (SCS) Training

The APU IMT is made up of personnel designated on a roster basis, with each individual available for one week on a 24-hour basis throughout the year, based in Perth. There is a weekly handover and briefing of the operations each week. The APU IMT consists of a number of defined roles, which enables BHP to respond to a variety of incidents. The APU IMT is located in the BHP Perth offices and is fully equipped to manage incidents.

IMT members undergo pre-requisite Incident Management System training (ICS 100 and ICS 200) before fulfilling their position on the IMT. The training follows industry best practice and incorporates BHP CEM procedures and processes.

To supplement the initial training, each IMT member participates in desktop exercises and additional minor and major exercises.

Full details of training requirements for IMT and SCS members is detailed within the APU IMT Capability Assessment Report (AOHSE-ER-0071).

10.3.5 Contractor Management

For BHP contractors, HSE risks in contracts are managed in accordance with the requirements outlined in BHP HSE Management Standard. As part of the contractor management process, BHP implements pre- and post-contract award processes and activities aimed at ensuring that contracts consistently and effectively cover the management of HSE in line with BHP's Petroleum HSE-related Our Requirements, the BHP Charter, and the BHP Petroleum HSE Management Standard.

Whilst BHP HSE Management Systems apply to the manner in which BHP execute their responsibilities under this EP, operational control of the MODU remains the responsibility of the MODU Contractor and shall be managed in accordance with Contractor Management Systems as detailed within the NOPSEMA accepted Safety Case for the facility.

10.3.6 Marine Operations and Assurance

Systems and procedures are in place to ensure all marine operations for the activities are conducted in accordance with environmental regulatory requirements and BHP marine controls, which cover management of marine operations and contracting of vessels.

The Marine Management Process comprising a Vessel Assurance Questionnaire require a number of audits be completed prior to hiring a vessel and marine operations suppliers to be audited and verified prior to engagement. This includes a search of Offshore Vessel Inspection Database (OVID) for all relevant records and certification, and/or additional audits for the following as identified in the risk assessment process:

- Marine Management Process;
- Dynamically positioned vessel review;
- Containment audit to ensure contained transport, storage and discharge of petroleum based and chemical products;
- Lifting and rigging audit;
- Invasive Marine Species (IMS) Risk Assessment; and
- Emergency response audit.

10.4 Monitoring, Auditing and Management of Non-Conformance and Review

10.4.1 Monitoring Environmental Performance

Environmental performance is required to be consistent with BHP HSE Management Standard and commitments made in this EP. The on-going environmental performance of contractors is the responsibility of key personnel described in Table 10-1. Key data that will be monitored and recorded during the activity are summarised in Table 10-2.

Table 10-2: Monitoring and record keeping summary

Parameter	Monitoring	Record Keeping	Frequency
MODU	Rig Move and Positioning Plan	Rig Move and Positioning Plan	Prior to commencement of activity
Seabed Disturbance	ROV surveys of mooring locations	ROV survey report	Prior to mooring
	Recovery of dropped objects where practicable to do so and where recovery will provide a net environmental benefit	Documentation of dropped object retrieval	As required
	Removal of all rig mooring equipment consistent with section 572 of the OPGGS Act	Drilling Report confirming removal of all rig mooring equipment from the seabed.	End of activity
Marine Fauna Interactions	Cetacean sightings and interactions (secondary to primary work activities/ responsibilities)	Fauna Sighting Datasheet. Incident Report Form. Monthly Incident Report; and Environmental Performance Report.	As required. As required. Monthly.
Introduced Marine Species	Management of biofouling	Marine Management process to be completed prior to hire of vessels	Prior to on-hire
		Record and review of IMS risk assessment by the Environmental Specialist for newly contracted MODU, AHTS vessels and immersible equipment entering the operational area.	Prior to mobilisation
		AHTS vessels Biofouling Management Plan and recordkeeping	Prior to mobilisation
	Management of ballast	Ballast Water Management Plan (BWMP). ballast water management certificate (IBWMC). Ballast water records.	Prior to entering Australian waters
Atmospheric Emissions	Details of diesel consumption, cold venting / flaring and monitoring/reporting of greenhouse gas, ozone-depleting substances, fluoride, nitrogen dioxide, sulphur dioxide and energy use.	Daily Drill Reports	Daily during activity
		Envirosys Records	
		ODS Record Book	
		Daily Vessel Report (DVR) records includes vessel fuel consumption	
Drill Fluids & Cuttings	Quantitative record of drilling discharges	Daily Drill Reports / Mud Reports	Daily during activity
	Monitoring of Solids Control Equipment		

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Parameter	Monitoring	Record Keeping	Frequency
	Drill fluid type and volume		
Cement	Volume of cement discharged	Well cement report	End of activity
	Volume of cement returned to shore		
Waste	Sewage and grey water	MODU / Vessel log	End of activity
		Maintenance records for sewage/grey water equipment	End of activity
	Hazardous and non-hazardous solid waste	Garbage Record Book	End of activity
		Maintenance records demonstrate functioning macerator onboard Vessel	End of activity
	Oily water – Bilges and machinery spaces	Oil Record Book	End of activity
	Fuels and oils	Containment and inspections, maintenance records, PMS records, checklists	End of activity
	Hazardous chemicals	Hazardous chemical locker inspection	End of activity
Loss or discharge to sea of harmful materials	Record log of report to AMSA RCC	As required	
Marine user interactions	Interactions with shipping and commercial fishing vessels movements	MODU control room / vessel log. Incidents also recorded in the BHP 1SAP system	As required
Training	Details of crew inductions/drills	Induction Record Sheets / drill reports	As completed

10.4.2 Record Keeping

Compliance records will be maintained. Record keeping will be in accordance with Regulation 14(7) that addresses maintaining records of emissions and discharges (Table 10-2).

10.4.3 Auditing, Assurance, Management of Non-Conformance and Continuous Improvement

The environmental performance of BHP activities will be reviewed in a number of ways in order to:

- Ensure all significant environmental aspects of the activity are covered in the EP;
- Ensure that management measures to achieve environmental performance outcomes are being implemented, reviewed and where necessary amended;
- Ensure that all environmental commitments have been met;
- Ensure that impacts and risks will be continuously identified and reduced to ALARP; and
- Identify potential non-conformances and opportunities for continuous improvement.

BHP conducts reviews and audits of their contractors at various stages including pre-award of contract, pre-activity and during activity, in accordance with BHP HSE Management System performance. The environmental performance of contractors to BHP involved in activities will be reviewed through the following activities including (but not limited to):

- Inspections of Contractor HSE Management systems and procedures;
- Pre-activity audits;
- Review of reporting documentation;
- Monitoring of progress;
- Auditing and assurance program;

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- Regular review of incident, audit, inspection, observation, safety meeting and daily operations reports;
- Action item tracking and closeout; and
- End of campaign reviews.

The environmental performance of BHP activities will be reviewed through:

- An audit of the MODU carried out by the BHP HSE Specialist or BHP Site Representative before or during the activities to ensure that procedures and equipment are in place to enable compliance with the EP;
- The audit will be documented and actions tracked through a non-compliance register, which is monitored on a regular basis;
- The Environment Plan will be distributed to the MODU Contractor prior to undertaking the activity and compliance against EPOs, EPSs, and measurement criteria monitored on a regular basis by BHP; and
- All environmental mitigation and management commitments from the EP will be documented and a description of compliance with each commitment will be maintained.

Audit findings, close-out reports and feedback from ongoing monitoring allow continuous improvement initiatives to be developed and inform the development of future EPs.

10.4.4 Management of Change

Permanent or temporary changes to organisation, equipment, plant, standards, or procedures that have a potential health, safety, integrity and/or environmental impact are assessed and subject to formal review and approval as outlined in BHP HSE Management Standard. This standard requires the change to be justified and authorised, risk assessed to understand the potential impacts of the change, a plan to be in place that clearly specifies the timescale for the change and any control measures to be implemented and the situation to be reassessed if there is an unexpected change in circumstances. The level of management approval for each change is commensurate with the risk.

Management of changes relevant to this EP, for example timing of the activity, changes to the scope of the activity described in Section 3 of this EP will be made in accordance with Management of Change procedures outlined in the BHP Petroleum HSE Management Standard.

The Management of Change process also allows for the assessment of new information that may become available after the acceptance of the EP, such as new management plans for Australian marine parks, new recovery plans or conservation advice for species, and changes to the EPBC Protected Matters Search results.

The Management of Change will be assessed and subject to formal review to determine if a revision of the accepted EP in force for the cessation activities is required to be submitted to NOPSEMA pursuant to Regulation 17 of the OPGGS (Environment) Regulations.

10.5 Reporting

To meet the environmental performance outcomes and standards outline in the EP, BHP undertake reporting at a number of levels as described in the following sub-sections.

10.5.1 Routine Reporting (External)

Start and End of Activity Notifications

In accordance with Regulation 29, BHP will notify in writing NOPSEMA and DMIRS of the commencement of the petroleum activity at least ten days before the activity commences and again within ten days of the completion of the activity.

To ensure BHP activities do not conflict with Department of Defence (DoD) training, BHP must notify DoD of the commencement of activities a minimum of five weeks prior to the commencement of activities. Notification will be provided to Offshore.Petroleum@defence.gov.au

BHP will:

- Notify the Australian Hydrographic Office (AHO) no less than four weeks before operations, with details relevant to the operations in order for the AHO promulgate the appropriate Notice to Mariners.
- Notify AMSA’s Joint Rescue Coordination Centre (JRCC) at least 24-48 hours before operations commence, in order to promulgate radio-navigation warnings.
- Notify JRCC when operations end.
- Provide updates to AHO and the JRCC on any changes to intended operations.
- Provide Department of Mines, Industry Regulation and Safety (DMIRS) pre-start notification confirming the start date of the proposed activity and a cessation notification to inform DMIRS upon completion of the activity to: petroleum.environment@dmirs.wa.gov.au

Environmental Performance Review and Reporting

Routine external reporting requirements are summarised in Table 10-3.

Table 10-3: Routine external reporting requirements

Report	Recipient	Frequency	Content
Monthly Recordable Incident Reports	NOPSEMA	Monthly, by the 15 th of each month.	Notification of a breach of an environmental performance outcome or standard, in the environment plan that applies to the activity that is not a reportable incident. Complete NOPSEMA’s Recordable Environmental Incident Monthly Report form.
Environmental Performance Report	NOPSEMA	Annual, with the first report submitted within 12 months of the commencement of the petroleum activity covered by this EP	In accordance with the Regulation 26C, confirmation of compliance with the Performance Outcomes, Performance Standards and Measurement Criteria of this EP. Reporting period 1 July to 30 June. Report must include sufficient information to enable NOPSEMA to determine whether or not the environmental performance outcomes and performance standards in the EP have been met.

End of the Environmental Plan

The EP will end when BHP notify NOPSEMA that petroleum activity has ended, and all of the obligations under the EP have been completed, and NOPSEMA has accepted the notification, in accordance with Regulation 25A of the Environment Regulations.

Notification will be through completion and submission of NOPSEMA's Regulation 25A – End of operation of environment plan form.

10.5.2 Incident Reporting (Internal)

BHP employees and contractors are required to report all environmental incidents and non-conformance with commitments made in the EP. It is the responsibility of the BHP HSE Manager to ensure that reporting of environmental incidents meets both regulatory reporting requirements and BHP Petroleum HSE Management Standard.

1SAP is used for the recording and reporting of these incidents. Detailed investigations are completed for all actual and high potential environmental incidents. The classification, reporting, investigation and actioning of all incidents including environmental are undertaken in accordance with BHP Petroleum Event and Investigation Management Protocol. Incident (potential or actual) corrective actions are monitored using 1SAP.

10.5.3 Incident Reporting (External) – Reportable and Recordable

Reportable Incidents

A reportable environmental incident is defined in Regulation 4 of the Environment Regulations as:

“...reportable incident, for an activity, means an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage”.

A reportable incident for the *Pyrenees Phase 4 Infill Drilling Program* includes, but are not limited to, those that have been identified through the risk assessment process as having a severity (consequence) level of ≥ 3 (refer to previous Table 6-2), or at a minimum:

- an uncontrolled release of hydrocarbons or environmentally hazardous chemicals of more than 80 litres to the marine environment;
- a vessel to vessel or vessel to MODU collision;
- a breach of RSEZ by an errant vessel;
- MODU loss of mooring;
- a dropped object with potential to rupture flowline;
- a confirmed or suspected introduction of an IMS to the operational area; or
- Injury or death of any marine fauna species listed as threatened or migratory under the EPBC Act.

In accordance with Regulations 26, 26A and 26AA, BHP will:

- Report all reportable incidents orally to NOPSEMA, as soon as practicable, and in any case not later than 2 hours after the first occurrence of the reportable incident; or if the reportable incident was not detected at the time of the first occurrence, the time of becoming aware of the reportable incident.

Oral notifications of a reportable incident to NOPSEMA will be via telephone: 1300 674 472.

The oral notification must contain:

- All material facts and circumstances concerning the reportable incident known or could be obtained by reasonable search or enquiry; and
- Any action taken to avoid or mitigate any adverse environment impacts of the reportable incident; and

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- The corrective action that has been taken, or is proposed to be taken, to stop, control or remedy the reportable incident.
- Provide a written record of the reportable incident to NOPSEMA, as soon as practicable after making the oral notification, but within three days after the first occurrence of the reportable incident unless NOPSEMA specifies otherwise. The written report should use a format consistent with NOPSEMA's Report of an Accident, Dangerous Occurrence or Environmental Incident form FM0929.
- Within 7 days of giving a written report of a reportable incident to NOPSEMA, a copy of the same written report must be provided to the National Petroleum Titles Administrator (NOPTA), and the Department of Mines, Industry Regulation and Safety (DMIRS).
- Provide written notification of any environmental incident that could potentially impact on any land or water in State jurisdiction via: petroleum.environment@dmirs.wa.gov.au

Recordable Incidents

A recordable environmental incident is defined in Regulation 4 of the Environment Regulations as:

*"...**recordable incident**, for an activity, means a breach of an environmental performance outcome or environmental performance standard, in the environment plan that applies to the activity, that is not a reportable incident".*

In terms of the activities within the scope of this EP, a recordable incident is a breach of the performance outcome or performance standards listed in Section 9 of this EP.

In the event of a recordable in recordable incident, BHP will report the occurrence to NOPSEMA as soon as is practicable after the end of the calendar month in which it occurs; and in any case, not later than 15 days after the end of the calendar month. If no recordable incidents have occurred, a 'nil incident' report will be submitted to NOPSEMA. Written reporting to NOPSEMA of recordable incidents and 'nil incidents' can be via completion of NOPSEMA's Form FM0928– Recordable Environmental Incident Monthly Report. The report will contain:

- a record of all the recordable incidents that occurred during the calendar month;
- all material facts and circumstances concerning the recordable incidents that are known or can, by reasonable search or enquiry, be found out;
- any action taken to avoid or mitigate any adverse environmental impacts of the recordable incidents;
- the corrective action that has been taken, or is proposed to be taken, to stop, control or remedy the recordable incident; and
- the action that has been taken, or is proposed to be taken, to prevent a similar incident occurring in the future.

Other External Incident Reporting Requirements

In addition to the notification and reporting of environmental incidents defined under the Environment Regulations and BHP Petroleum HSE Standard, the following incident reporting requirements also apply:

- In accordance with the Navigation Act 2012, any oil pollution incidents in Commonwealth waters will be reported by the Vessel Master to AMSA within 2 hours via the national emergency notification contacts and a written report within 24 hours of the request by AMSA.

The national 24-hour emergency notification contact details are:

Freecall: 1800 641 792

Fax: (02) 6230 6868

Email: mdo@amsa.gov.au

- All oil pollution incidents in WA State waters will be reported by the Vessel Master to the Oil Spill Response Coordination (OSRC) Unit within the DoT as soon as practicable (within 2 hours of spill occurring) via the

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24 hour reporting number (08) 9480 9924. The Duty Officer will then advise whether the following forms are required to be submitted:

- Marine Pollution Form (POLREP)
<http://www.transport.wa.gov.au/mediaFiles/marine/MAC-F-PollutionReport.pdf> and/ or
- Marine Pollution Situation Report (SITREP)
<http://www.transport.wa.gov.au/mediaFiles/marine/MAC-F-SituationReport.pdf>
- Any loss or discharge to sea of harmful materials is to be reported by the MODU OIM / Vessel Master using the prescribed Pollution Report (POLREP) form to the Rescue Coordination Centre (RCC).
- All oil pollution incidents in WA Port Authority Waters will be reported by the Vessel Master to the relevant WA Port Authority Harbour Master.
- BHP will notify DBCA duty officer on (08) 9219 9108 if spill has the potential to impact State Marine Parks or has impacted wildlife in State waters (to activate Oiled Wildlife Advisor), as well as notifying the DBCA Pilbara regional office (08) 9182 2000 as soon as practicable.
- All oil pollution incidents likely to affect WA Waters to be reported by the Vessel Master / MODU OIM (or delegate) to the DMIRS Emergency Incident Phone (0419 960 621) followed by written report sent to: petroleum.environment@dmirs.wa.gov.au
- Director of National Parks (DNP) should be made aware of oil/gas pollution incidences that occur within a marine park or are likely to impact on a marine park as soon as possible. Notification should be made to: Marine Compliance Duty Officer on 0419 293 465 (24 hours).

The notification should include:

- titleholder details;
- time and location of the incident (including name of marine park likely to be effected);
- proposed response arrangements as per the Oil Pollution Emergency Plan (e.g. dispersant, containment, etc.);
- confirmation of providing access to relevant monitoring and evaluation reports when available; and
- contact details for the response coordinator.
- In Commonwealth Waters– All suspected or known instances of introduced aquatic pests or disease detected in Commonwealth waters to be reported to the Department of Agriculture, Water and the Environment (DAWE) immediately, via the online reporting form: <https://www.agriculture.gov.au/pests-diseases-weeds/report>
- In WA State Waters – All suspected or known instances of introduced aquatic pests or disease detected in WA waters to be reported to the Biosecurity Section of DPIRD immediately, using the following contact details:
Telephone: Fishwatch 1800 815 507
Email: biosecurity@fish.wa.gov.au
- Any harm or mortality to EPBC Act-listed threatened marine fauna, whether attributable to the activity or not, within 7 days to the Department of Agriculture, Water and the Environment (DAWE) via email at: Email: EPBC.permits@environment.gov.au
- Any vessel strikes with cetaceans or whale sharks will be reported in the National Ship Strike Database at: <https://data.marinemammals.gov.au/report/shipstrike>

10.6 Emergency Preparedness and Response

10.6.1 Overview

Under Regulation 14(8), the implementation strategy must contain an oil pollution emergency plan (OPEP) and provide for the updating of the OPEP. In accordance with Regulation 14, the sections below detail the implementation strategy for hydrocarbon spill emergency conditions during drilling activities. The section outlines the response framework in the event of a hydrocarbon spill. As part of the implementation strategy, BHP has developed a series of spill response documents, inclusive of an OPEP (Appendix). Specific BHP arrangements are presented to ensure that the environmental impacts and risks of spill response activities will be continuously identified and reduced to ALARP.

10.6.2 Oil Spill Response Jurisdictional Arrangements

In the event of an oil spill, Control Agencies are assigned to respond to the various levels of spills is outlined in Table 10-4. The ‘Statutory Agency’ and ‘Control Agency’ are defined as follows:

Jurisdictional Authority: *the State or Commonwealth Agency assigned by legislation, administrative arrangements or within the relevant contingency plan, to control response activities to a maritime environmental emergency in their area of jurisdiction.*

Control Agency: *is the agency with operational responsibility in accordance with the relevant contingency plan to take action to respond to an oil and/or chemical spill in the marine environment.*

For a response in State jurisdiction, BHP will adhere to the IMT functions and Lead IMT designations as described in Appendix 2 of the Western Australian Department of Transport (DoT) Offshore Petroleum Industry Guidance Note - Marine Oil Pollution: Response and Consultation Arrangements (July 2020).

Table 10-4: Statutory and lead control agencies for oil spill pollution incidents

Area	Spill Source	Jurisdictional Authority	Lead Control Agency	
			Level 1	Level 2/3
Commonwealth Waters	Offshore Petroleum Activity	NOPSEMA	BHP	BHP
	Vessels	AMSA	AMSA	AMSA
State Waters	Offshore Petroleum Activity	DoT	BHP	DoT
	Vessels	DoT	BHP	DoT
Port Waters	Vessels	Port Authority	Port Authority / DoT	Port Authority / DoT

10.6.3 External Emergency Response Plans

The following external plans have been used to inform the development of oil pollution emergency documentation for the proposed activity:

- NatPlan - National Plan for Maritime Environmental Emergencies (NatPlan)
 - Sets out the national arrangements, policies and principles for the management of marine oil pollution. It defines obligations the States and various industry sectors in respect of marine oil pollution prevention, preparation, response and recovery.
- AMOSPlan – Australian Industry Cooperative Spill Response Arrangements
 - Managed by AMOSC, it details the cooperative arrangements for response to oil spills by Australian oil and associated industries.
- WA State Hazard Plan – Maritime Environmental Emergencies (SHPMEE)

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- Formally endorsed by the State Emergency Management Committee (SEMC) on 4 October 2019, the MEE details the management arrangements for preparation and response to marine oil pollution incidents in State waters.
- DoT Oil Spill Contingency Plan (DoT OSCP)
 - Details the procedures and arrangements for the management of marine oil pollution emergencies that are the responsibility of the DoT.
 - DoT Offshore Petroleum Industry Guidance Note (IGN) - Marine Oil Pollution (MOP) Response and Consultation Arrangements (available online: <https://www.transport.wa.gov.au/imagine/oil-spill-contingency-plans.asp>);
- Industry Joint Venture Plans: Various Plans developing general and assisted Oil Spill Response Capabilities
- Western Australian Oiled Wildlife Response Plan (WAOWRP)
 - Provides guidance and sets out the management arrangements for implementing oiled wildlife response in State waters. Each region has an Oiled Wildlife Response Plan that gives further details on sensitivities and available resources. The Pilbara Region Oiled Wildlife Response Plan is the relevant regional plan for oiled wildlife associated with *Pyrenees Phase 4 Infill Drilling* activities.
- AMSA Australian Government Coordination Arrangements for Maritime Environmental Emergencies
 - Provides a framework for the coordination of Australian Governmental departments and agencies in response to a maritime environmental emergency

The OPEP interfaces with National, State and BHP plans as shown in Figure 10-2.

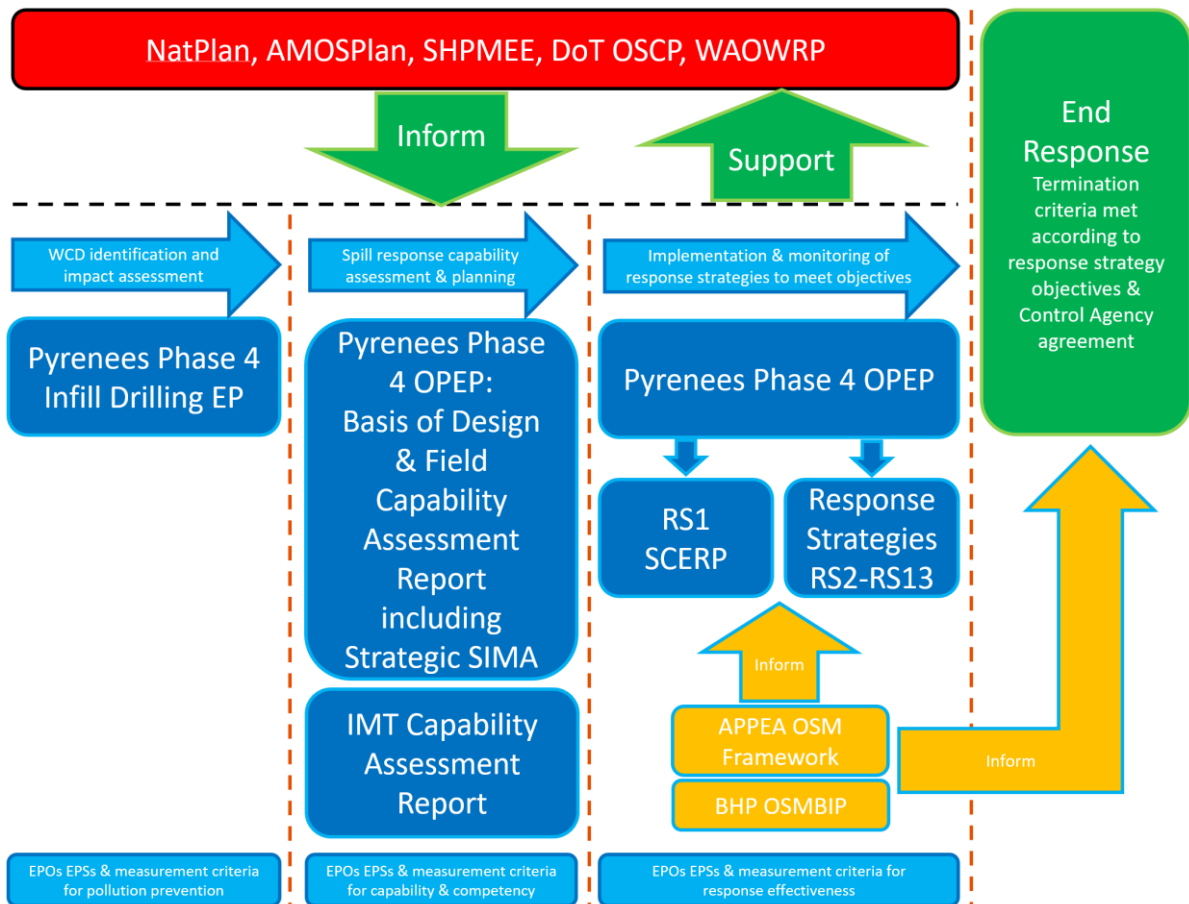


Figure 10-2: BHP spill response document framework

10.6.4 Internal Emergency Response Plans

Internal BHP requirements include the need to *Develop Emergency Response plans that are scaled according to the Petroleum activities, associated hazards, material risks and applicable regulatory requirements.*

To support this requirement, the following documents have been developed and implemented:

- Incident Management Plan – Australia (AOHSE-ER-0001);
 - Incident Management Handbook – (ICS Model);
- APU Emergency Contact Directory (AOHSE-0002-005);
 - APU IMT Contact Directory (EMQnet);
- BHP Pyrenees Phase 4 Well Operations Management Plan (WOMP) demonstrating compliance with:
 - Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011;
 - Weather Monitoring and Planning (PET-GDC20-DR-PRD-00061): describing extreme weather forecasting and emergency disconnect protocols and timeframes;
 - Well Design (PET-GDC20-DR-PRD-00062): detailing minimum design requirements to ensure well integrity;
 - BHP Petroleum Well Integrity Standard (DR-STD-PET-DC-0193): detailing well integrity and barrier requirements including verification of barriers and barrier elements during well construction, well suspension, temporary abandonment and permanent abandonment.
 - Cementing Standard (DR-PET-STD-DC-0142): detailing minimum cementing standards to ensure formation isolation; and
 - Well & Seismic Delivery (WSD) Organisation, Development and Training Standard (DR-STD-PET-DC-0123): covering well control training requirements for Drillers, Assistant Drillers & Supervisors involved in well control.

The following documents form the Pyrenees Spill Response Document Framework:

- The *Pyrenees Phase 4 Oil Pollution Emergency Plan (OPEP)* (BHPB-04PY-N950-0022): Detailed framework for spill response implementation inclusive of Environmental Performance Outcomes (EPOs), Environmental Performance Standards (EPSs) & Measurements Criteria for the effectiveness of the of response strategy implementation.

- Pyrenees Phase 4 OPEP: Basis of Design & Field Capability Assessment (BHPB-04PY-N950-0002)

The Basis of Design Assessment provides a detailed evaluation of response need based upon appropriate response strategies for the identified worst-case discharge (WCD) scenarios. The document includes:

- The Spill Impact Mitigation Assessment (SIMA)
 - The SIMA process developed by IPIECA (2017) is a pre-spill planning tool to facilitate response option selection and support the development of the overall response strategies by identifying and comparing the potential effectiveness and impacts of oil spill response strategies.
- An environmental impact and risk evaluation for the implementation of each selected response strategy;
- An evaluation of response need based upon WCD scenarios for each suitable response strategy;
- An evaluation of response capability to implement each suitable response strategy in an effective and timely manner, including an assessment of personnel, equipment, procedures both internal to BHP and from State and National resources and oil spill response organisations (OSRAs);
- An evaluation of the immediate need (first strike) and additional resource to implement an extended response;

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- An evaluation of response timings for each response strategy including detailed response time models (RTMs) for source control strategies;
- Spill response logistical arrangements;
- A detailed ALARP evaluation for each response strategy to demonstrate all reasonable and practicable response capability in available to implement a timely response; and
- Environmental Performance Outcomes (EPOs), Environmental Performance Standards (EPSs) & Measurements Criteria for response preparedness.

- APU Incident Management Team (IMT) Capability Assessment (AOHSE-ER-0071)

The IMT Capability Assessment provides a detailed evaluation of IMT capability and competency to enable the implementation of response strategies for the full duration of the oil pollution emergency. The document includes:

- APU / BHP Response Organisation Structure;
- IMT & Source Control Section (SCS) Structure including roles and responsibilities;
- EMT Structure including roles & responsibilities;
- IMT / SCS trainings & competency requirements;
- IMT / SCS resourcing evaluation; and
- Environmental Performance Outcomes (EPOs), Environmental Performance Standards (EPSs) & Measurements Criteria for maintenance of IMT / SCS capability & competency.

- Response Strategies RS2 – RS13

Detailed field response guidance documents for the implementation of all feasible response strategies as identified via the strategic SIMA process.

- BHP Australia Source Control Emergency Response Plan (SCERP) (OSRL-SW-PLA-00025):

The SCERP is consistent with the requirements of the BHP *Critical Control Performance Standards: Source Control* (PET-GDC20-DR-PRD-00063), the Source Control Framework detailed within the International Oil and Gas Producers (IOGP) Report 594 - Subsea Well Source Control Emergency Response Planning Guide for Subsea Wells (2019) and the APPEA Australian Offshore Titleholder's Source Control Guideline (June 2021). The SCERP details:

- BHP's access to industry resources under the APPEA Memorandum of Understanding: Mutual Aid;
- A program-specific evaluation of WCD consistent with Society of Petroleum Engineers (SPE), Technical Report on Calculation of Worst-Case Discharge, SPE-174705-TR;
- Primary well design details for identified blowout scenarios;
- An evaluation of surface access to undertake source control operations including subsea intervention, capping stack deployment and relief well locations;
- Detail the planning and resourcing requirements to initiate source control operations including: the SFRT, capping stack system, & relief well drilling; and
- A detailed timeline for the implementation of source control operations to the point of successful well kill.

The SCERP is in a format consistent with the APPEA Australian Offshore Titleholder's Source Control Guideline (June 2021) and includes:

- Purpose & objectives;
- Scope & overview of source control / kill strategy;
- References & applicable supporting documents;
- BHP source control incident levels & notification actions;

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- BHP source control response actions & interface arrangements with the BHP Incident Management Plan (IMP) & MODU Emergency Response Plans (ERP);
 - BHP Source Control Section (SCS) roles & responsibilities;
 - Source control resources available via the APPEA Mutual Aid MoU, specialist contractors & organisations, contractual and mobilisation arrangements;
 - MODU & vessel availability including tracking, securing, regulatory approvals and mobilisation;
 - Detailed logistics (national and international) & SIMOPS plans including field exclusions and coordination;
 - A Subsea Intervention Plan;
 - A Capping Stack Mobilisation Plan;
 - A separate Relief Well Plan;
 - BHP SCERP training, exercises, & readiness validation; and
 - Supporting technical appendices
- Pyrenees Field: Operational and Scientific Monitoring Bridging Implementation Plan (OSMBIP) (BHPB-04PY-N950-0023)

The OSMBIP provides the framework for environmental monitoring response to Level 2 and Level 3 offshore oil spills from petroleum activities undertaken by BHP Petroleum (Australia) Pty Ltd in the Pyrenees Oil Field Development located 20 kilometres off the North-West coast of Western Australia. The document is consistent with the Joint Industry OSM Bridging Implementation Plan (APPEA, 2020) and supplements the APPEA Joint Industry Operational and Scientific Monitoring Plan Framework (APPEA, 2020) with BHP-specific monitoring capability and procedures.
 - Tactical Response Plans (TRPs) for:
 - Yardie Creek
 - Turquoise Bay
 - Mangrove Bay
 - Jurabi Pt to Lighthouse beaches
 - Muiron Islands
 - Environmental Sensitivities Exmouth Region (AOHSE-ER-0021-008);
 - North West Cape Sensitivity Mapping (AOHSE-ER-0036); and
 - Contractor Emergency Response Plans (ERPs), SOPEPs and bridging documents.

10.6.5 Notifications and IMT Activation

For Level 1 incidents, the MODU and/or AHTS vessel contractor responds to the incident and immediately notifies the BHP Drilling Superintendent and/or Head of Drilling & Completions Australia.

For Level 2/3 incidents, the MODU and/or AHTS vessel contractor immediately notifies the BHP Drilling Superintendent and/or Head of Drilling & Completions Australia who as soon as possible notifies the BHP Emergency and Crisis Centre (ECC). The ECC is located in Houston and provides dedicated emergency response communications and co-ordination 24hours a day, 365 days per year.

10.6.6 Government Agency Notification

BHP response teams are hierarchical in nature, and response teams and resources are progressively activated depending on the severity of an incident. Government Agencies and Industry Organisations may also be mobilised. The *Pyrenees Phase 4 Infill Drilling Program* Stakeholder Database (housed within EMQnet) will be used to maintain contact with identified stakeholders.

10.6.7 Industry Joint Venture Programmes

BHP undertake Joint Venture Programmes with other operators and organisations including, but not limited to, Santos, Woodside, Vermillion, DoT and AMOSC. These programmes aim to develop operational guidelines, operational tests, training processes and plans to inform and prepare oil spill response strategies. The programmes also provide guidance and training around First Strike incident plans, key operational considerations, understanding of shoreline sensitivities and lists of resources required to implement response.

10.6.8 Review and Testing of the Oil Pollution Emergency Arrangements

Review and update of the OPEP and SCERP

Whilst the duration of the activity is approximately 3-4 months, this may be undertaken over a 2 calendar year period therefore BHP shall review both the OPEP & SCERP within 12 months of NOPSEMA acceptance to ensure currency of information unless the activity is completed prior to this 12 month period.

The Regional HSE Lead Australia is responsible for assessing any changes and deciding if the changes require a resubmission of the OPEP under Section 17 of the Environment Regulations.

The Head of Drilling & Completions Australia is responsible for the review, and where applicable, update of the SCERP.

Schedule of Response Testing

BHP maintains a schedule of testing of spill response arrangements.

There are three exercise styles that will be utilised to exercise and test response arrangements:

- Notification Exercise;
- Desktop / Discussion Exercise (DISCEX) in the form of a workshop; and
- Major / Functional Exercise in the form of a scenario-based simulation (No actual deployment of equipment)

A desktop / DISCEX (familiarisation/ information session) will be conducted prior to commencement of drilling for the BHP Perth IMT to provide an overview of the OPEP and SCERP including source control tactics that may be employed during a LOWC event. BHP and IMR Houston-based resources that would likely be involved in the IMT Source Control Section will also receive the familiarization/ information session.

BHP will conduct a major / functional exercise at least 1 month prior to the commencement of drilling activities based upon a WCD (LOWC) scenario within the Pyrenees Field. Additionally, BHP will make provision to test response arrangements:

- if they are significantly amended following the acceptance of the EP / OPEP, including the command structure and functional arrangements of the IMT and interface / contracting arrangements with OSROs and / or response service providers;
- not later than 12 months after the most recent test should the accepted EP / OPEP remain in-force for longer than a 12 month period; and
- if a new location for the activity is added to the EP after the response arrangements have been tested, and before the next test is conducted. Testing the response arrangements in relation to the new location will be undertaken as soon as practicable after it is added to the plan.

Response Testing Objectives

The major / functional exercise will incorporate the Perth IMT Command and General Staff, Source Control Section resources and selected support specialist contractors. The exercise may be conducted in a phased approach, or as a single oil spill response exercise. Where BHP response strategies and IMT have been

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subject to a major exercise in the past 12 months, and the testing scenario is comparable to that of a Pyrenees oil pollution emergency in relation to oil type and resources at risk from oil pollution, results from previous exercises may be used to validate the response testing objectives detailed below.

The exercise objectives for testing the OPEP will include:

- Test establishment of Perth IC Centres (real-time) and Forward Operating Bases;
- Test incident reporting protocols in relation to both internal and external requirements;
- Test activation of OSRO's and readiness to mobilise personnel and equipment within specified timeframes as detailed within the OPEP;
- Test communications with OSROs including arrangements for remote working;
- Development of an IAP for Day 1 response in State waters;
- Test BHP IMT communications and interface relationships with DoT IMT via JSCC;
- Validate BHP capability to support a potential shoreline response in State Jurisdiction;
- Validate BHP capability to implement the OSMBIP (BHPB-04PY-N950-0023); and
- Test arrangements for the management of aboriginal heritage sites during a response.

The exercise objectives for testing the SCERP will include:

Personnel availability and readiness:

- Practice activation of Source Control Section Perth and Houston functions;
- Validate adequate resourcing for Perth based Source Control Section lead roles;
- Validate adequate resourcing for Houston based Source Control Section roles;
- Validate resourcing for specialist contractors for relief well planning and execution;
- Validate resourcing for specialist contractor roles to support site survey /debris clearance and BOP Intervention;
- Validate resourcing for specialist contractor roles to support water column monitoring;
- Validate resourcing for specialist contractors to undertake capping stack deployment;
- Practice developing SCS strategies and tactics to meet objectives; and
- Practice and validate successful interface of Houston based SCS resources with Perth IMT SCS.

Equipment availability:

- Validation of vessel tracking software (Sea / Response) utilised to identify vessels with ROV support for site survey, debris clearance/BOP intervention and SSDI;
- Validate resourcing for SSDI equipment and execution;
- Validate capping stack transport and deployment vessel utilising vessel tracking software;
- Validate subsea dispersant supply timings from AMOSC and OSRL to facilitate SSDI operations; and
- Validate water column monitoring equipment transport timings into Australia

Procedure and Process:

- Validation of OSRL Singapore capping stack and water column monitoring activation process; and

- Validation of AMOSC SFRT activation process

Evaluation of effectiveness of response arrangements

Exercise evaluation of a functional exercise will be undertaken by selected exercise evaluators drawn both internally within BHP and externally by specialist incident management /source control training providers. The evaluation will consider if the exercise objectives have been achieved and include:

- If IMT roles and responsibilities were undertaken adequately to manage a WCD (LOWC) event;
- If key decision/trigger points were identified;
- If any resource issues were identified;
- If the SCERP and the BHP Incident Management framework support an effective response to a LOWC event;
- If the interface and support between Houston and Perth SCS resources was effectively managed; and
- If participants within the SCS were familiar with the relevant SCERP components.

Lessons learned throughout the exercise and during the post exercise debrief will be recorded including identified strengths and areas for improvement.

Response testing recommendations

Any actions from exercises are tracked and closed out via the BHP 1SAP system and lessons learnt incorporated into subsequent tests. Where required, response documentation shall be updated to incorporate learnings derived during response testing.

Audits

Audits of External Organisations

A formal audit of AMOSC is done by representatives of member companies annually. At the conclusion of an audit, improvement opportunities and corrective actions are formally noted and corrective actions assigned. In some instances changes may be required to the OPEP, but changes will only be made in accordance with the OPGGS (Environment) Regulations.

Audits of Internal Actions

Following an emergency spill incident there may be a requirement for legal and/ or other regulatory or formal HSE incident investigations to be conducted in accordance with the BHP HSE Management System.

In addition to this, it is essential that the IMT response actions are reviewed as soon as practicable after an incident. The aim of the incident review is to identify any particular lessons that should be shared across the Company, and that can be used to improve the plans or response actions in the future.

Post-spill debriefs address:

- Spill causes, if known;
- Spill response;
- Speed;
- Operation;
- Effectiveness;
- Equipment suitability;
- Health and safety issues, as appropriate; and
- Integration of plan and procedures with other response organisations, consultants, and or agencies.

10.6.9 Emergency Preparedness Consultation

BHP has undertaken consultation with both DoT and DBCA in alignment with Offshore Petroleum Industry Guidance Note - Marine Oil Pollution: Response and Consultation Arrangements (DoT, July 2020). Specifically, all information outlined within Appendix 6 of the guidance note was presented to both DoT and DBCA in a workshop held on the 17th September 2021. AMOSC was also in attendance.

In accordance with DoT guidance, a copy of the draft Pyrenees OPEP (inclusive of Basis of Design Field Capability Assessment Report and IMT Capability Assessment Report) was sent to DoT for review. Comments from DoT on the draft response documents shall be considered within future revisions of these documents.

Additionally, the BHP Regional HSE Lead Australia shall arrange for final versions of the above documents to be forwarded to the following key Response Agencies prior to undertaking the activity:

- Australian Maritime Oil Spill Centre (AMOSC); and
- WA DoT Oil Spill Response Coordination (OSRC) Unit.

10.6.10 Pollution Insurance

BHP and all subsidiary companies, including BHP Petroleum Australia maintain liability insurance for sudden and accidental pollution. The level of coverage is commensurate with the potential nature and scale of a WCD for the activity and has been calculated in accordance with the 2018 *APPEA Method for Estimating Levels of Financial Assurance*.

10.6.11 Cyclone Response

Tropical cyclones have the potential to cause damage to equipment, risk to the safety and health of personnel and potential to cause spills of hazardous materials into the environment from damaged equipment and vessels.

As the timing of the activity may change, it is possible the program could overlap with the cyclone season (November to April, with most cyclones occurring between January and March). If the activity is conducted in cyclone season, the MODU contractor must have a Cyclone Contingency Plan (CCP) in place outlining the processes and procedures that would be implemented during a cyclone event, which will be reviewed and accepted by BHP.

10.6.12 Pandemic Response

Management of COVID-19 – Planned Activities

Table 10-5 provides a list of the procedures that document the controls that will be used to manage COVID-19 during the activity.

Table 10-5: Procedures for management of COVID-19

Document	Author	Summary
Novel coronavirus (COVID-19) Australian Upstream Oil & Gas Industry Offshore and Offshore Protocols (April 2020).	APPEA	<p>These protocols have been developed by the Australian oil and gas industry to inform Governments of industry protocols in place to protect workers and the community. The protocol is intended to reinforce and operate concurrently with the public health arrangements as they are put in place by Australian state Governments to manage and address the impacts of COVID-19 including restrictions on borders or movement. The objectives of these protocols are to:</p> <ul style="list-style-type: none"> • Keep the oil and gas industry workforce safe and healthy, • Ensure that the oil and gas industry does not adversely impact the health of regions and communities it operates in and does not undermine public health efforts, and

Document	Author	Summary
		<ul style="list-style-type: none"> Maintain operations, business continuity and production for the benefit of the Australia’s energy and fuel security, the industry, workers, and communities in which they operate
COVID-19 Global Response Manual	BHP	The COVID-10 Global Response Manual provides the mandatory requirements, company-wide controls and guidance to treat the risk of COVID-19 across all BHP Locations
Resources Industry Worker (Restrictions on Access) Directions	WA Govt	Access restriction to rig or platform crew member to enter, or remain at, a rural or remote airport or a state Port for the purpose of undertaking a journey unless the rig or platform crew member has been fully vaccinated against COVID-19 (unless is an exempt person)

BHP shall review the MODU and Vessel Contractor’s COVID-19 Management Plans prior to undertaking the activity, and ensure consistency with Novel coronavirus (COVID-19) Australian Upstream Oil & Gas Industry Offshore and Offshore Protocols (April 2020) and the BHP COVID-19 Global Response Manual.

BHP have a weekly operations team COVID-19 Business Continuity Plan meeting where all changes to current State and national COVID-19 conditions are evaluated and managed.

Management of COVID-19 – Unplanned Activities (Oil Spill Response)

During a spill event the protocols listed above would also apply to all aspects of the response.

The upstream petroleum industry, via APPEA Oil Spill Preparedness and Response Working Group (OSPRWG), and the Drilling Industry Safety Committee (DISC) Source Control Working Group (WG) have conducted a COVID-19 Oil Spill Response and Source Control Service Provider Capability Validation Activity. This activity evaluated service provider organisation capability (personnel, equipment, assets, mobilisation capabilities, etc.) and their agreement to work under the National Plan endorsed Novel Coronavirus (COVID-19) Disease Management Plan. Two workshops have been conducted with representatives from the Upstream Oil and Gas Industry (including BHP), AMOSC, NOPSEMA and the WA Department of Transport.

The main risk that the COVID-19 pandemic presents to spill response is the ability to move personnel across State and international borders due to the controls put in place by the Australian Government at both Commonwealth and State levels. For WA, quarantine controls are mandated via Quarantine (Closing the Border) Directions given by the WA Commissioner of Police under the framework of the *Emergency Management Act 2005*. Exemptions would be requested from the WA Government to potentially move additional personnel to assist with a sustained response, however these cannot be granted in advance at the time of preparing this EP. This has the potential to impact response planning in the first 14 days of the response where the response may require additional personnel from outside of WA. Subsequent rostering can allow for a 14 day quarantine and so will have a much reduced impact on the response capability. Contingency measures are being evaluated regarding the ability to separate international and interstate responders from WA Response teams in the first 14 days of the response, however, these arrangements would still require WA Government approval.

Given the numbers of personnel and the likelihood of the event occurring it could not be justified to have the numbers of personnel relocate to WA or to be on a 14 day quarantine roster.

Table 10-6 is an adaption of the assessment completed during the Oil Spill Response and Source Control – Mitigations Workshop and State Oil Spill Response Workshop held with Dot & DBCA. As part of the preparation of this EP, BHP assessed each of the applicable response strategies for a worst case LOWC scenario, and at the time of the review, can confirm the ability to execute from WA resources under current COVID-19 conditions. Further information is presented within the APU Incident Management Team (IMT) Capability Assessment Report (AOHSE-ER-0071).

Table 10-6: BHP COVID-19 oil spill response assessment

Response Activity (APPEA categories)	International Mobilisation Numbers and likelihood of need (APPEA assessment)	Interstate Mobilisation Numbers and Likelihood of need (APPEA assessment)	Existing WA resourced capability in place for the activity (BHP assessment)
Aerial Surveillance		3-5 Low	YES
Aerial Dispersant	3-6 High	5-20 High	YES
Offshore Vessel Dispersant		5-10 Low	YES
Offshore Contain and Recovery		5-10 Moderate	YES
SCAT / Shoreline Clean-Up		50 – 100 Moderate	YES
Protect & Deflect of Sensitives Area		10-20 Low	YES
Oiled Wildlife Cleaning and Rehabilitation	2-10 Moderate	30-50 Moderate	YES
Operational Monitoring		2-5 Low	YES

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Appendix A

BHP Charter



Our Charter

**We are BHP,
a leading global resources company.**

Our Purpose

To bring people and resources together to build a better world.

Our Strategy

Our strategy is to have the best capabilities, best commodities and best assets, to create long-term value and high returns.

Our Values

Sustainability

Putting health and safety first, being environmentally responsible and supporting our communities.

Integrity

Doing what is right and doing what we say we will do.

Respect

Embracing openness, trust, teamwork, diversity and relationships that are mutually beneficial.

Performance

Achieving superior business results by stretching our capabilities.

Simplicity

Focusing our efforts on the things that matter most.

Accountability

Defining and accepting responsibility and delivering on our commitments.

We are successful when:

Our people start each day with a sense of purpose and end the day with a sense of accomplishment.

Our teams are inclusive and diverse.

Our communities, customers and suppliers value their relationships with us.

Our asset portfolio is world-class and sustainably developed.

Our operational discipline and financial strength enables our future growth.

Our shareholders receive a superior return on their investment.

Mike Henry

Chief Executive Officer

February 2020

Appendix B

RELEVANT LEGISLATION, REGULATIONS AND OTHER REQUIREMENTS

Commonwealth Legislation and Regulations

Legislation or Regulation	Description
<i>Air Navigation Act 1920</i>	The Act relates to the management of air navigation.
<i>Australian Maritime Safety Authority Act 1990</i>	The Australian Maritime Safety Authority (AMSA) is a Commonwealth agency responsible for regulation of maritime safety, search and rescue, and ship sourced pollution prevention functions under the Navigation Act 1912 (Cth), protection of the sea legislation, including the Protection of the Sea (Prevention of Pollution from Ships) Act 1983 (Cth) and subordinate legislation made pursuant to these Acts.
<i>Australian Ballast Water Management Requirements (Commonwealth of Australia, 2020)</i>	The Australian Ballast Water Management Requirements (Rev 8) set out the obligations on vessel operators with regards to the management of ballast water and ballast tank sediment when operating within Australian seas.
<i>Biosecurity Act 2015</i>	This Act is about managing diseases and pests that may cause harm to human, animal or plant health or the environment. The proposed amendments also strengthen Australia’s ability to manage ballast water in ships. They will provide additional protection for coastal environments from the risk of marine pest incursions by fostering new ballast water treatment technologies and phasing out ballast water exchange.
Biosecurity Regulation 2016	The Biosecurity Regulation prescribes a number of measures and obligations that are common between the Biosecurity Act. Pre-arrival reporting, cost recovery and the isolation and export power provisions all support business as usual activities that were available under the Quarantine Act and therefore represent no substantive change.
<i>Environment Protection & Biodiversity Conservation Act 1999 (EPBC Act)</i>	Commonwealth Department of Agriculture, Water and the Environment administers the Act that provides legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places—defined in the EPBC Act as matters of national environmental significance (NES). These include nationally threatened species and ecological communities, migratory species and Commonwealth marine areas. The Act regulates assessment and approval of proposed actions likely to have a significant impact on a matter of NES. The approval decision is made by a delegate of the Australian Government Environment Minister.
Environment Protection and Biodiversity Conservation Regulations 2000	Regulations provide for a wide range of detail essential for the operation of the Act, including regulations relating to management of Commonwealth reserves, information requirements for assessment processes, enforcement, granting of various permits, publication requirements and criteria that need to be met in relation to a wide variety of decision making processes provided for under the Act.
<i>Environment Protection and Biodiversity Conservation Act 1999 - Proclamation - Ningaloo Marine Park (Commonwealth Waters)</i>	Declaration of Ningaloo Marine Park in Commonwealth Waters.
<i>Environment Protection (Sea Dumping) Act 1981</i> Environment Protection (Sea Dumping) Regulations 1983	The Act regulates the dumping at sea of controlled material (including certain wastes and other matter), the incineration at sea of controlled material, loading for the purpose of dumping or incineration, export for the purpose of dumping or incineration, and the placement of artificial reefs. Permits are required for any sea dumping activities. Operational discharges from vessels are not defined as ‘dumping’ under the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 and therefore not regulated under the Act.
<i>Hazardous Waste (Regulation of Exports and Imports) Act 1989</i>	Relates to controls over import and export of hazardous waste material. Permits are required to import waste into Australia.

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Legislation or Regulation	Description
<i>Industrial Chemicals (Notification and Assessment Act) 1989</i>	The Act establishes the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) to regulate the supply of chemicals into Australia, and importers or manufacturers of chemicals or chemical products must comply. The Act involves assessing and registering industrial chemicals in a national scheme and applies to solvents, adhesives, plastics, laboratory chemicals and paints, as well as chemicals used in cleaning products. Chemicals are defined by exclusion: a substance is an industrial chemical if it is not an agricultural or veterinary product, medicine or medicinal product, food additive, contaminant or natural toxicant.
<i>Maritime Transport and Offshore Facilities Security Act 2003</i>	Department of Infrastructure & Transport (Maritime Security for Offshore Oil & Gas) regulate offshore security plans and Maritime Security Identification Cards (MSIC's).
Maritime Transport and Offshore Facilities Security Regulations 2003	Department of Infrastructure & Transport (Maritime Security for Offshore Oil & Gas) regulate offshore security plans and MSICs.
<i>National Environment Protection Council Act 1994</i>	This Act provides for the establishment of a National Environment Protection Council (NEPC), and empowers the setting of National Environmental Protection Measures (NEPM). Under the NEPC Act, the Commonwealth has agreed to apply any adopted NEPM to its activities as part of the fulfilment of its obligations under the Intergovernmental Agreement on the Environment 1992 and enables application of State law to ensure uniformity in national pollution standards and environmental protection. NEPMs can only be made to address the following 7 environmental issues: 1.ambient air quality; 2.ambient marine, estuarine and fresh water quality; 3.noise standards; 4.site contamination assessment guidelines; 5.hazardous waste impacts; 6. re-use and recycling of used material; and 7.motor vehicle noise and emissions.
National Environment Protection (National Pollutant Inventory) Measure 1998	The National Pollutant Inventory (NPI) is a database established to provide information on substances being emitted to the air, land and water, and transported in waste. The inventory tracks the magnitude of emissions and the amounts transported in waste of 93 substances. While the NPI NEPM is a federal initiative, each state has legislation giving effect to the program.
<i>National Greenhouse and Energy Reporting Act 2007</i>	This Act provides for the reporting and dissemination of information related to greenhouse gas emissions, greenhouse gas projects, energy production and energy consumption, and for other purposes.
<i>Navigation Act 2012</i>	This Act establishes framework for controls on navigation, marine safety and shipping for ships in Australian waters or territories primarily proceeding on international or inter-state voyages.
Navigation (Orders) Regulations 1980	Details the penalty where Marine Orders are prescribed as "Penal Provisions".
Marine Orders	Marine Orders (MO) are subordinate rules made pursuant to the Navigation Act 2012 and Protection of the Sea (Prevention of Pollution from Ships) Act 1983 affecting the maritime industry. They are a means of implementing Australia's international maritime obligations by giving effect to international conventions in Australian law.
Marine Order 32 - Cargo Handling Equipment	MO32 relates to loading and unloading of cargo, and the safe transfer of persons, from ships, off-shore industry vessels and off-shore industry mobile units
Marine Order 41 Carriage of Dangerous Goods	MO41 gives effect to Part A Chapter VII of SOLAS, in particular the International Maritime Dangerous Goods Code (IMGDC) which deals with the carriage of dangerous goods in packaged form, together with prescribing other matters related to carriage of dangerous goods in ships, notice of intention to ship dangerous goods, and provisions related to the loading, stowing, carriage or unloading in ships of cargo.
Marine Order 58 – International Safety Management Code	MO58 specifies the requirements of the International Safety Management (ISM) Code and gives effect to Chapter IX of SOLAS. The purpose of the ISM Code is to provide an international standard for the safe management and operation of ships and for pollution prevention.

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Legislation or Regulation	Description
Marine Order 59 –Offshore Industry Supply Vessels	MO59 specifies a number of performance-based requirements for safe navigation and a safe system of operations for off-shore industry vessel operations, including arrangements for safe operations during emergencies. The Order specifies guidelines considered to satisfy these performance-based requirements. The Order also allows alternative practices to be considered and approved as equivalent to those practices in the specified guidelines (NWEA Guidelines). MO59 applies to vessels not registered in Australia, if vessel is engaged in operations associated with or incidental to petroleum exploration or production activity.
Marine Order 91 - Marine Pollution Prevention - Oil	MO91 gives effect to Annex I of the International Convention for the Prevention of Pollution from Ships 1973, as amended by the Protocol of 1978 (MARPOL 73/78).
Marine Order 93 - Marine Pollution Prevention - Noxious Liquid Substances	MO93 gives effect to Annex II of the International Convention for the Prevention of Pollution from Ships 1973, as amended by the Protocol of 1978 (MARPOL 73/78). Details the discharge criteria and measures for the control of pollution by noxious liquid substances carried in bulk. It subdivides substances into and contains detailed operational standards and procedures. Some 250 substances are appended to the London Convention. The discharge of their residues is allowed only to reception facilities until certain concentrations and conditions (which vary with the category of substances) are compiled with. In any case, no discharge of residues containing noxious substances is permitted within 12 miles of the nearest land.
Marine Order 94 - Marine Pollution Prevention – Package Harmful Substances	MO94 gives effect to Annex III of the International Convention for the Prevention of Pollution from Ships 1973, as amended by the Protocol of 1978 (MARPOL 73/78) in relation to packaged harmful substances.
Marine Order 95 - Marine Pollution Prevention - Garbage	MO95 gives effect to Regulation 8 of Annex V (dealing with port State control on operational requirements) and prescribes matters in relation to Regulation 9 of Annex V (dealing with placards, garbage management plans and garbage record-keeping) to the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78).
Marine Order 96 Marine Pollution Prevention - Sewage	MO96 sets out MARPOL requirements in relation to survey and certification requirements; how sewage should be treated or held aboard ship; and the circumstances in which discharge into the sea may be allowed.
Marine Order 97 - Marine Pollution Prevention - Air Pollution	MO96 sets out MARPOL requirements in relation to air pollution.
Marine Order 98 Marine Pollution - Anti-fouling Systems	MO98 gives affect Articles 3, 4 and 10 of the Anti-Fouling System Convention and Annex 4 to that Convention which provides for controls on anti-fouling systems, and the survey, inspection and certification of ships in relation to those systems. MO98 also prescribes various matters, such as survey and certification requirements and forms to be used to report incidents, for the purposes of the Protection of the Sea (Harmful Anti-fouling Systems) Act 2006.
Notices to Mariners	Issues Nautical Charts. Manages marking of Safety Zones after NOPSEMA gazetting under OPGGSA Section 612 and Marine Cautionary Zones.
<i>Offshore Petroleum and Greenhouse Gas Storage Act 2006</i>	Legislation concerning Australian offshore petroleum exploration & production in Commonwealth Waters. National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) is an independent safety and environmental management Authority funded by levies on industry participants and regulates matters with powers conferred directly from OPGGSA and via Regulations concerned with: <ul style="list-style-type: none"> • Occupational Health & Safety law at Facilities and offshore operations under Schedule 3 • Environmental management • Structural integrity of Wells under Resource management regulations. NOPSEMA may also declare a 500 metre petroleum safety zone around wells associated with drilling operations.

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Legislation or Regulation	Description
Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009	<p>Regulations administered by NOPSEMA to ensure offshore petroleum activity is carried out in a manner consistent with the principles of ecologically sustainable development and in accordance with an accepted environment plan, in particular:</p> <ul style="list-style-type: none"> • Assessment of environment plans (EP), including associated oil pollution emergency plans (OPEPs) [previously oil spill contingency plans (OSCPs)]; and • Investigation of accidents, occurrences and circumstances with regard to deficiencies in environmental management.
Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009	<p>Regulations administered by NOPSEMA particularly requiring that an accepted Safety Case is in force for a facility. A facility can include a Mobile Offshore Drilling Unit, and aspects of the Safety Case may interrelate with environmental considerations, such as the Facility Description and matters related to technical integrity of the facility.</p>
Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011	<p>NOPSEMA acceptance of well operations management plan (WOMP) & administration of regulations associated with well integrity.</p>
<i>Offshore Petroleum and Greenhouse Gas Storage (Regulatory Levies) Act 2003</i>	<p>Act to impose levies relating to the regulation of offshore petroleum activities, including well levies and environment plan levy.</p>
Offshore Petroleum and Greenhouse Gas Storage (Regulatory Levies) Regulations 2004	<p>Regulations prescribing the amount and method of calculation for imposition of levies relating to the regulation of offshore petroleum activities, including well levies and environment plan levy.</p>
<i>Ozone Protection and Synthetic Greenhouse Gas Management Act 1989</i>	<p>This Act gives effect to Australia's obligations under the Vienna Convention and the Montreal Protocol by introducing, a system of controls on the manufacture, import and export of substances that deplete ozone in the atmosphere and synthetic greenhouse gases.</p>
Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995	<p>Regulation contain controls relating to: import/export/manufacture licensing; manufacture and disposal of scheduled substances; refrigeration and air-conditioning; methyl bromide; and fire protection; import and export of any products and equipment containing hydrofluorocarbons, perfluorocarbons and SF6; and a requirement for importers and manufacturers to pay a levy incorporating a carbon charge component based on the equivalent carbon price.</p>
<i>Protection of the Sea (Harmful Anti-fouling Systems) Act 2006</i>	<p>Gives effect to the Control of Harmful Anti-Fouling Systems on Ships (HAF) Convention which makes it an offence for any ship bearing harmful chemical compounds on their hulls or external parts or surfaces to enter an Australian port, shipyard or offshore terminal, unless the ship bears a coating to prevent such compounds leaching into the water. A similar offence applies to Australian ships entering a port, shipyard or offshore terminal elsewhere in the world.</p>
<i>Protection of the Sea (Powers of Intervention) Act 1981</i>	<p>Act authorises AMSA to take measures for the purpose of protecting the sea from pollution by oil and other noxious substances discharged from ships and implements the International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties and the Protocol relating to Intervention on the High Seas in Cases of Pollution by Substances other than Oil. Act enables AMSA to take measures on the high seas to prevent, mitigate or eliminate the danger apparent upon a maritime casualty where there is grave and imminent danger to the coastline of Australia, or to the related interests of Australia from pollution or threat of pollution of the sea by oil which may reasonably be expected to result in major harmful consequences. Similar powers apply in relation to a ship which is in internal waters, is in the Australian coastal sea, or any Australian ship on the high seas where oil or a noxious substance is escaping, and gives AMSA power to take such measures as it considers necessary to achieve a number of objectives detailed in the Act.</p>

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Legislation or Regulation	Description
<i>Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i>	Act administered by the Australian Maritime Safety Authority (AMSA), deals with the protection of the marine environment from ship-sourced pollution. The Act implements the International Convention for the Prevention of Pollution from Ships 1973 and the subsequent 1978 Protocol to the Convention (collectively MARPOL 73/78) and setting operational and construction standards for ships to prevent pollution and regulating normal operational discharges from ships. MARPOL 73/78 annexes regulate the discharge of oil (Annex I), noxious liquid substances (Annex II), the disposal from ships of sewage (Annex IV) and garbage (Annex V) and prohibit the disposal of harmful substances carried by sea in packaged forms (Annex III).
Protection of the Sea (Prevention of Pollution from Ships) (Orders) Regulations 1994	Sets penalty levels for non-compliance.
<i>Protection of the Sea (Shipping Levy Collection) Act 1981</i>	Levy is a charge against ships and is based on the "potential polluter pays" principle. The levy applies to vessels which are more than 24 metres in length and have onboard more than 10 tonnes of oil in bulk as fuel or cargo.
<i>Underwater Cultural Heritage Act 2018</i>	The Act replaces the <i>Historic Shipwrecks Act 1976</i> with a modernised framework for protecting and managing Australia underwater culture heritage. The Act protects shipwrecks, sunken aircraft that are at least 75 years old, whether their location is known or unknown, and associated relics. It also enables the Minister to protect shipwrecks that have been sunk for less than 75 years if they are of historic significance, such as ships wrecked during World War II. All relics associated with historic shipwrecks are protected both while associated with the shipwreck and after their removal, provided that they went down with the ship. The Act also enables the Minister to declare protected zones around historic shipwrecks. A permit is required to carry out prescribed activities, such as trawling, diving or mooring or using ships in a protected zone. The Act prohibits conduct that may interfere with protected shipwrecks and their associated relics.

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Western Australian Legislation and Regulations

Legislation or Regulation	Description
<i>Aboriginal Heritage Act 1972</i>	Enacted to ensure that all Aboriginal cultural heritage within Western Australia could be properly protected and preserved. The Act provides recognition, protection and preservation of Aboriginal sites in Western Australia. It is an offence under s.17 of the Act to excavate, destroy, damage, conceal, or in any way alter an Aboriginal site.
<i>Conservation and Land Management Act 1984</i>	Department of Biodiversity, Conservation and Attractions (DBCA) is responsible for the day to day management of marine parks vested with Marine Parks and Reserves Authority (MPRA) and provide administrative support to the MPRA. MPRA is responsible for the preparation of management plans for all lands and waters which are vested in it. Marine nature reserves, marine parks and marine management areas are the three reserve categories vested in the MPRA. Offshore operations must comply with specific marine park conditions when navigating or conducting activities in or near areas designated as marine sanctuaries for conservation, recreational, ecological, historical, research, educational, or aesthetic qualities, such as Ningaloo Marine Park (state waters) (Class A reserve) and Muiron Islands Marine Management Area.
Conservation and Land Management Regulations 2002	Details further requirements for protection of flora and fauna including restrictions on approaches to fauna, fishing restrictions and operation of vessels in marine protected areas. Also includes prohibition of pollution in marine protected areas.
<i>Dangerous Goods Safety Act 2004</i>	Act relating to the safe storage, handling and transport of dangerous goods and for related purposes.
Dangerous Goods Safety (Explosives) Regulations 2007	Relevant to storage and handling of explosives on marine support vessels.
Dangerous Goods Safety (Goods in Ports) Regulations 2007	'Goods in Ports' Regulations give legal status to the provisions of Australian Standard AS 3846 The handling and transport of dangerous cargoes in port areas. Requires classification of Dangerous Goods loads based on the International Maritime Dangerous Goods Code (IMDG) rather than ADG Code. Additional requirements are for safety management and emergency plans.
Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007	Regulations adopt NOHSC Standard for the Storage and Handling of Workplace Dangerous Goods. Western Australia has retained a licensing system for dangerous goods. In relation to dangerous goods, 'handling' includes manufacture, process, pack, use, sell, supply, carry and disposal of dangerous goods. References to the Australian Dangerous Goods Code (the ADG Code) in the regulations relate to the 7th edition of the ADG Code.
<i>Emergency Management Act 2005</i>	The State Hazard Plan for Hazardous Material Emergencies (HAZMAT) details the emergency management arrangements relating to the prevention of, preparation for, response to and recovery from Marine Transport Emergencies that occur in WA waters.
Emergency Management Regulations 2006	DoT Marine Safety is the prescribed Hazard Management Agency for response under the Emergency Management Regulations 2006 for all emergencies in which there is an —actual or impending event involving a ship that is capable of causing loss of life, injury to a person or damage to the health of a person, property or the environment.
<i>Environmental Protection Act 1986</i>	Act contains measures for preventing or minimising pollution, which includes a general prohibition against pollution. Applicable areas include discharge of operational waste (sewage, galley waste) and oily water from vessels, gaseous emissions from diesel engines and ballast water exchange and discharge.
Environmental Protection Regulations 1987	Prescribes further matters to give effect to the Act including control of pollution and licence fees.
Environmental Protection (Unauthorised Discharges) Regulations 2004	Prescribes further details of materials that are prohibited from discharge into the environment.

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Legislation or Regulation	Description
<i>Fish Resources Management Act 1994</i>	Act establishes framework for management of fishery resources. Commercial fishing is licensed or under a Fisheries Management Plan. Fisheries in WA waters are subject to the Act and include a wide range of aquatic organisms, other than protected species. Threatened aquatic species may be protected under State and Commonwealth biodiversity conservation laws. Department of Fisheries manages commercial and recreational fishing in Western Australia within four regions – the West Coast, Gascoyne, South Coast and North Coast. The Act also has power to declare Fish Habitat Protection Areas (FHPA).
<i>Marine and Harbours Act 1981</i>	Act to provide for the advancement of efficient and safe shipping and effective boating and port administration through the provision of certain facilities and services.
<i>Marine and Harbours (Fuelling) Regulations 1985</i>	Refuelling businesses in ports to be licensed.
<i>Maritime Archaeology Act 1973</i>	Maritime Archaeology Act of 1973 protects maritime archaeological sites in state waters, such as bays, harbours and rivers. Other than shipwrecks, it includes single relics, such as an anchor, and land sites associated with exploration, early settlements, whaling and pearling camps and shipwreck survivor camps.
<i>Pollution of Waters by Oil and Noxious Substances Act 1987 and associated regulations</i>	Act relating to the protection of the sea and certain waters from pollution by oil and other noxious substances discharged from ships and places on land.
<i>Port Authorities Act 1999</i>	Local Pilotage Directions apply to vessels navigating within declared ports such as the Dampier Port Authority (DPA) port limits however DPA complies with the Port Authorities Act 1999 (WA) and Port Authorities Regulations 2001 (WA) Part 3. The Regulations take precedent over Port Directions in the event of any conflict.
Port Authorities Regulations 2001	Pilotage services within the Port are licensed by DPA in the form of a pilotage provider's licence issued under the terms of the Port Authorities Regulations 2001.
Port of Dampier Marine Notice (002/2005)	Addresses sewage and putrescible waste discharge requirements whilst vessel in Port of Dampier.
<i>Shipping and Pilotage Act 1967</i>	Act relating to shipping and pilotage in and about the ports, fishing boat harbours and mooring control areas of the State.
Navigable Waters Regulations 1958	Prescribes further matters on navigational safety in WA waters, use of jetties, obstruction and wrecks, berthing and mooring of vessels.
<i>Western Australian Marine (Sea Dumping) Act 1981</i>	An Act to provide for the protection of the environment by regulating the dumping into the sea, and the incineration at sea, of wastes and other matter and the dumping into the sea of certain other objects.
Western Australian Marine (Sea Dumping) Regulations 1982	Primarily concerns fees and prescribed information for reports of dumping.
<i>Western Australian Marine Act 1982</i>	Before any commercial vessel can operate in the State of Western Australia, the vessel is required to have onboard a valid Certificate of Survey. Certificate of Survey is only issued when the vessel satisfactorily complies with the Western Australian Marine Act in respect to its hull, machinery and equipment and is crewed according to the WA Marine Act 1982.
WA Marine (Surveys and Certificates of Survey) Regulations 1983	Marine Safety is responsible for approving plans, inspecting, approving construction and carrying out periodical surveys of all commercial vessels under WA jurisdiction, be they passenger carrying, trading, fishing, or offshore industry vessels.
W.A. Marine (Certificates of Competency and Safety Manning) Regulations 1983	Marine Safety is responsible for administering national and internationally agreed competency standards; and for the examination of candidates for commercial Certificates of Competency as master, mate or engineer in WA vessels.

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

Legislation or Regulation	Description
Prevention of Collisions at Sea Regulations 1983	Regulations largely comprise the Rules set out in the International Regulations for Preventing Collisions at Sea 1972 (COLREGs) applicable in state and internal waters.
<i>Wildlife Conservation Act 1950</i> Wildlife Conservation Regulations 1970	An Act to provide for the conservation and protection of wildlife.
Wildlife Conservation (Specially Protected Fauna) Notice 2006	Declaration of specially protected fauna in WA, including fauna that is rare or is likely to become extinct. List includes over 199 species, itemising scientific and common name.

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

Industry Standards, Codes of Practice, Guidelines and Commonwealth Guidance Material

AMSA Technical guidelines for preparing contingency plans for marine and coastal facilities (2015)
AMSA National Plan for Maritime Environmental Emergencies (the NatPlan)
APPEA Australian Offshore Titleholder's Source Control Guideline (June 2021)
Australia's Oceans Policy - Western Australia South-West, Western-Central and North-West Marine Plans
Australian Petroleum Production and Exploration Association (APPEA) Code of Practice 2008
Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000
Australian Ballast Water Management Requirements, Version 8, 2020
Australian National Guidelines for Whale and Dolphin Watching 2005
EPBC Act Policy Statement 2.1 - Interactions between Offshore Seismic Activities and Whales (May 2007)
DAWR Offshore Installations - Biosecurity Guide (2019)
DAWE Policy Statement: 'Indirect consequences' of an action: Section 527E of the EPBC Act (2013): https://www.environment.gov.au/system/files/resources/f96c4a92-ffb1-4b77-befe-e2fd9130b0d8/files/epbc-act-policy-indirect-consequences.pdf
Guidelines on Minimising Acoustic Disturbance to Marine Fauna 1997 – WA Department of Mines and Petroleum
IOGP Risk Assessment Data Directory: Blowout Frequencies, September 2019
IOGP Report 592 - Subsea Capping Response Time Model Toolkit User Guide
IOGP Report 594 - Subsea Well Source Control Emergency Response Planning Guide for Subsea Wells (2019)
National Biofouling Management Guidance for the Petroleum Production and Exploration Industry 2009
National Light Pollution Guidelines for Wildlife, January 2020
National Marine Safety Committee principal technical standard, the National Standard for commercial vessels. National Standard for Commercial Vessels (NSCV)
National Strategy for Ecologically Sustainable Development 1992
National Maritime Emergency Response Arrangement (NEMERA)
NOPSEMA (2012). Control Measures and Performance Standards Guidance Note. N040300-GN0271 Revision No. 4. December 2012.
NOPSEMA (2020). Information Paper: Reducing Marine Pest Biosecurity Risks through Good Practice Biofouling Management, N04750-IP1899, Rev 1, March 2020.
NOPSEMA Guidance note: Environment plan content requirements – (GN1344) 11.9.2020
NOPSEMA Guidance note: Petroleum activities and Australian marine parks – (GN1785) 3.6.2020
NOPSEMA Guidance note: Oil pollution risk management – Rev 2 (GN1488) (2018)
NOPSEMA Guidance note: Notification and reporting of environmental incidents – (GN0926) 8.6.2020
NOPSEMA Guidance note: ALARP – Rev 6 (GN0166) (2015)
NOPSEMA Policy: Environment plan assessment - (PL1347) 19.5.2020
NOPSEMA Guideline: Environment plan decision making – Rev 7 (GL1721) (2021)
NOPSEMA Guideline: Making submissions to NOPSEMA – (GL0255) 4.5.2020
NOPSEMA Guideline: Consultation with Commonwealth agencies with responsibilities in the marine area (GL1887) 3.7.2020
NOPSEMA Information paper: Operational and scientific monitoring programs – Rev2 (IP1349) (2016)

PYRENEES PHASE 4 INFILL DRILLING PROGRAM ENVIRONMENT PLAN AUSTRALIAN PRODUCTION UNIT

NOPSEMA Information Paper: Source Control Planning and Procedures (2021)
NOPSEMA Bulletin #1: Oil Spill Modelling – Rev 0 (A652993) (2019)
NOPSEMA Bulletin #2: Clarifying Statutory Requirements and Good Practice Consultation – Rev 0 (A696998) (2019)
NOPSEMA Explanatory Note: Australian dispersant acceptance process (N-04750-IP1597 A446655) (06/07/2020)
Offshore Petroleum Industry Guidance Note; Marine Oil Pollution: Response and Consultation Arrangements (Western Australian Department of Transport, July 2020).
SPE Technical Report; Calculation of Worst-Case Discharge (WCD), Rev 1 2016 (Society of Petroleum Engineers, 2015)

Appendix C

CONDITIONS FOR OPERATIONS ISSUED TO THE PYRENEES DEVELOPMENT -
HIGHLIGHTED CONDITIONS ARE RELEVANT TO THIS ENVIRONMENT PLAN

Reference	Approval Conditions under EPBC Act (see EPBC 2005/2034) (Environment Minister, 2006)	Reference	Consolidated Approval Notice (September 2015)	EP Section Reference
<p>1. The person taking the action must submit, for the Minister’s approval, a plan (or plans) for managing the offshore impacts of the action. The plan (or plans) must include measures for:</p>				
1 (a)	Drilling operations:	1 (a)	Drilling operations:	This EP
1 (a)i	Drilling fluid type and disposal method.	1 (a)i	Drilling fluid type and disposal method.	EP s3.14.6 & s7.8
1 (a)ii	Drill cuttings disposal method.	1 (a)ii	Drill cuttings disposal method.	EP s3.14.7 & s7.8
1 (a)iii	Fuel and chemical handling and transfer procedures.	1 (a)iii	Fuel and chemical handling and transfer procedures.	EP s8.6 & Table 9-10
1 (a)iv	Cetacean interaction procedures for supply vessels and aircraft that are consistent with Part 8 of the <i>Environment Protection and Biodiversity Conservation Regulations 2000</i> .	1 (a)iv	Cetacean interaction procedures for supply vessels and aircraft that are consistent with Part 8 of the <i>Environment Protection and Biodiversity Conservation Regulations 2000</i> .	EP s8.8 & Table 9-12
1 (a)v	Cetacean and whale shark sightings reporting.	1 (a)v	Cetacean and whale shark sightings reporting	EP s8.8 & Table 9-12
1 (b)	Construction and installation:	1 (b)	Construction and installation:	Construction and installation conditions are not applicable to this activity scope given the proposed scope utilises existing subsea infrastructure within the Pyrenees Field, including well locations.
1 (b)i	Design and construction that allow for the decommissioning of all structures and components above the sea floor.	1 (b)i	Design and construction that allow for the decommissioning of all structures and components above the sea floor.	<p>Mooring locations are within the existing field development adjacent to previously established Crosby South and Stickle well centres.</p> <p>Ballast water management is covered within EP s8.9.</p> <p>Controls relevant to Part 8 of the <i>Environment Protection and Biodiversity Conservation Regulations 2000</i> and Cetacean and whale shark sightings reporting are detailed above.</p>

Reference	Approval Conditions under <i>EPBC Act</i> (see EPBC 2005/2034) (Environment Minister, 2006)	Reference	Consolidated Approval Notice (September 2015)	EP Section Reference
1 (b)ii	Details of the final selection of well locations, anchor type and placements, and flowline paths.	1 (b)ii	Details of the final selection of well location, anchor type and placements, and flowline paths.	
1 (b)iii	Hydrotest fluid type, handling and disposal.	1 (b)iii	Hydrotest fluid type, handling and disposal.	
1 (b)iv	Ballast water management for international construction vessels arriving in Australia.		Not referenced.	
1 (b)v	Cetacean interaction procedures for supply vessels and aircraft that are consistent with Part 8 of the <i>Environment Protection and Biodiversity Conservation Regulations 2000</i> .	1 (b)iv	Cetacean interaction procedures for supply vessels and aircraft that are consistent with Part 8 of the <i>Environment Protection and Biodiversity Conservation Regulations 2000</i> .	
1 (b)vi	Cetacean and whale shark sightings reporting.	1 (b)v	Cetacean and whale shark sightings reporting	
1 (c)	Operations:	1c)	Operations	N/A – not operational activity
1 (c)i	Trading tanker vetting procedures.	1(c)i	Trading tanker vetting procedures.	N/A – not operational activity
1 (c)ii	Ballast water management for international vessels arriving in Australia.		Not referenced.	As above.
1 (c)iii	Produced formation water (PFW) and naturally occurring radioactive materials (NORMs) monitoring and management.	1c)ii	Produced formation water (PFW) and naturally occurring radioactive materials (NORMs) monitoring and management	N/A – not operational activity
1 (c)iv	Interaction procedures for supply vessels and aircraft that are consistent with Part 8 of the EPBC Regulations 2000.	1(c)iii	Interaction procedures for supply vessels and aircraft that are consistent with Part 8 of the EPBC Regulations 2000.	As above.
1 (c)v	Monitoring of noise effects of operations on cetaceans.	1(c)iv	Monitoring of noise effects of operations on cetaceans.	N/A – not operational activity
1 (c)vi	Cetacean and whale shark sighting reporting.	1(c) v	Cetacean and whale shark sighting reporting.	As above.
2	Approved Oil Spill Contingency Plan (OSCP), including: <ul style="list-style-type: none"> Types of dispersants, protective booms, clean up gear, and related equipment to 	2	Approved OSCP, including: <ul style="list-style-type: none"> Types of dispersant, protective booms, clean up gear, and related equipment to be used in the event of a spill and their storage arrangements; 	OPEP document OPEP: BOD document OSMPBIP document IMT Capability Assessment document

Reference	Approval Conditions under <i>EPBC Act</i> (see EPBC 2005/2034) (Environment Minister, 2006)	Reference	Consolidated Approval Notice (September 2015)	EP Section Reference
	<p>be used in the event of a spill and their storage arrangements;</p> <ul style="list-style-type: none"> • A demonstrated capacity to deploy oil spill response equipment within 12 hours; • Training of staff in oil spill response measures; • Identification of sensitive areas, in particular, Ningaloo Marine Park, and specific response measures for these areas; • Details of insurance arrangements that have been made in respect of the costs associated with repairing any environmental damage arising from potential oil spills; and • The reporting of oil spill incidents to the DoEE. <p>The approved plan must be implemented.</p>		<ul style="list-style-type: none"> • A demonstrated capacity to deploy oil spill response equipment within 12 hours; • Training of staff in oil spill response measures; • Identification of sensitive areas, in particular, Ningaloo Marine Park, and specific response measures for these areas; and • The reporting of oil spill incidents. <p>The approved Plan must be implemented.</p>	EP s10.5.3 'Incident Reporting (External)'
3	Prepare a Decommissioning Plan for Ministerial approval at least 12 months before start of decommissioning. The approved Decommissioning Plan must be implemented.	3	Prepare a Decommissioning Plan for Ministerial approval at least 12 months before start of decommissioning. The approved Decommissioning Plan must be implemented	N/A
4	Within 18 months of the commencement of offshore construction, BHP must ensure that an independent approved audit of compliance with the conditions of approval is conducted. The audit criteria must be agreed by the Minister and the audit report must address the criteria to the satisfaction of the Minister.	4	Within 18 months of the commencement of offshore construction, BHP must ensure that an independent approved audit of compliance with the conditions of approval is conducted. The audit criteria must be agreed by the Minister and the audit report must address the criteria to the satisfaction of the Minister.	N/A
5	On 1 July of each year of the Development, the General Manager, BHP Petroleum must provide a certificate stating that BHP has complied with the conditions of this Approval.	5	Condition 5 revoked	N/A

Reference	Approval Conditions under EPBC Act (see EPBC 2005/2034) (Environment Minister, 2006)	Reference	Consolidated Approval Notice (September 2015)	EP Section Reference
6	Any subsea tie-ins not included in an approved Plan pursuant to condition 1, 2 and 3, must submit a revised version of any such Plan for the Minister’s approval. The revised Plan submitted, must be implemented instead of the Plan originally approved.	6	Any subsea tie-ins not included in an approved EP pursuant to condition 1, 2 and 3, must revise the EP or submit a new EP to address the activities associated with, and potential environmental impacts of, the subsea tie-in. Activities associated with subsea tie-ins may not be commenced until each EP or revised EP has been approved by the Minister. The revised EP that has been approved by the Minister must be implemented.	N/A
7	Any activity otherwise than in accordance with the Plan referred to in conditions 1,2 and 3, must submit a revised version of any such Plan for the Minister’s approval. The revised Plan submitted, must be implemented instead of the Plan originally approved.	7	BHP may choose to revise an Management Plan approved by the Minister under condition 1, 2, 3 or 6 without submitting it for approval under section 143A of the EPBC Act, if the taking of the action in accordance with the revised EP would not likely to have new or increased impact. If BHP makes this choice they must: <ul style="list-style-type: none"> i. Notify the Department in writing that the approved Plan has been revised and provide the Department with an electronic copy of the revised EP; ii. Implement the revised Plan from the date that the EP is submitted to the Department.; and iii. For the life of the approval, maintain a record of the reasons BHP considers that taking the action in accordance with the revised Plan would not likely to have a new or increased impact. 	EP s10.4.4
		7A	BHP may revoke their choice under condition 7 at any time by notice to the Department. If BHP revokes the choice to implement a revised Plan, without approval under section 143A of the Act, the Plan approved by the Minister must be implemented.	N/A
		7B	If the Minister gives a notice to BHP that the Minister is satisfied that the taking of the action in accordance with the revised Plan would be likely to have a new or increased impact then: <ul style="list-style-type: none"> i. Condition 7 does not apply, or ceases to apply, in relation to the revised Plan; and ii. BHP must implement the plan approved by the Minister. 	N/A

Reference	Approval Conditions under <i>EPBC Act</i> (see EPBC 2005/2034) (Environment Minister, 2006)	Reference	Consolidated Approval Notice (September 2015)	EP Section Reference
			<p>To avoid any doubt, this condition does not affect any operation of condition 7 and 7A in the period before that day of this notice is given.</p> <p>At the time of giving this notice the Minister may also notify that for a specified period of time that condition 7 does not apply for one or more specified Plan required under the approval.</p>	
		7C	Condition 7, 7A, and 7B are not intended to limit the operation of section 143A of the Act which allows BHP to submit a revised Plan to the minister for approval.	N/A
8	It the Minster believes that it is necessary or desirable for the better protection of the environment to do so, the Minister may request BHP to make specified revisions to an approved Plan pursuant to conditions 1,2 and 3, and to submit a revised Plan for the Minister’s approval. BHP must comply with any such request. If the Minister approves a revised Plan pursuant to this condition, the revised Plan must be implemented instead of the Plan originally approved.	8	Condition 8 revoked.	N/A
9	Within five years of the date of this approval, BHP must provide to the satisfaction of the Minister evidence that the proposal has been substantially commenced. If the Minister is not satisfied that there has been substantial commencement of the Development, the Development must not thereafter be commenced.	9	<p>Within five years of the date of this approval, BHP must provide to the satisfaction of the Minister evidence that the proposal has been substantially commenced. If the Minister is not satisfied that there has been substantial commencement of the Development, the Development must not thereafter be commenced.</p> <p>Note: Relates to date or approval decision 26 April 2006.</p>	N/A
		10	<p>An Plan required by condition 1, 2, 3 or 6 is automatically deemed to have been submitted to, and approved by, the Minister if the measures (as specified in the relevant condition) are included in an EP relating to the taking of the action that:</p> <p>a) Was submitted to NOPSEMA after 27 February 2014;</p> <p>b) Either</p>	EP / OPEP documents

Reference	Approval Conditions under <i>EPBC Act</i> (see EPBC 2005/2034) (Environment Minister, 2006)	Reference	Consolidated Approval Notice (September 2015)	EP Section Reference
			<ul style="list-style-type: none"> i. Is in force under the OPGGS (Environment) Regulations; or ii. Has ended in accordance with regulation 25A of the OPGGS (Environment) Regulations <p>The Plan approved by the Minister no longer needs to be implemented.</p>	
		10A	<p>Where a Plan required by condition 1, 2 or 6 has been approved by the Minister and the measures (as specified in the relevant condition) are included in an Plan that:</p> <ul style="list-style-type: none"> c) Was submitted to NOPSEMA after 27 February 2014; d) Either <ul style="list-style-type: none"> iii. is in force under the OPGGS (Environment) Regulations; or iv. has ended in accordance with regulation 25A of the OPGGS (Environment) Regulations <p>The Plan approved by the Minister no longer needs to be implemented.</p>	EP / OPEP documents
		10B	<p>Where an Plan, which includes measure specified in the conditions referred to in condition 10 and 10A above, is in force under the OPGGS (Environment) Regulations that relates to the taking of the action, BHP must comply with those measures as specified in that Plan.</p>	EP / OPEP documents

Appendix D

EPBC ACT PROTECTED MATTERS SEARCH REPORT: OPERATIONAL AREA



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.

Report created: 11/11/21 14:50:20

[Summary](#)

[Details](#)

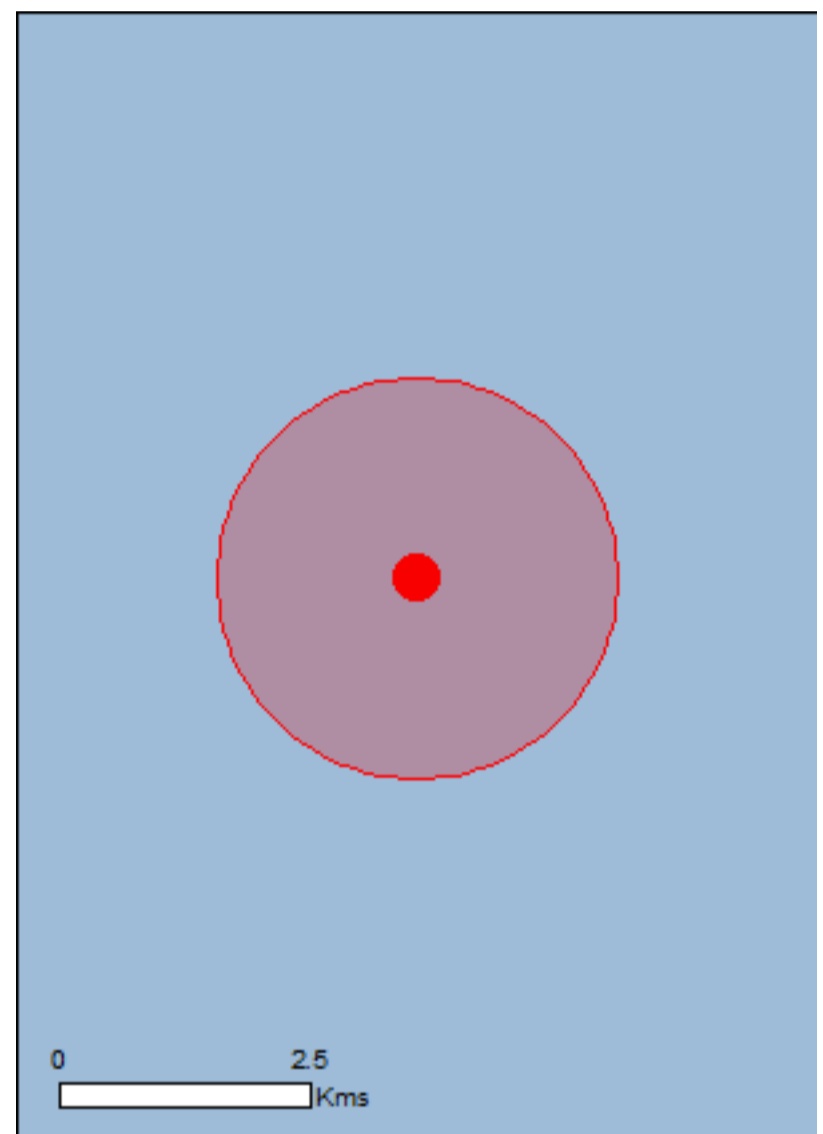
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

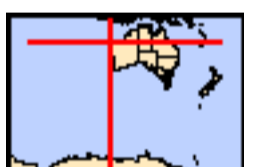
[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 2.0Km



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:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	20
Listed Migratory Species:	36

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. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

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:	47
Whales and Other Cetaceans:	24
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	None
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	1

Details

Matters of National Environmental Significance

Commonwealth Marine Area

[\[Resource Information \]](#)

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

Name

EEZ and Territorial Sea

Marine Regions

[\[Resource Information \]](#)

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name

[North-west](#)

Listed Threatened Species

[\[Resource Information \]](#)

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species

Name	Status	Type of Presence
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	habitat likely to occur within area Species or species habitat known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known 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 White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to 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		
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat may occur within area
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat known to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area

Name	Threatened	Type of Presence
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area

Migratory Wetlands Species

Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		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		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat may occur within area
Fish		
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Haliichthys taeniophorus Ribbioned Pipehorse, Ribbioned Seadragon [66226]		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 histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		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
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Ephalophis greyi North-western Mangrove Seasnake [1127]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to 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 borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Delphinus delphis Common Dolphin, 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
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area

Name	Status	Type of Presence
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus Dwarf Sperm Whale [58]		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
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Extra Information

Key Ecological Features (Marine)

[[Resource Information](#)]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Canyons linking the Cuvier Abyssal Plain and the	North-west

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 and National Heritage properties, Wetlands of International and National 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.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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.

Coordinates

-21.54528 114.09528

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:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian 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, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-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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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.

Report created: 11/11/21 14:52:20

[Summary](#)

[Details](#)

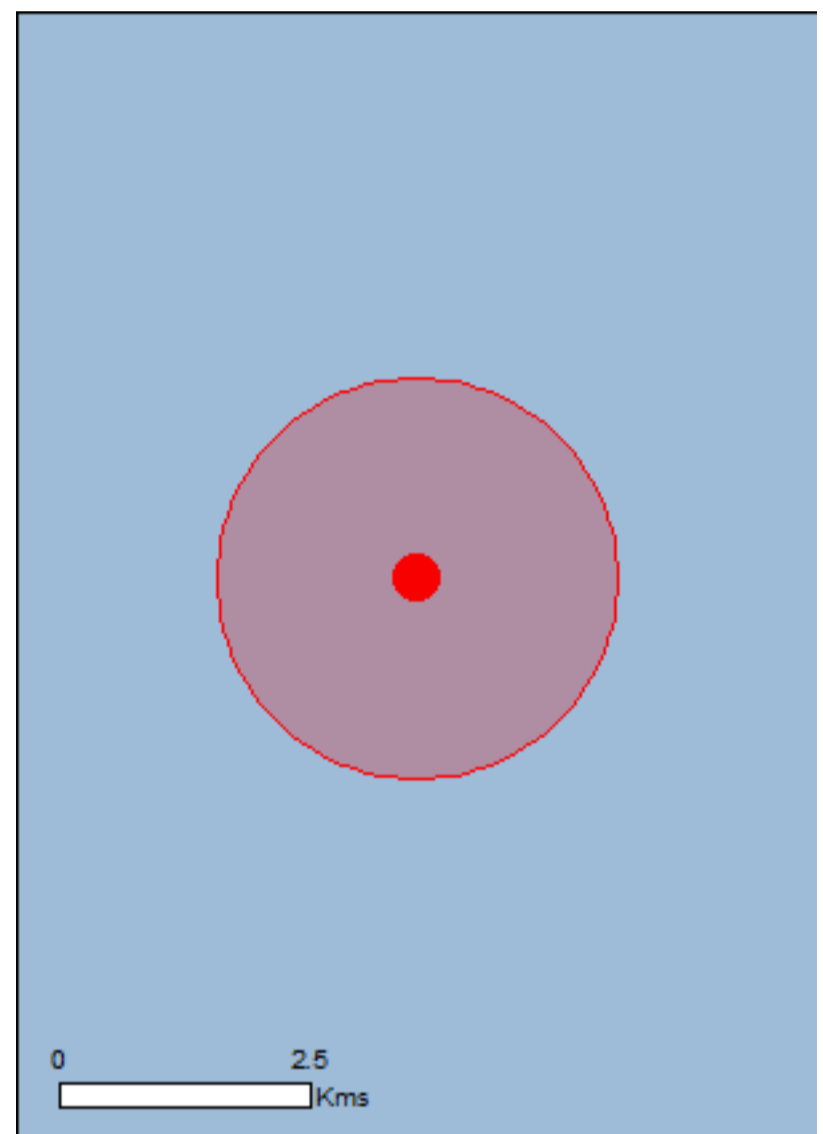
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

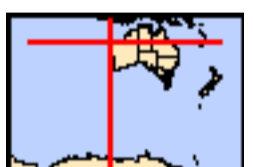
[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 2.0Km



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:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	20
Listed Migratory Species:	35

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. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

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:	47
Whales and Other Cetaceans:	24
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	None
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	1

Details

Matters of National Environmental Significance

Commonwealth Marine Area

[\[Resource Information \]](#)

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

Name

EEZ and Territorial Sea

Marine Regions

[\[Resource Information \]](#)

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name

[North-west](#)

Listed Threatened Species

[\[Resource Information \]](#)

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species

Name	Status	Type of Presence
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	habitat likely to occur within area Species or species habitat known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known 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 White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to 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		
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat may occur within area
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area

Migratory Wetlands Species

Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		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		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat may occur within area
Fish		
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Micrognathus micronotus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		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
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Ephalophis greyi North-western Mangrove Seasnake [1127]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to 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 borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Delphinus delphis Common Dolphin, 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
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area

Name	Status	Type of Presence
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus Dwarf Sperm Whale [58]		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
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Extra Information

Key Ecological Features (Marine)

[[Resource Information](#)]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Canyons linking the Cuvier Abyssal Plain and the	North-west

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 and National Heritage properties, Wetlands of International and National 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.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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.

Coordinates

-21.52333 114.10972

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:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian 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, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-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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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.

Report created: 12/05/21 14:27:56

[Summary](#)

[Details](#)

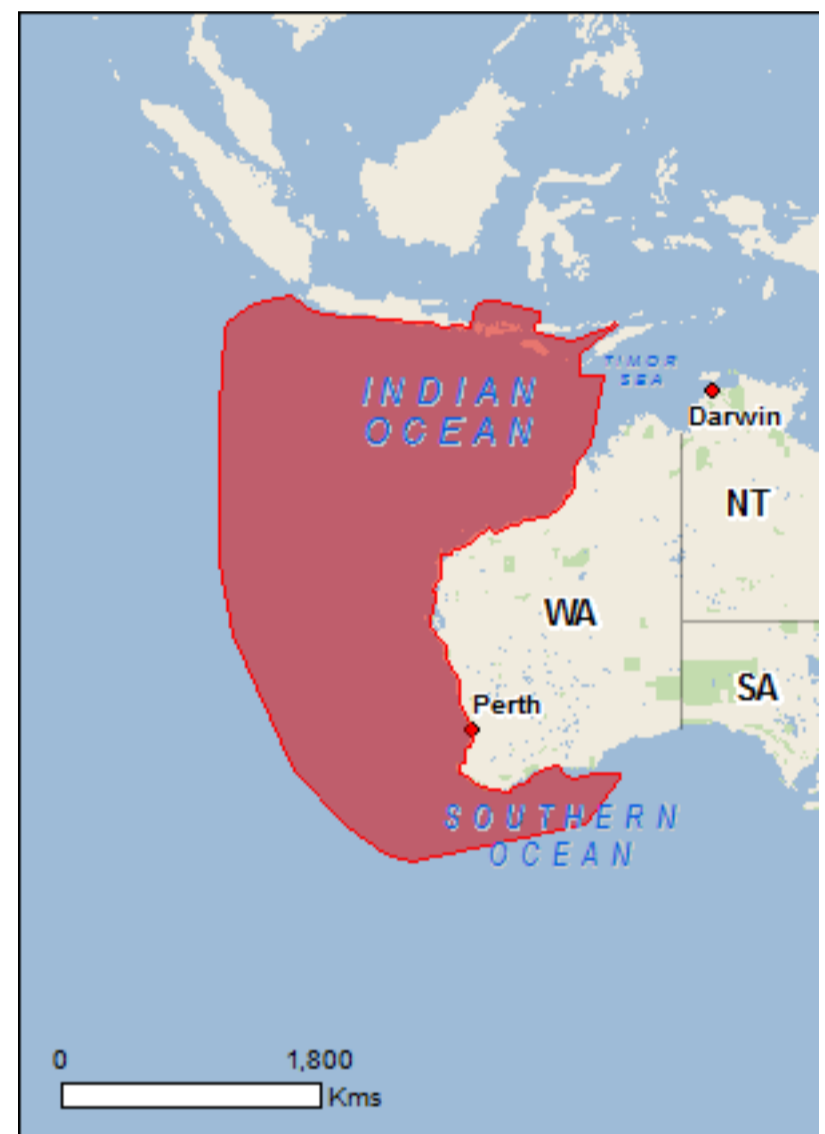
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

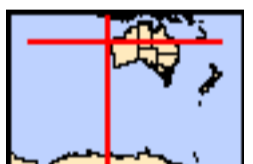
[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 0.0Km



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:	4
National Heritage Places:	9
Wetlands of International Importance:	10
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	15
Listed Threatened Species:	241
Listed Migratory Species:	111

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. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

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:	23
Commonwealth Heritage Places:	28
Listed Marine Species:	214
Whales and Other Cetaceans:	44
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	1
Australian Marine Parks:	47

Extra Information

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

State and Territory Reserves:	300
Regional Forest Agreements:	1
Invasive Species:	66
Nationally Important Wetlands:	44
Key Ecological Features (Marine)	23

Details

Matters of National Environmental Significance

World Heritage Properties [\[Resource Information \]](#)

Name	State	Status
Australian Convict Sites (Fremantle Prison Buffer Zone)	WA	Buffer zone
Australian Convict Sites (Fremantle Prison)	WA	Declared property
Shark Bay, Western Australia	WA	Declared property
The Ningaloo Coast	WA	Declared property

National Heritage Properties [\[Resource Information \]](#)

Name	State	Status
Natural		
Lesueur National Park	WA	Listed place
Shark Bay, Western Australia	WA	Listed place
The Ningaloo Coast	WA	Listed place
The West Kimberley	WA	Listed place
Indigenous		
Dampier Archipelago (including Burrup Peninsula)	WA	Listed place
Historic		
Batavia Shipwreck Site and Survivor Camps Area 1629 - Houtman Abrolhos	WA	Listed place
Dirk Hartog Landing Site 1616 - Cape Inscription Area	WA	Listed place
Fremantle Prison (former)	WA	Listed place
HMAS Sydney II and HSK Kormoran Shipwreck Sites	EXT	Listed place

Wetlands of International Importance (Ramsar) [\[Resource Information \]](#)

Name	Proximity
Ashmore reef national nature reserve	Within Ramsar site
Becher point wetlands	Within Ramsar site
Eighty-mile beach	Within Ramsar site
Forrestdale and thomsons lakes	Within Ramsar site
Hosnies spring	Within Ramsar site
Lake gore	Within 10km of Ramsar
Peel-yalgorup system	Within Ramsar site
Roebuck bay	Within Ramsar site
The dales	Within Ramsar site
Vasse-wonnerup system	Within Ramsar site

Commonwealth Marine Area [\[Resource Information \]](#)

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

Name
EEZ and Territorial Sea
Extended Continental Shelf

Marine Regions [\[Resource Information \]](#)

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
North-west
South-west

Listed Threatened Ecological Communities [\[Resource Information \]](#)

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.

Name	Status	Type of Presence
Aquatic Root Mat Community 1 in Caves of the Leeuwin Naturaliste Ridge	Endangered	Community known to occur within area
Aquatic Root Mat Community 2 in Caves of the Leeuwin Naturaliste Ridge	Endangered	Community known to occur within area
Aquatic Root Mat Community 3 in Caves of the Leeuwin Naturaliste Ridge	Endangered	Community known to occur within area
Aquatic Root Mat Community 4 in Caves of the Leeuwin Naturaliste Ridge	Endangered	Community known to occur within area
Aquatic Root Mat Community in Caves of the Swan Coastal Plain	Endangered	Community known to occur within area
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Clay Pans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area
Monsoon vine thickets on the coastal sand dunes of Dampier Peninsula	Endangered	Community likely to occur within area
Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia	Endangered	Community likely to occur within area
Scott River Ironstone Association	Endangered	Community likely to occur within area
Sedgelands in Holocene dune swales of the southern Swan Coastal Plain	Endangered	Community known to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Thrombolite (microbial) community of coastal freshwater lakes of the Swan Coastal Plain (Lake Richmond)	Endangered	Community known to occur within area
Thrombolite (microbialite) Community of a Coastal Brackish Lake (Lake Clifton)	Critically Endangered	Community known to occur within area
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area

Listed Threatened Species [\[Resource Information \]](#)

Name	Status	Type of Presence
Birds		
Accipiter hiogaster natalis Christmas Island Goshawk [82408]	Endangered	Species or species habitat known to occur within area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Breeding known to occur within area
Atrichornis clamosus Noisy Scrub-bird, Tjimiluk [654]	Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Breeding known to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding known to occur within area

Name	Status	Type of Presence
Cereopsis novaehollandiae grisea Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Breeding known to occur within area
Chalcophaps indica natalis Christmas Island Emerald Dove, Emerald Dove (Christmas Island) [67030]	Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Dasyornis longirostris Western Bristlebird [515]	Endangered	Species or species habitat likely to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area
Fregata andrewsi Christmas Island Frigatebird, Andrew's Frigatebird [1011]	Endangered	Breeding known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Critically Endangered	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Malurus leucopterus edouardi White-winged Fairy-wren (Barrow Island), Barrow Island Black-and-white Fairy-wren [26194]	Vulnerable	Species or species habitat likely to occur within area
Malurus leucopterus leucopterus White-winged Fairy-wren (Dirk Hartog Island), Dirk Hartog Black-and-White Fairy-wren [26004]	Vulnerable	Species or species habitat likely to occur within area
Ninox natalis Christmas Island Hawk-Owl, Christmas Boobook [66671]	Vulnerable	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat known to occur within area
Pezoporus flaviventris Western Ground Parrot, Kyloring [84650]	Critically Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Breeding likely to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat known to occur within area
Pterodroma arminjoniana Round Island Petrel, Trinidade Petrel [89284]	Critically Endangered	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	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 Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within

Name	Status	Type of Presence area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Turdus poliocephalus erythropleurus Christmas Island Thrush [67122]	Endangered	Species or species habitat likely to occur within area
Turnix varius scintillans Painted Button-quail (Houtman Abrolhos) [82451]	Vulnerable	Species or species habitat likely to occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat may occur within area
Crustaceans		
Cherax tenuimanus Hairy Marron, Margaret River Hairy Marron, Margaret River Marron [78931]	Critically Endangered	Species or species habitat may occur within area
Engaewa reducta Dunsborough Burrowing Crayfish [82675]	Critically Endangered	Species or species habitat known to occur within area
Engaewa walpolea Walpole Burrowing Crayfish [82676]	Endangered	Species or species habitat known to occur within area
Fish		
Galaxias truttaceus (Western Australian population) Western Trout Minnow [89857]	Endangered	Species or species habitat known to occur within area
Galaxiella nigrostriata Blackstriped Dwarf Galaxias, Black-stripe Minnow [88677]	Endangered	Species or species habitat known to occur within area
Milyeringa veritas Blind Gudgeon [66676]	Vulnerable	Species or species habitat known to occur within area
Nannatherina balstoni Balston's Pygmy Perch [66698]	Vulnerable	Species or species habitat known to occur within area
Nannoperca pygmaea Little Pygmy Perch [88315]	Endangered	Species or species habitat known to occur within area
Ophisternon candidum Blind Cave Eel [66678]	Vulnerable	Species or species habitat known to occur within area
Frogs		
Geocrinia alba White-bellied Frog, Creek Frog [26181]	Critically Endangered	Species or species habitat known to occur within area
Spicospina flammocaerulea Sunset Frog [64782]	Vulnerable	Species or species habitat known to occur within area
Insects		

Name	Status	Type of Presence
Hesperocolletes douglasi Douglas' Broad-headed Bee, Rottnest Bee [66734]	Critically Endangered	Species or species habitat known to occur within area
Trioza barrettae Banksia brownii plant louse [87805]	Endangered	Species or species habitat likely to occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Bettongia lesueur Barrow and Boodie Islands subspecies Boodie, Burrowing Bettong (Barrow and Boodie Islands) [88021]	Vulnerable	Species or species habitat known to occur within area
Bettongia lesueur lesueur Burrowing Bettong (Shark Bay), Boodie [66659]	Vulnerable	Species or species habitat known to occur within area
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat known to occur within area
Crocidura trichura Christmas Island Shrew [86568]	Critically Endangered	Species or species habitat likely to occur within area
Dasyurus geoffroi Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Isodon auratus barrowensis Golden Bandicoot (Barrow Island) [66666]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes conspicillatus conspicillatus Spectacled Hare-wallaby (Barrow Island) [66661]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes hirsutus Central Australian subspecies Mala, Rufous Hare-Wallaby (Central Australia) [88019]	Endangered	Translocated population known to occur within area
Lagorchestes hirsutus bernieri Rufous Hare-wallaby (Bernier Island) [66662]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes hirsutus dorrae Rufous Hare-wallaby (Dorre Island) [66663]	Vulnerable	Species or species habitat known to occur within area
Lagostrophus fasciatus fasciatus Banded Hare-wallaby, Merrine, Marnine, Munning [66664]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Breeding known to occur within area
Myrmecobius fasciatus Numbat [294]	Endangered	Species or species habitat known to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Breeding known to occur within area
Osphranter robustus isabellinus Barrow Island Wallaroo, Barrow Island Euro [89262]	Vulnerable	Species or species habitat likely to occur within area
Parantechinus apicalis Dibbler [313]	Endangered	Species or species habitat known to occur within area
Perameles bougainville bougainville Western Barred Bandicoot (Shark Bay) [66631]	Endangered	Species or species habitat known to occur within area
Petrogale lateralis lateralis Black-flanked Rock-wallaby, Moororong, Black-footed Rock Wallaby [66647]	Endangered	Species or species habitat known to occur within area
Phascogale calura Red-tailed Phascogale, Red-tailed Wambenger, Kenngoor [316]	Vulnerable	Species or species habitat may occur within area
Potorous gilbertii Gilbert's Potoroo, Ngilkat [66642]	Critically Endangered	Translocated population known to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Breeding known to occur within area
Pseudomys fieldi Shark Bay Mouse, Djoongari, Alice Springs Mouse [113]	Vulnerable	Species or species habitat likely to occur within area
Pseudomys shortridgei Heath Mouse, Dayang, Heath Rat [77]	Endangered	Species or species habitat likely to occur within area
Pteropus natalis Christmas Island Flying-fox, Christmas Island Fruit-bat [87611]	Critically Endangered	Roosting known to occur within area
Rhinonictes aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat, Bare-rumped Sheath-tail Bat [66889]	Vulnerable	Species or species habitat likely to occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat known to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat may occur within area

Other

Name	Status	Type of Presence
Bertmainius tingle Tingle Pygmy Trapdoor Spider [89126]	Endangered	Species or species habitat known to occur within area
Idiosoma nigrum Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat known to occur within area
Kumonga exleyi Cape Range Remipede [86875]	Vulnerable	Species or species habitat known to occur within area
Westralunio carteri Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area
Plants		
Acacia forrestiana Forest's Wattle [17235]	Vulnerable	Species or species habitat known to occur within area
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat known to occur within area
Androcalva bivillosa Straggling Androcalva [87807]	Critically Endangered	Species or species habitat known to occur within area
Anigozanthos bicolor subsp. minor Little Kangaroo Paw, Two-coloured Kangaroo Paw, Small Two-colour Kangaroo Paw [21241]	Endangered	Species or species habitat known to occur within area
Anigozanthos viridis subsp. terraspectans Dwarf Green Kangaroo Paw [3435]	Vulnerable	Species or species habitat known to occur within area
Asplenium listeri Christmas Island Spleenwort [65865]	Critically Endangered	Species or species habitat known to occur within area
Banksia brownii Brown's Banksia, Feather-leaved Banksia [8277]	Endangered	Species or species habitat known to occur within area
Banksia goodii Good's Banksia [16727]	Vulnerable	Species or species habitat may occur within area
Banksia nivea subsp. uliginosa Swamp Honeypot [82766]	Endangered	Species or species habitat known to occur within area
Banksia squarrosa subsp. argillacea Whicher Range Dryandra [82769]	Vulnerable	Species or species habitat likely to occur within area
Banksia verticillata Granite Banksia, Albany Banksia, River Banksia [8333]	Vulnerable	Species or species habitat likely to occur within area
Beyeria lepidopetala Small-petalled Beyeria, Short-petalled Beyeria [18362]	Endangered	Species or species habitat likely to occur within area
Boronia exilis Scott River Boronia [64844]	Endangered	Species or species habitat known to occur within area
Brachyscias verecundus Ironstone Brachyscias [81321]	Critically Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Caladenia barbarella Small Dragon Orchid, Common Dragon Orchid [68686]	Endangered	Species or species habitat known to occur within area
Caladenia bryceana subsp. cracens Northern Dwarf Spider-orchid [64556]	Vulnerable	Species or species habitat known to occur within area
Caladenia busselliana Bussell's Spider-orchid [24369]	Endangered	Species or species habitat known to occur within area
Caladenia caesarea subsp. maritima Cape Spider-orchid [64856]	Endangered	Species or species habitat known to occur within area
Caladenia elegans Elegant Spider-orchid [56775]	Endangered	Species or species habitat known to occur within area
Caladenia excelsa Giant Spider-orchid [56717]	Endangered	Species or species habitat likely to occur within area
Caladenia granitora [65292]	Endangered	Species or species habitat may occur within area
Caladenia harringtoniae Harrington's Spider-orchid, Pink Spider-orchid [56786]	Vulnerable	Species or species habitat likely to occur within area
Caladenia hoffmanii Hoffman's Spider-orchid [56719]	Endangered	Species or species habitat known to occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat known to occur within area
Caladenia lodgeana Lodge's Spider-orchid [68664]	Critically Endangered	Species or species habitat known to occur within area
Caladenia procera Carbunup King Spider Orchid [68679]	Critically Endangered	Species or species habitat likely to occur within area
Caladenia viridescens Dunsborough Spider-orchid [56776]	Endangered	Species or species habitat known to occur within area
Calectasia cyanea Blue Tinsel Lily [7669]	Critically Endangered	Species or species habitat likely to occur within area
Chamelaucium sp. S coastal plain (R.D.Royce 4872) Royce's Waxflower [87814]	Vulnerable	Species or species habitat likely to occur within area
Chordifex abortivus Manypeaks Rush [64868]	Endangered	Species or species habitat may occur within area
Chorizema humile Prostrate Flame Pea [32573]	Endangered	Species or species habitat likely to occur within area
Chorizema varium Limestone Pea [16981]	Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Commersonia apella Many-flowered Commersonia [86877]	Critically Endangered	Species or species habitat known to occur within area
Conostylis dielsii subsp. teres Irwin's Conostylis [3614]	Endangered	Species or species habitat known to occur within area
Conostylis lepidospermoides Sedge Conostylis [9254]	Endangered	Species or species habitat likely to occur within area
Conostylis micrantha Small-flowered Conostylis [17635]	Endangered	Species or species habitat known to occur within area
Conostylis misera Grass Conostylis [21320]	Endangered	Species or species habitat may occur within area
Darwinia ferricola Scott River Darwinia [56706]	Endangered	Species or species habitat known to occur within area
Daviesia elongata subsp. elongata Long-leaved Daviesia [64883]	Vulnerable	Species or species habitat may occur within area
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat known to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat known to occur within area
Drakaea concolor Kneeling Hammer-orchid [56777]	Vulnerable	Species or species habitat known to occur within area
Drakaea elastica Glossy-leaved Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat known to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat known to occur within area
Drummondita ericoides Morseby Range Drummondita [9193]	Endangered	Species or species habitat known to occur within area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat known to occur within area
Eremophila glabra subsp. chlorella [84927]	Endangered	Species or species habitat may occur within area
Eremophila sp. Narrow leaves (J.D.Start D12-150) [89307]	Critically Endangered	Species or species habitat known to occur within area
Eucalyptus argutifolia Yanchep Mallee, Wabbling Hill Mallee [24263]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Eucalyptus beardiana Beard's Mallee [18933]	Vulnerable	Species or species habitat may occur within area
Eucalyptus crispata Yandanooka Mallee [24268]	Vulnerable	Species or species habitat may occur within area
Eucalyptus cuprea Mallee Box [56773]	Endangered	Species or species habitat known to occur within area
Eucalyptus impensa Eneabba Mallee [56711]	Endangered	Species or species habitat likely to occur within area
Eucalyptus johnsoniana Johnson's Mallee [14516]	Vulnerable	Species or species habitat may occur within area
Eucalyptus lateritica Laterite Mallee [6271]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus leprophloia Scaly Butt Mallee, Scaly-butt Mallee [56712]	Endangered	Species or species habitat likely to occur within area
Eucalyptus suberea Cork Mallee, Mount Lesueur Mallee [5529]	Vulnerable	Species or species habitat known to occur within area
Eucalyptus x balanites Cadda Road Mallee, Cadda Mallee [87816]	Endangered	Species or species habitat may occur within area
Eucalyptus x phylacis Meelup Mallee [87817]	Endangered	Species or species habitat known to occur within area
Gastrolobium argyrotichum Metricup Pea [89145]	Critically Endangered	Species or species habitat known to occur within area
Gastrolobium papilio Butterfly-leaved Gastrolobium [78415]	Endangered	Species or species habitat may occur within area
Grevillea batrachioides Mt Lesueur Grevillea [21735]	Endangered	Species or species habitat likely to occur within area
Grevillea brachystylis subsp. australis [55525]	Vulnerable	Species or species habitat likely to occur within area
Grevillea bracteosa subsp. howatharra [85002]	Critically Endangered	Species or species habitat known to occur within area
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat may occur within area
Grevillea elongata Ironstone Grevillea [64578]	Vulnerable	Species or species habitat may occur within area
Grevillea humifusa Spreading Grevillea [61182]	Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Hakea megalosperma Lesueur Hakea [10505]	Vulnerable	Species or species habitat likely to occur within area
Hemiandra gardneri Red Snakebush [7945]	Endangered	Species or species habitat known to occur within area
Hypocalymma angustifolium subsp. Hutt River (S.Patrick 2982) [85023]	Endangered	Species or species habitat known to occur within area
Hypocalymma longifolium Long-leaved Myrtle [8081]	Vulnerable	Species or species habitat known to occur within area
Isopogon uncinatus Albany Cone Bush, Hook-leaf Isopogon [20871]	Endangered	Species or species habitat known to occur within area
Kennedia glabrata Northcliffe Kennedia [16452]	Vulnerable	Species or species habitat likely to occur within area
Kennedia lateritia Augusta Kennedia [45985]	Endangered	Species or species habitat likely to occur within area
Lambertia echinata subsp. echinata Prickly Honeysuckle [56729]	Endangered	Species or species habitat may occur within area
Lambertia echinata subsp. occidentalis Western Prickly Honeysuckle [64528]	Endangered	Species or species habitat may occur within area
Lambertia orbifolia Roundleaf Honeysuckle [15725]	Endangered	Species or species habitat known to occur within area
Lechenaultia chlorantha Kalbarri Leschenaultia [16763]	Vulnerable	Species or species habitat likely to occur within area
Leptomeria dielsiana Diels' Currant Bush [5146]	Vulnerable	Species or species habitat known to occur within area
Leucopogon marginatus Thick-margined Leucopogon [12527]	Endangered	Species or species habitat likely to occur within area
Leucopogon obtectus Hidden Beard-heath [19614]	Endangered	Species or species habitat likely to occur within area
Macarthuria keigheryi Keighery's Macarthuria [64930]	Endangered	Species or species habitat likely to occur within area
Marianthus paralius [83925]	Endangered	Species or species habitat known to occur within area
Melaleuca sp. Wanneroo (G.J. Keighery 16705) [89456]	Endangered	Species or species habitat known to occur within area
Microtis globula South-Coast Mignonette Orchid [6780]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Minuria tridens Minnie Daisy [13753]	Vulnerable	Species or species habitat known to occur within area
Paracaleana dixonii Sandplain Duck Orchid [86882]	Endangered	Species or species habitat known to occur within area
Petrophile latericola Laterite Petrophile [64532]	Endangered	Species or species habitat may occur within area
Pityrodia augustensis Mt Augustus Foxglove [4962]	Vulnerable	Species or species habitat likely to occur within area
Pneumatopteris truncata fern [68812]	Critically Endangered	Species or species habitat known to occur within area
Pterostylis sinuata Northampton Midget Greenhood, Western Swan Greenhood [84991]	Endangered	Species or species habitat known to occur within area
Reedia spathacea Reedia [2995]	Critically Endangered	Species or species habitat known to occur within area
Seringia exastia Fringed Fire-bush [88920]	Critically Endangered	Species or species habitat known to occur within area
Sphenotoma drummondii Mountain Paper-heath [21160]	Endangered	Species or species habitat may occur within area
Stachystemon nematophorus Three-flowered Stachystemon [81447]	Vulnerable	Species or species habitat known to occur within area
Synaphea sp. Fairbridge Farm (D. Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat likely to occur within area
Synaphea sp. Serpentine (G.R. Brand 103) [86879]	Critically Endangered	Species or species habitat may occur within area
Synaphea stenoloba Dwellingup Synaphea [66311]	Endangered	Species or species habitat known to occur within area
Tectaria devexa [14767]	Endangered	Species or species habitat likely to occur within area
Tetratheca nephelioides [83217]	Critically Endangered	Species or species habitat likely to occur within area
Thelymitra dedmaniarum Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat may occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat known to occur within area
Verticordia apecta Hay River Featherflower, Scruffy Verticordia [65545]	Critically Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Verticordia densiflora var. pedunculata Long-stalked Featherflower [55689]	Endangered	Species or species habitat may occur within area
Verticordia plumosa var. ananeotes Tufted Plumed Featherflower [23871]	Endangered	Species or species habitat may occur within area
Verticordia plumosa var. vassensis Vasse Featherflower [55804]	Endangered	Species or species habitat known to occur within area
Wurmbea calcicola Naturaliste Nancy [64691]	Endangered	Species or species habitat known to occur within area
Wurmbea tubulosa Long-flowered Nancy [12739]	Endangered	Species or species habitat known to occur within area
Reptiles		
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus foliosquama Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Cryptoblepharus egeriae Christmas Island Blue-tailed Skink, Blue-tailed Snake-eyed Skink [1526]	Critically Endangered	Species or species habitat likely to occur within area
Ctenotus lancelini Lancelin Island Skink [1482]	Vulnerable	Species or species habitat known to occur within area
Ctenotus zasticus Hamelin Ctenotus [25570]	Vulnerable	Species or species habitat known to occur within area
Cyrtodactylus sadleiri Christmas Island Giant Gecko [86865]	Endangered	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Egernia stokesii badia Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Congregation or aggregation known to occur within area
Lepidodactylus listeri Christmas Island Gecko, Lister's Gecko [1711]	Critically Endangered	Species or species habitat known to occur within area
Lerista neviniae Nevin's Slider [85296]	Endangered	Species or species habitat known to occur

Name	Status	Type of Presence within area
Liasis olivaceus barroni Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat known to occur within area
Liopholis pulchra longicauda Jurien Bay Skink, Jurien Bay Rock-skink [83162]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Pseudemydura umbrina Western Swamp Tortoise [1760]	Critically Endangered	Translocated population known to occur within area
Ramphotyphlops exocoeti Christmas Island Blind Snake, Christmas Island Pink Blind Snake [1262]	Vulnerable	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 known to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Glyphis garricki Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Breeding known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to 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		
Anous stolidus Common Noddy [825]		Breeding known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Breeding known to occur within area
Ardenna grisea Sooty Shearwater [82651]		Species or species habitat may occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Ardenna tenuirostris Short-tailed Shearwater [82652]		Breeding known to occur within area

Name	Threatened	Type of Presence
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata andrewsi Christmas Island Frigatebird, Andrew's Frigatebird [1011]	Endangered	Breeding known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Breeding known to occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, 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
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Breeding known to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons Little Tern [82849]		Breeding known to occur within area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area

Name	Threatened	Type of Presence
Sula sula Red-footed Booby [1023]		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 Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat known to occur within area
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Breeding known to occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area

Name	Threatened	Type of Presence
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Dugong dugon Dugong [28]		Breeding known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat likely to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Congregation or aggregation known to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat known to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Breeding known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Foraging, feeding or related behaviour known to occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Breeding known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known

Name	Threatened	Type of Presence
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		to occur within area Breeding known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Cecropis daurica Red-rumped Swallow [80610]		Species or species habitat known to occur within area
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Acrocephalus orientalis Oriental Reed-Warbler [59570]		Species or species habitat known to occur within area
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris subminuta Long-toed Stint [861]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area

Name	Threatened	Type of Presence
Charadrius dubius Little Ringed Plover [896]		Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting known to occur within area
Glareola maldivarum Oriental Pratincole [840]		Roosting known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur

Name	Threatened	Type of Presence within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Tringa totanus Common Redshank, Redshank [835]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Christmas Island National Park
Defence - ARTILLERY BARRACKS - FREMANTLE
Defence - BROOME TRAINING DEPOT
Defence - CAMPBELL BARRACKS - SWANBOURNE
Defence - EAST FREMANTLE SMALL CRAFT BASE
Defence - EXMOUTH ADMIN & HF TRANSMITTING
Defence - EXMOUTH VLF TRANSMITTER STATION
Defence - GERALDTON TRAINING DEPOT "A" Company 16th Battalion
Defence - GREENOUGH RIFLE RANGE
Defence - HMAS STIRLING-ROCKINGHAM ;HMAS STIRLING - GARDEN ISLAND
Defence - IRWIN BARRACKS - KARRAKATTA
Defence - LANCELIN - AIR SAFETY MARKER
Defence - LANCELIN TRAINING AREA
Defence - LEARMONTH - AIR WEAPONS RANGE
Defence - LEARMONTH RADAR SITE - TWIN TANKS EXMOUTH
Defence - LEARMONTH RADAR SITE - VLAMING HEAD EXMOUTH
Defence - LEEUWIN BARRACKS - EAST FREMANTLE
Defence - MUCHEA ARMAMENT RANGE
Defence - PRESTON POINT TRAINING DEPOT
Defence - ROCKINGHAM - NAVY CPSO
Defence - SWAN BARRACKS
Defence - SWANBOURNE RIFLE RANGE

Commonwealth Heritage Places [\[Resource Information \]](#)

Name	State	Status
Natural		
Ashmore Reef National Nature Reserve	EXT	Listed place
Christmas Island Natural Areas	EXT	Listed place
Garden Island	WA	Listed place
Lancelin Defence Training Area	WA	Listed place
Learmonth Air Weapons Range Facility	WA	Listed place
Mermaid Reef - Rowley Shoals	WA	Listed place
Ningaloo Marine Area - Commonwealth Waters	WA	Listed place
Scott Reef and Surrounds - Commonwealth Area	EXT	Listed place
Historic		
Administrators House Precinct	EXT	Listed place
Army Magazine Buildings Irwin Barracks	WA	Listed place
Artillery Barracks	WA	Listed place

Name	State	Status
Bungalow 702	EXT	Listed place
Cape Leeuwin Lighthouse	WA	Listed place
Claremont Post Office	WA	Listed place
Cliff Point Historic Site	WA	Listed place
Drumsite Industrial Area	EXT	Listed place
Geraldton Drill Hall Complex	WA	Listed place
HMAS Sydney II and HSK Kormoran Shipwreck Sites	EXT	Listed place
Industrial and Administrative Group	EXT	Listed place
J Gun Battery	WA	Listed place
Malay Kampong Group	EXT	Listed place
Malay Kampong Precinct	EXT	Listed place
Perth General Post Office	WA	Listed place
Phosphate Hill Historic Area	EXT	Listed place
Poon Saan Group	EXT	Listed place
Settlement Christmas Island	EXT	Listed place
South Perth Post Office	WA	Listed place
South Point Settlement Remains	EXT	Listed place

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		
Acrocephalus orientalis Oriental Reed-Warbler [59570]		Species or species habitat known to occur within area
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous minutus Black Noddy [824]		Breeding known to occur within area
Anous stolidus Common Noddy [825]		Breeding known to occur within area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Breeding known to occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur

Name	Threatened	Type of Presence
Calidris ruficollis Red-necked Stint [860]		within area Roosting known to occur within area
Calidris subminuta Long-toed Stint [861]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Cereopsis novaehollandiae grisea Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Breeding known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius dubius Little Ringed Plover [896]		Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Roosting known to occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area

Name	Threatened	Type of Presence
Fregata andrewsi Christmas Island Frigatebird, Andrew's Frigatebird [1011]	Endangered	Breeding known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Breeding known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting known to occur within area
Glareola maldivarum Oriental Pratincole [840]		Roosting known to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Breeding known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area
Hirundo daurica Red-rumped Swallow [59480]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area
Larus novaehollandiae Silver Gull [810]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Breeding known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, 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
Motacilla cinerea Grey Wagtail [642]		Species or species

Name	Threatened	Type of Presence
Motacilla flava Yellow Wagtail [644]		habitat known to occur within area Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat known to occur within area
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Breeding known to occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Breeding likely to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Breeding likely to occur within area
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Pterodroma macroptera Great-winged Petrel [1035]		Breeding known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Puffinus assimilis Little Shearwater [59363]		Breeding known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Breeding known to occur within area

Name	Threatened	Type of Presence
Puffinus griseus Sooty Shearwater [1024]		Species or species habitat may occur within area
Puffinus huttoni Hutton's Shearwater [1025]		Foraging, feeding or related behaviour known to occur within area
Puffinus pacificus Wedge-tailed Shearwater [1027]		Breeding known to occur within area
Puffinus tenuirostris Short-tailed Shearwater [1029]		Breeding known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area
Sterna albifrons Little Tern [813]		Breeding known to occur within area
Sterna anaethetus Bridled Tern [814]		Breeding known to occur within area
Sterna bengalensis Lesser Crested Tern [815]		Breeding known to occur within area
Sterna bergii Crested Tern [816]		Breeding known to occur within area
Sterna caspia Caspian Tern [59467]		Breeding known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sterna fuscata Sooty Tern [794]		Breeding known to occur within area
Sterna nereis Fairy Tern [796]		Breeding known to occur within area
Stiltia isabella Australian Pratincole [818]		Roosting known to occur within area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Sula sula Red-footed Booby [1023]		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 Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within

Name	Threatened	Type of Presence area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Tringa totanus Common Redshank, Redshank [835]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area
Fish		
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Acentronura larsonae Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area
Bhanotia fasciolata Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys latispinosus Muiron Island Pipefish [66196]		Species or species habitat may occur within area
Choeroichthys sculptus Sculptured Pipefish [66197]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys haematopterus Reef-top Pipefish [66201]		Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Cosmocampus maxweberi Maxweber's Pipefish [66209]		Species or species habitat may occur within area
Doryrhamphus baldwini Redstripe Pipefish [66718]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus macrorhynchus Whiskered Pipefish, Ornate Pipefish [66222]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Halicampus mataafae Samoan Pipefish [66223]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish [66229]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippichthys spicifer Belly-barred Pipefish, Banded Freshwater Pipefish [66232]		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 histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Hippocampus subelongatus West Australian Seahorse [66722]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Leptoichthys fistularius Brush-tail Pipefish [66248]		Species or species habitat may occur within area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Micrognathus brevisrostris thorntail Pipefish, Thorn-tailed Pipefish [66254]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		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
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phoxocampus belcheri Black Rock Pipefish [66719]		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 hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock 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
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		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
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Breeding known to occur within area
Dugong dugon Dugong [28]		Breeding known to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Breeding known to occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus foliosquama Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus fuscus Dusky Seasnake [1119]		Species or species habitat known to occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Aipysurus pooleorum Shark Bay Seasnake [66061]		Species or species

Name	Threatened	Type of Presence
Aipysurus tenuis Brown-lined Seasnake [1121]		habitat may occur within area Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnstone's Crocodile [1773]		Species or species habitat may occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Emydocephalus annulatus Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
Enhydrina schistosa Beaked Seasnake [1126]		Species or species habitat may occur within area
Ephalophis greyi North-western Mangrove Seasnake [1127]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Hydrelaps darwiniensis Black-ringed Seasnake [1100]		Species or species habitat may occur within area
Hydrophis coggeri Slender-necked Seasnake [25925]		Species or species habitat may occur within area
Hydrophis czeblukovi Fine-spined Seasnake [59233]		Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis mcdowellii null [25926]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species

Name	Threatened	Type of Presence
Lapemis hardwickii Spine-bellied Seasnake [1113]		habitat may occur within area Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Congregation or aggregation known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to 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 bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Berardius arnuxii Arnoux's Beaked Whale [70]		Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to 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	Breeding known to occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur within area

Name	Status	Type of Presence
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Hyperoodon planifrons Southern Bottlenose Whale [71]		Species or species habitat may occur within area
Indopacetus pacificus Longman's Beaked Whale [72]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus Dwarf Sperm Whale [58]		Species or species habitat may occur within area
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat likely to occur within area
Lissodelphis peronii Southern Right Whale Dolphin [44]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Breeding known to occur within area
Mesoplodon bowdoini Andrew's Beaked Whale [73]		Species or species habitat may occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Ginkgo-toothed Beaked Whale, Ginkgo-toothed Whale, Ginkgo Beaked Whale [59564]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area
Mesoplodon hectori Hector's Beaked Whale [76]		Species or species habitat may occur within area
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area
Mesoplodon mirus True's Beaked Whale [54]		Species or species habitat may occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species

Name	Status	Type of Presence
Physeter macrocephalus Sperm Whale [59]		habitat may occur within area Foraging, feeding or related behaviour known to occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tasmacetus shepherdi Shepherd's Beaked Whale, Tasman Beaked Whale [55]		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 aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Commonwealth ReservesTerrestrial [Resource Information]

Name	State	Type
Christmas Island	EXT	National Park (Commonwealth)

Australian Marine Parks [Resource Information]

Name	Label
Abrolhos	Habitat Protection Zone (IUCN IV)
Abrolhos	Multiple Use Zone (IUCN VI)
Abrolhos	National Park Zone (IUCN II)
Abrolhos	Special Purpose Zone (IUCN VI)
Argo-Rowley Terrace	Multiple Use Zone (IUCN VI)
Argo-Rowley Terrace	National Park Zone (IUCN II)
Argo-Rowley Terrace	Special Purpose Zone (Trawl) (IUCN VI)
Ashmore Reef	Recreational Use Zone (IUCN IV)
Ashmore Reef	Sanctuary Zone (IUCN Ia)
Bremer	National Park Zone (IUCN II)
Bremer	Special Purpose Zone (Mining)
Carnarvon Canyon	Habitat Protection Zone (IUCN IV)
Cartier Island	Sanctuary Zone (IUCN Ia)

Name	Label
Dampier	Habitat Protection Zone (IUCN IV)
Dampier	Multiple Use Zone (IUCN VI)
Dampier	National Park Zone (IUCN II)
Eastern Recherche	National Park Zone (IUCN II)
Eastern Recherche	Special Purpose Zone (IUCN VI)
Eighty Mile Beach	Multiple Use Zone (IUCN VI)
Gascoyne	Habitat Protection Zone (IUCN IV)
Gascoyne	Multiple Use Zone (IUCN VI)
Gascoyne	National Park Zone (IUCN II)
Geographe	Habitat Protection Zone (IUCN IV)
Geographe	Multiple Use Zone (IUCN VI)
Geographe	National Park Zone (IUCN II)
Geographe	Special Purpose Zone (Mining)
Jurien	National Park Zone (IUCN II)
Jurien	Special Purpose Zone (IUCN VI)
Kimberley	Habitat Protection Zone (IUCN IV)
Kimberley	Multiple Use Zone (IUCN VI)
Kimberley	National Park Zone (IUCN II)
Mermaid Reef	National Park Zone (IUCN II)
Montebello	Multiple Use Zone (IUCN VI)
Ningaloo	National Park Zone (IUCN II)
Ningaloo	Recreational Use Zone (IUCN IV)
Perth Canyon	Habitat Protection Zone (IUCN IV)
Perth Canyon	Multiple Use Zone (IUCN VI)
Perth Canyon	National Park Zone (IUCN II)
Roebuck	Multiple Use Zone (IUCN VI)
Shark Bay	Multiple Use Zone (IUCN VI)
South-west Corner	Habitat Protection Zone (IUCN IV)
South-west Corner	Multiple Use Zone (IUCN VI)
South-west Corner	National Park Zone (IUCN II)
South-west Corner	Special Purpose Zone (IUCN VI)
South-west Corner	Special Purpose Zone (Mining)
Two Rocks	Multiple Use Zone (IUCN VI)
Two Rocks	National Park Zone (IUCN II)

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Adele Island	WA
Airlie Island	WA
Alfred Cove	WA
Austin Bay	WA
Bald Island	WA
Barrow Island	WA
Bashford	WA
Bedout Island	WA
Beekeepers	WA
Bella Vista	WA
Bernier And Dorre Islands	WA
Bessieres Island	WA
Bold Park	WA
Boodie, Double Middle Islands	WA
Boorara-Gardner	WA
Boullanger, Whitlock, Favourite, Tern And Osprey Islands	WA
Bramley	WA
Broadwater	WA
Broome Wildlife Centre	WA
Browse Island	WA
Bundegi Coastal Park	WA
Burnside And Simpson Island	WA
Canning River	WA
Cape Range	WA
Carnac Island	WA
Chatham Island	WA
Chester	WA

Name	State
Coulomb Point	WA
Creery Island	WA
Cutubury	WA
D'Entrecasteaux	WA
Dirk Hartog Island	WA
Dongara	WA
Doubtful Islands	WA
Drovers Cave	WA
Eclipse Island	WA
Escape Island	WA
Flinders Bay	WA
Forest Grove	WA
Freycinet, Double Islands etc	WA
Gingilup Swamps	WA
Gingin Stock Route	WA
Gnandaroo Island	WA
Goegrup Lake	WA
Greater Hawke	WA
Hamelin Island	WA
Harry Waring Marsupial Reserve	WA
Hill River	WA
Hilliger	WA
Howatharra	WA
Investigator Island	WA
Jandabup	WA
Jarrkunpungu	WA
Jerdacuttup Lakes	WA
Jinmarnkur	WA
Jinmarnkur Kulja	WA
Jurabi Coastal Park	WA
Kalbarri	WA
Karajarri	WA
Keanes Point Reserve	WA
Kings Park	WA
Koks Island	WA
Kooljerrenup	WA
Kordabup	WA
Kujungurru Warrarn	WA
Kujungurru Warrarn	WA
Lacepede Islands	WA
Lake Joondalup	WA
Lake Logue	WA
Lake McLarty	WA
Lake Mealup	WA
Lake Shaster	WA
Lancelin And Edwards Islands	WA
Leda	WA
Leeuwin-Naturaliste	WA
Len Howard	WA
Lesueur	WA
Little Rocky Island	WA
Locke	WA
Locker Island	WA
Lowendal Islands	WA
Matilda Bay Reserve	WA
McLarty	WA
McLean Road	WA
Mealup Point	WA
Mehniup	WA
Milyu	WA
Montebello Islands	WA
Moore River	WA
Moore River	WA
Mount Frankland South	WA
Mount Roe	WA
Mount Shadforth	WA

Name	State
Muiron Islands	WA
Murujuga	WA
NTWA Bushland covenant (0003)	WA
NTWA Bushland covenant (0005)	WA
NTWA Bushland covenant (0013)	WA
NTWA Bushland covenant (0014)	WA
NTWA Bushland covenant (0015A)	WA
NTWA Bushland covenant (0015B)	WA
NTWA Bushland covenant (0017)	WA
NTWA Bushland covenant (0043)	WA
NTWA Bushland covenant (0044A)	WA
NTWA Bushland covenant (0044B)	WA
NTWA Bushland covenant (0044C)	WA
NTWA Bushland covenant (0047)	WA
NTWA Bushland covenant (0065A)	WA
NTWA Bushland covenant (0065B)	WA
NTWA Bushland covenant (0067A)	WA
NTWA Bushland covenant (0067B)	WA
NTWA Bushland covenant (0070)	WA
NTWA Bushland covenant (0072A)	WA
NTWA Bushland covenant (0072B)	WA
NTWA Bushland covenant (0084)	WA
NTWA Bushland covenant (0085A)	WA
NTWA Bushland covenant (0085B)	WA
NTWA Bushland covenant (0090)	WA
NTWA Bushland covenant (0102)	WA
NTWA Bushland covenant (0120A)	WA
NTWA Bushland covenant (0120B)	WA
NTWA Bushland covenant (0137)	WA
NTWA Bushland covenant (0144)	WA
NTWA Bushland covenant (0147)	WA
NTWA Bushland covenant (0152)	WA
NTWA Bushland covenant (0153)	WA
NTWA Bushland covenant (0155)	WA
NTWA Bushland covenant (0164)	WA
Nabaroo	WA
Nambung	WA
Nanga Station	WA
Neerabup	WA
Neerabup	WA
Nilgen	WA
Nilligarri	WA
North Sandy Island	WA
North Turtle Island	WA
Northern Part Victoria Location 3721 & 3565	WA
Nyangumarta Warrarn	WA
Oakabella	WA
Oakajee	WA
Owingup	WA
Pagett	WA
Part Murchison house	WA
Penguin Island	WA
Perth Zoo	WA
Port Gregory	WA
Port Kennedy Scientific Park	WA
Quagering	WA
Quarram	WA
Recherche Archipelago	WA
Redmond Road	WA
Rottnest Island	WA
Round Island	WA
Rudyard Beach	WA
Sabina	WA
Scott	WA
Seal Island (WA25645)	WA
Serrurier Island	WA

Name	State
Shannon	WA
Shelter Island	WA
South Mimegarra	WA
Southern Beekeepers	WA
Springdale	WA
St Alouarn Island	WA
Stockdill Road	WA
Stockyard Gully Reserve	WA
Stokes	WA
Sugar Loaf Rock	WA
Swan River	WA
Tamala Pastoral Lease (Part)	WA
Tennessee North	WA
Tent Island	WA
Thomsons Lake	WA
Torndirrup	WA
Tuart Forest	WA
Unnamed WA11883	WA
Unnamed WA11962	WA
Unnamed WA11993	WA
Unnamed WA15185	WA
Unnamed WA21164	WA
Unnamed WA21176	WA
Unnamed WA24868	WA
Unnamed WA25836	WA
Unnamed WA26065	WA
Unnamed WA26400	WA
Unnamed WA26620	WA
Unnamed WA27888	WA
Unnamed WA29777	WA
Unnamed WA31468	WA
Unnamed WA31906	WA
Unnamed WA32478	WA
Unnamed WA32601	WA
Unnamed WA33287	WA
Unnamed WA33799	WA
Unnamed WA34039	WA
Unnamed WA35283	WA
Unnamed WA35593	WA
Unnamed WA35594	WA
Unnamed WA36907	WA
Unnamed WA36909	WA
Unnamed WA36910	WA
Unnamed WA36913	WA
Unnamed WA36915	WA
Unnamed WA37168	WA
Unnamed WA37338	WA
Unnamed WA37383	WA
Unnamed WA37500	WA
Unnamed WA38749	WA
Unnamed WA39584	WA
Unnamed WA39752	WA
Unnamed WA40322	WA
Unnamed WA40828	WA
Unnamed WA40877	WA
Unnamed WA41080	WA
Unnamed WA41102	WA
Unnamed WA41568	WA
Unnamed WA41597	WA
Unnamed WA41775	WA
Unnamed WA42030	WA
Unnamed WA42255	WA
Unnamed WA42377	WA
Unnamed WA42469	WA
Unnamed WA42942	WA
Unnamed WA43290	WA

Name	State
Unnamed WA43786	WA
Unnamed WA43903	WA
Unnamed WA44004	WA
Unnamed WA44414	WA
Unnamed WA44665	WA
Unnamed WA44667	WA
Unnamed WA44672	WA
Unnamed WA44673	WA
Unnamed WA44676	WA
Unnamed WA44682	WA
Unnamed WA44685	WA
Unnamed WA44688	WA
Unnamed WA44705	WA
Unnamed WA44709	WA
Unnamed WA44838	WA
Unnamed WA44977	WA
Unnamed WA44978	WA
Unnamed WA44986	WA
Unnamed WA45089	WA
Unnamed WA45772	WA
Unnamed WA45773	WA
Unnamed WA46661	WA
Unnamed WA46756	WA
Unnamed WA46895	WA
Unnamed WA46926	WA
Unnamed WA46982	WA
Unnamed WA46983	WA
Unnamed WA46984	WA
Unnamed WA48205	WA
Unnamed WA48291	WA
Unnamed WA48717	WA
Unnamed WA48837	WA
Unnamed WA48858	WA
Unnamed WA48968	WA
Unnamed WA49220	WA
Unnamed WA49385	WA
Unnamed WA49561	WA
Unnamed WA49994	WA
Unnamed WA50017	WA
Unnamed WA50067	WA
Unnamed WA50270	WA
Unnamed WA50514	WA
Unnamed WA51162	WA
Unnamed WA51375	WA
Unnamed WA51376	WA
Unnamed WA51497	WA
Unnamed WA51658	WA
Unnamed WA51784	WA
Unnamed WA51932	WA
Unnamed WA51943	WA
Unnamed WA51944	WA
Unnamed WA51945	WA
Unnamed WA51946	WA
Unnamed WA52237	WA
Unnamed WA52354	WA
Unnamed WA52366	WA
Unnamed WA53015	WA
Utcha Well	WA
Victor Island	WA
Walpole-Nornalup	WA
Wanagarren	WA
Wandi	WA
Wedge Island	WA
Weld Island	WA
West Cape Howe	WA
William Bay	WA

Name	State
Wokatherra	WA
Woodvale	WA
Y Island	WA
Yalgorup	WA
Yanchep	WA
Yardanogo	WA
Yawuru	WA
Yelverton	WA
Zuytdorp	WA

Regional Forest Agreements [\[Resource Information \]](#)

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

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 Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Gallus gallus Red Junglefowl, Feral Chicken, Domestic Fowl [917]		Species or species habitat likely to occur within area
Lonchura oryzivora Java Sparrow [59586]		Species or species habitat likely to occur within area
Meleagris gallopavo Wild Turkey [64380]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pavo cristatus Indian Peafowl, Peacock [919]		Species or species habitat likely to occur within area
Phasianus colchicus Common Pheasant [920]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat may occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		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
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus exulans Pacific Rat, Polynesian Rat [79]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur

Name	Status	Type of Presence
Sus scrofa Pig [6]		within area 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		
Andropogon gayanus Gamba Grass [66895]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus declinatus Bridal Veil, Bridal Veil Creeper, Pale Berry Asparagus Fern, Asparagus Fern, South African Creeper [66908]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Cylindropuntia spp. Prickly Pears [85131]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within

Name	Status	Type of Presence area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to 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
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area
Lycodon aulicus Wolf Snake, Common Wolf Snake, Asian Wolf Snake [83178]		Species or species habitat likely to occur within area
Lygosoma bowringii Christmas Island Grass-skink [1312]		Species or species habitat likely to occur within area
Ramphotyphlops braminus Flowerpot Blind Snake, Brahminy Blind Snake,		Species or species

Name	Status	Type of Presence
Cacing Besi [1258]		habitat known to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
"The Dales", Christmas Island	EXT
Ashmore Reef	EXT
Barraghup Swamp	WA
Becher Point Wetlands	WA
Blackwood River (Lower Reaches) and Tributaries System	WA
Booragoon Swamp	WA
Broke Inlet System	WA
Bundera Sinkhole	WA
Cape Leeuwin System	WA
Cape Range Subterranean Waterways	WA
De Grey River	WA
Doggerup Creek System	WA
Eighty Mile Beach System	WA
Exmouth Gulf East	WA
Gibbs Road Swamp System	WA
Gingilup-Jasper Wetland System	WA
Herdsman Lake	WA
Hosine's Spring, Christmas Island	EXT
Hutt Lagoon System	WA
Joondalup Lake	WA
Karakin Lakes	WA
Lake Logue/Indoon System	WA
Lake MacLeod	WA
Lake McLarty System	WA
Lake Thetis	WA
Lancelin Defence Training Area	WA
Learmonth Air Weapons Range - Saline Coastal Flats	WA
Leslie (Port Hedland) Saltfields System	WA
Loch McNess System	WA
Maringup Lake	WA
Mermaid Reef	EXT
Murchison River (Lower Reaches)	WA
Owingup Swamp System	WA
Palmer Barracks, Guildford	WA
Peel-Harvey Estuary	WA
Roebuck Bay	WA
Rottnest Island Lakes	WA
Shark Bay East	WA
Spectacles Swamp	WA
Swan-Canning Estuary	WA
Thomsons Lake	WA
Vasse-Wonnerup Wetland System	WA
Willie Creek Wetlands	WA
Yalgorup Lakes System	WA

Key Ecological Features (Marine) [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Ancient coastline at 125 m depth contour	North-west
Ashmore Reef and Cartier Island and surrounding	North-west
Canyons linking the Argo Abyssal Plain with the	North-west
Canyons linking the Cuvier Abyssal Plain and the	North-west
Commonwealth waters adjacent to Ningaloo Reef	North-west
Continental Slope Demersal Fish Communities	North-west
Exmouth Plateau	North-west
Glomar Shoals	North-west
Mermaid Reef and Commonwealth waters	North-west
Seringapatam Reef and Commonwealth waters in	North-west
Wallaby Saddle	North-west

Name	Region
Albany Canyons group and adjacent shelf break	South-west
Ancient coastline at 90-120m depth	South-west
Cape Mentelle upwelling	South-west
Commonwealth marine environment surrounding	South-west
Commonwealth marine environment surrounding	South-west
Commonwealth marine environment within and	South-west
Commonwealth marine environment within and	South-west
Diamantina Fracture Zone	South-west
Naturaliste Plateau	South-west
Perth Canyon and adjacent shelf break, and other	South-west
Western demersal slope and associated fish	South-west
Western rock lobster	South-west

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 and National Heritage properties, Wetlands of International and National 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.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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.

Coordinates

-34.71791 116.08585,-34.87158 116.52962,-34.94083 117.25812,-34.99141 117.64613,-35.09846 117.81013,-35.10493 118.26137,-34.87895 118.44901,-34.47786 119.4928,-34.32319 119.52611,-33.79495 120.49551,-33.75509 121.23711,-34.24586 121.82899,-34.44811 122.28407,-34.10309 123.59872,-34.18439 125.06432,-34.41044 125.10001,-36.64713 122.9228,-38.50668 112.11886,-38.19259 110.49131,-36.86009 108.08329,-34.0214 104.80201,-26.61425 101.02736,-22.62866 100.18265,-16.83598 100.16718,-15.48444 100.11959,-13.59039 100.15766,-8.66245 100.48024,-8.13486 100.69236,-7.00699 102.21997,-6.59296 104.54709,-7.52809 105.91409,-7.87787 107.9628,-7.83028 109.24628,-7.95402 110.52168,-8.07299 110.83576,-8.19672 112.24377,-8.20624 113.36688,-8.48702 114.08071,-8.3728 115.0325,-8.5584 115.70827,-7.20909 116.03774,-6.93783 116.78727,-6.81647 117.52253,-7.59599 120.14303,-8.10733 120.10515,-8.22535 119.85959,-8.53944 119.78344,-8.77168 119.97761,-8.90255 120.02091,-9.08815 121.34865,-9.30971 122.12105,-8.52988 124.38526,-8.26009 124.83218,-8.3419 124.91231,-10.16128 122.67639,-11.3986 122.58716,-11.49973 124.07789,-15.72327 123.23913,-16.913 122.32899,-17.3532 122.24571,-17.51382 122.32304,-17.8348 122.27173,-18.275 122.22117,-18.64976 121.89697,-18.75684 121.72743,-19.18514 121.52518,-19.51663 121.30855,-19.88348 120.64296,-19.99602 120.05357,-20.13498 119.55864,-20.04361 119.09798,-20.40755 118.84737,-20.46643 118.42712,-20.611 118.0336,-20.80122 117.78027,-20.85832 117.34562,-20.58231 116.96015,-20.88212 116.58419,-21.07247 116.21776,-21.30566 115.97029,-21.63165 115.45871,-21.753 115.12321,-21.88134 114.7799,-22.12598 114.56027,-22.13133 114.55547,-22.20177 113.96536,-22.22179 113.96013,-22.22398 113.95956,-22.54822 113.87494,-22.82471 113.99629,-23.24117 113.9397,-23.50761 113.90349,-23.87814 113.64824,-23.96146 113.59084,-23.97186 113.58813,-24.02953 113.57312,-24.25952 113.51326,-24.31869 113.5303,-24.66184 113.62913,-25.37574 113.44207,-25.91634 113.23089,-25.91682 113.2307,-26.14266 113.32693,-26.3938 113.43395,-26.77749 113.79384,-27.14844 114.13211,-27.3388 114.22154,-28.04669 114.31672,-28.37981 114.64984,-28.79327 114.78135,-29.1115 115.06625,-29.55646 115.12811,-30.26773 115.17196,-31.73366 115.88359,-32.38841 115.8705,-32.71677 115.73209,-32.74519 115.72011,-32.94119 115.48791,-33.63525 115.46421,-33.69771 115.10432,-34.16171 115.12572,-34.16607 115.12592,-34.17678 115.31509,-34.20929 115.56236,-34.51407 115.88913,-34.71791 116.08585

Acknowledgements

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- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
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- [-South Australian 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, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-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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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.

Report created: 12/05/21 14:38:56

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

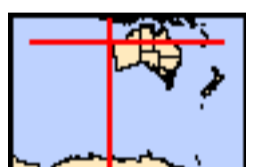
[Acknowledgements](#)



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[Coordinates](#)

[Buffer: 0.0Km](#)



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:	2
National Heritage Places:	7
Wetlands of International Importance:	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	6
Listed Threatened Species:	117
Listed Migratory Species:	93

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. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

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:	6
Commonwealth Heritage Places:	17
Listed Marine Species:	190
Whales and Other Cetaceans:	44
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	1
Australian Marine Parks:	34

Extra Information

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

State and Territory Reserves:	54
Regional Forest Agreements:	1
Invasive Species:	52
Nationally Important Wetlands:	10
Key Ecological Features (Marine)	20

Details

Matters of National Environmental Significance

World Heritage Properties [\[Resource Information \]](#)

Name	State	Status
Shark Bay, Western Australia	WA	Declared property
The Ningaloo Coast	WA	Declared property

National Heritage Properties [\[Resource Information \]](#)

Name	State	Status
Natural		
Shark Bay, Western Australia	WA	Listed place
The Ningaloo Coast	WA	Listed place
The West Kimberley	WA	Listed place
Indigenous		
Dampier Archipelago (including Burrup Peninsula)	WA	Listed place
Historic		
Batavia Shipwreck Site and Survivor Camps Area 1629 - Houtman Abrolhos	WA	Listed place
Dirk Hartog Landing Site 1616 - Cape Inscription Area	WA	Listed place
HMAS Sydney II and HSK Kormoran Shipwreck Sites	EXT	Listed place

Wetlands of International Importance (Ramsar) [\[Resource Information \]](#)

Name	Proximity
Hosnies spring	Within Ramsar site
The dales	Within Ramsar site

Commonwealth Marine Area [\[Resource Information \]](#)

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

Name

EEZ and Territorial Sea
Extended Continental Shelf

Marine Regions [\[Resource Information \]](#)

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name

[North-west](#)
[South-west](#)

Listed Threatened Ecological Communities [\[Resource Information \]](#)

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.

Name	Status	Type of Presence
Aquatic Root Mat Community 1 in Caves of the Leeuwin Naturaliste Ridge	Endangered	Community known to occur within area
Aquatic Root Mat Community in Caves of the Swan Coastal Plain	Endangered	Community known to occur within area
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Sedgeland in Holocene dune swales of the southern Swan Coastal Plain	Endangered	Community known to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological	Critically Endangered	Community likely to occur within area

Name	Status	Type of Presence
community		
Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Accipiter hiogaster natalis Christmas Island Goshawk [82408]	Endangered	Species or species habitat known to occur within area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Breeding known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Breeding known to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Chalcophaps indica natalis Christmas Island Emerald Dove, Emerald Dove (Christmas Island) [67030]	Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Fregata andrewsi Christmas Island Frigatebird, Andrew's Frigatebird [1011]	Endangered	Breeding known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Critically Endangered	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, 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
Malurus leucopterus edouardi White-winged Fairy-wren (Barrow Island), Barrow Island Black-and-white Fairy-wren [26194]	Vulnerable	Species or species habitat likely to occur within area
Malurus leucopterus leucopterus White-winged Fairy-wren (Dirk Hartog Island), Dirk Hartog Black-and-White Fairy-wren [26004]	Vulnerable	Species or species habitat likely to occur within area
Ninox natalis Christmas Island Hawk-Owl, Christmas Boobook [66671]	Vulnerable	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat known to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Breeding likely to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area

Name	Status	Type of Presence
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Turdus poliocephalus erythropleurus Christmas Island Thrush [67122]	Endangered	Species or species habitat likely to occur within area
Turnix varius scintillans Painted Button-quail (Houtman Abrolhos) [82451]	Vulnerable	Species or species habitat likely to occur within area
Fish		
Galaxiella nigrostriata Blackstriped Dwarf Galaxias, Black-stripe Minnow [88677]	Endangered	Species or species habitat likely to occur within area
Milyeringa veritas Blind Gudgeon [66676]	Vulnerable	Species or species habitat known to occur within area
Nannatherina balstoni Balston's Pygmy Perch [66698]	Vulnerable	Species or species habitat likely to occur within area
Ophisternon candidum Blind Cave Eel [66678]	Vulnerable	Species or species habitat known to occur within area
Insects		
Hesperocolletes douglasi Douglas' Broad-headed Bee, Rottnest Bee [66734]	Critically Endangered	Species or species habitat may occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Bettongia lesueur Barrow and Boodie Islands subspecies Boodie, Burrowing Bettong (Barrow and Boodie Islands) [88021]	Vulnerable	Species or species habitat known to occur within area
Bettongia lesueur lesueur Burrowing Bettong (Shark Bay), Boodie [66659]	Vulnerable	Species or species habitat known to occur within area
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat known to occur within area
Crocidura trichura Christmas Island Shrew [86568]	Critically Endangered	Species or species

Name	Status	Type of Presence
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	habitat likely to occur within area Species or species habitat known to occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Isoodon auratus barrowensis Golden Bandicoot (Barrow Island) [66666]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes conspicillatus conspicillatus Spectacled Hare-wallaby (Barrow Island) [66661]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes hirsutus Central Australian subspecies Mala, Rufous Hare-Wallaby (Central Australia) [88019]	Endangered	Translocated population known to occur within area
Lagorchestes hirsutus bernieri Rufous Hare-wallaby (Bernier Island) [66662]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes hirsutus dorrae Rufous Hare-wallaby (Dorre Island) [66663]	Vulnerable	Species or species habitat known to occur within area
Lagostrophus fasciatus fasciatus Banded Hare-wallaby, Merrnine, Marnine, Munning [66664]	Vulnerable	Species or species habitat known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Breeding known to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Breeding known to occur within area
Osphranter robustus isabellinus Barrow Island Wallaroo, Barrow Island Euro [89262]	Vulnerable	Species or species habitat likely to occur within area
Parantechinus apicalis Dibbler [313]	Endangered	Species or species habitat may occur within area
Perameles bougainville bougainville Western Barred Bandicoot (Shark Bay) [66631]	Endangered	Species or species habitat known to occur within area
Petrogale lateralis lateralis Black-flanked Rock-wallaby, Moororong, Black-footed Rock Wallaby [66647]	Endangered	Species or species habitat known to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat likely to occur within area
Pseudomys fieldi Shark Bay Mouse, Djoongari, Alice Springs Mouse	Vulnerable	Species or species

Name	Status	Type of Presence
[113]		habitat likely to occur within area
Pteropus natalis Christmas Island Flying-fox, Christmas Island Fruit-bat [87611]	Critically Endangered	Roosting known to occur within area
Rhinonictes aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat may occur within area
Other		
Idiosoma nigrum Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat may occur within area
Kumonga exleyi Cape Range Remipede [86875]	Vulnerable	Species or species habitat known to occur within area
Westralunio carteri Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Anigozanthos viridis subsp. terraspectans Dwarf Green Kangaroo Paw [3435]	Vulnerable	Species or species habitat likely to occur within area
Asplenium listeri Christmas Island Spleenwort [65865]	Critically Endangered	Species or species habitat known to occur within area
Banksia nivea subsp. uliginosa Swamp Honeypot [82766]	Endangered	Species or species habitat likely to occur within area
Caladenia lodgeana Lodge's Spider-orchid [68664]	Critically Endangered	Species or species habitat known to occur within area
Calectasia cyanea Blue Tinsel Lily [7669]	Critically Endangered	Species or species habitat may occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area
Drakaea elastica Glossy-leaved Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat may occur within area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat may occur within area
Eucalyptus argutifolia Yanchep Mallee, Wabbling Hill Mallee [24263]	Vulnerable	Species or species habitat known to occur within area
Hemiandra gardneri Red Snakebush [7945]	Endangered	Species or species

Name	Status	Type of Presence
Kennedia lateritia Augusta Kennedia [45985]	Endangered	habitat likely to occur within area Species or species habitat likely to occur within area
Minuria tridens Minnie Daisy [13753]	Vulnerable	Species or species habitat known to occur within area
Pityrodia augustensis Mt Augustus Foxglove [4962]	Vulnerable	Species or species habitat likely to occur within area
Pneumatopteris truncata fern [68812]	Critically Endangered	Species or species habitat known to occur within area
Tectaria devexa [14767]	Endangered	Species or species habitat likely to occur within area
Reptiles		
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Cryptoblepharus egeriae Christmas Island Blue-tailed Skink, Blue-tailed Snake-eyed Skink [1526]	Critically Endangered	Species or species habitat likely to occur within area
Ctenotus zasticus Hamelin Ctenotus [25570]	Vulnerable	Species or species habitat known to occur within area
Cyrtodactylus sadleiri Christmas Island Giant Gecko [86865]	Endangered	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Egernia stokesii badia Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Lepidodactylus listeri Christmas Island Gecko, Lister's Gecko [1711]	Critically Endangered	Species or species habitat known to occur within area
Liasis olivaceus barroni Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Ramphotyphlops exocoeti Christmas Island Blind Snake, Christmas Island	Vulnerable	Species or species

Name	Status	Type of Presence
Pink Blind Snake [1262]		habitat likely to occur within area
Sharks		
Carcharias taurus (west coast population) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Glyphis garricki Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to 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		
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Breeding known to occur within area
Ardenna grisea Sooty Shearwater [82651]		Species or species habitat may occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely

Name	Threatened	Type of Presence
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	to occur within area Foraging, feeding or related behaviour likely to occur within area
Fregata andrewsi Christmas Island Frigatebird, Andrew's Frigatebird [1011]	Endangered	Breeding known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Breeding known to occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, 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
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Breeding known to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons Little Tern [82849]		Breeding known to occur within area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Sula sula Red-footed Booby [1023]		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 Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely

Name	Threatened	Type of Presence to occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat known to occur within area
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Breeding known to occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Dugong dugon Dugong [28]		Breeding known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat known to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Breeding known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Foraging, feeding or related behaviour known to occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Cecropis daurica Red-rumped Swallow [80610]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur

Name	Threatened	Type of Presence within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Pluvialis squatarola Grey Plover [865]		Species or species habitat known to occur within area
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Commonwealth Land - Christmas Island National Park Defence - EXMOUTH ADMIN & HF TRANSMITTING Defence - EXMOUTH VLF TRANSMITTER STATION Defence - LEARMONTH - AIR WEAPONS RANGE Defence - LEARMONTH RADAR SITE - TWIN TANKS EXMOUTH

Commonwealth Heritage Places [\[Resource Information \]](#)

Name	State	Status
Natural		
Christmas Island Natural Areas	EXT	Listed place
Learmonth Air Weapons Range Facility	WA	Listed place
Mermaid Reef - Rowley Shoals	WA	Listed place
Ningaloo Marine Area - Commonwealth Waters	WA	Listed place
Scott Reef and Surrounds - Commonwealth Area	EXT	Listed place
Historic		
Administrators House Precinct	EXT	Listed place
Bungalow 702	EXT	Listed place
Cape Leeuwin Lighthouse	WA	Listed place
Drumsite Industrial Area	EXT	Listed place
HMAS Sydney II and HSK Kormoran Shipwreck Sites	EXT	Listed place
Industrial and Administrative Group	EXT	Listed place
Malay Kampong Group	EXT	Listed place
Malay Kampong Precinct	EXT	Listed place
Phosphate Hill Historic Area	EXT	Listed place
Poon Saan Group	EXT	Listed place
Settlement Christmas Island	EXT	Listed place
South Point Settlement Remains	EXT	Listed place

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		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Breeding known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species

Name	Threatened	Type of Presence
Diomedea dabbenena Tristan Albatross [66471]	Endangered	habitat likely to occur within area Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area
Fregata andrewsi Christmas Island Frigatebird, Andrew's Frigatebird [1011]	Endangered	Breeding known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Breeding known to occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Species or species habitat known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Species or species habitat known to occur within area
Hirundo daurica Red-rumped Swallow [59480]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area
Larus novaehollandiae Silver Gull [810]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Breeding known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Macronectes giganteus Southern Giant-Petrel, 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
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat known to occur within area
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Breeding known to occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Breeding likely to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Breeding likely to occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat likely to occur within area
Pluvialis squatarola Grey Plover [865]		Species or species habitat known to occur within area
Pterodroma macroptera Great-winged Petrel [1035]		Foraging, feeding or related behaviour known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known

Name	Threatened	Type of Presence
Puffinus assimilis Little Shearwater [59363]		to occur within area Breeding known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Breeding known to occur within area
Puffinus griseus Sooty Shearwater [1024]		Species or species habitat may occur within area
Puffinus huttoni Hutton's Shearwater [1025]		Foraging, feeding or related behaviour known to occur within area
Puffinus pacificus Wedge-tailed Shearwater [1027]		Breeding known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Breeding known to occur within area
Sterna anaethetus Bridled Tern [814]		Breeding known to occur within area
Sterna bengalensis Lesser Crested Tern [815]		Breeding known to occur within area
Sterna bergii Crested Tern [816]		Breeding known to occur within area
Sterna caspia Caspian Tern [59467]		Breeding known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sterna fuscata Sooty Tern [794]		Breeding known to occur within area
Sterna nereis Fairy Tern [796]		Breeding known to occur within area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Sula sula Red-footed Booby [1023]		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 Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Species or species habitat known to occur within area
Fish		
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Acentronura larsonae Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area
Bhanotia fasciolata Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys latispinosus Muiron Island Pipefish [66196]		Species or species habitat may occur within area
Choeroichthys sculptus Sculptured Pipefish [66197]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Corythoichthys haematopterus Reef-top Pipefish [66201]		Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Cosmocampus maxweberi Maxweber's Pipefish [66209]		Species or species habitat may occur within area
Doryrhamphus baldwini Redstripe Pipefish [66718]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus macrorhynchus Whiskered Pipefish, Ornate Pipefish [66222]		Species or species habitat may occur within area
Halicampus mataafae Samoan Pipefish [66223]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribbioned Pipehorse, Ribbioned Seadragon [66226]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish [66229]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippichthys spicifer Belly-barred Pipefish, Banded Freshwater Pipefish [66232]		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 histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Hippocampus subelongatus West Australian Seahorse [66722]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Micrognathus brevirostris thorntail Pipefish, Thorn-tailed Pipefish [66254]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		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
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phoxocampus belcheri Black Rock Pipefish [66719]		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 hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock 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

Name	Threatened	Type of Presence
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		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
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Breeding known to occur within area
Dugong dugon Dugong [28]		Breeding known to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Breeding known to occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus fuscus Dusky Seasnake [1119]		Species or species habitat known to occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Aipysurus pooleorum Shark Bay Seasnake [66061]		Species or species habitat may occur within area
Aipysurus tenuis Brown-lined Seasnake [1121]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species

Name	Threatened	Type of Presence
Caretta caretta Loggerhead Turtle [1763]	Endangered	habitat may occur within area Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Emydocephalus annulatus Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
Ephalophis greyi North-western Mangrove Seasnake [1127]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Hydrelaps darwiniensis Black-ringed Seasnake [1100]		Species or species habitat may occur within area
Hydrophis coggeri Slender-necked Seasnake [25925]		Species or species habitat may occur within area
Hydrophis czeb lukovi Fine-spined Seasnake [59233]		Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis mcdowellii null [25926]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Lapemis hardwickii Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within

Name	Threatened	Type of Presence 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 bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Berardius arnuxii Arnoux's Beaked Whale [70]		Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Hyperoodon planifrons Southern Bottlenose Whale [71]		Species or species habitat may occur within area
Indopacetus pacificus Longman's Beaked Whale [72]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area

Name	Status	Type of Presence
Kogia simus Dwarf Sperm Whale [58]		Species or species habitat may occur within area
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat likely to occur within area
Lissodelphis peronii Southern Right Whale Dolphin [44]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Breeding known to occur within area
Mesoplodon bowdoini Andrew's Beaked Whale [73]		Species or species habitat may occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Ginkgo-toothed Beaked Whale, Ginkgo-toothed Whale, Ginkgo Beaked Whale [59564]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area
Mesoplodon hectori Hector's Beaked Whale [76]		Species or species habitat may occur within area
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area
Mesoplodon mirus True's Beaked Whale [54]		Species or species habitat may occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Foraging, feeding or related behaviour known to occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species

Name	Status	Type of Presence
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		habitat may occur within area Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tasmacetus shepherdi Shepherd's Beaked Whale, Tasman Beaked Whale [55]		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 aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Commonwealth ReservesTerrestrial [Resource Information]

Name	State	Type
Christmas Island	EXT	National Park (Commonwealth)

Australian Marine Parks [Resource Information]

Name	Label
Abrolhos	Habitat Protection Zone (IUCN IV)
Abrolhos	Multiple Use Zone (IUCN VI)
Abrolhos	National Park Zone (IUCN II)
Abrolhos	Special Purpose Zone (IUCN VI)
Argo-Rowley Terrace	Multiple Use Zone (IUCN VI)
Argo-Rowley Terrace	National Park Zone (IUCN II)
Argo-Rowley Terrace	Special Purpose Zone (Trawl) (IUCN VI)
Carnarvon Canyon	Habitat Protection Zone (IUCN IV)
Dampier	Habitat Protection Zone (IUCN IV)
Dampier	Multiple Use Zone (IUCN VI)
Dampier	National Park Zone (IUCN II)
Eighty Mile Beach	Multiple Use Zone (IUCN VI)
Gascoyne	Habitat Protection Zone (IUCN IV)
Gascoyne	Multiple Use Zone (IUCN VI)
Gascoyne	National Park Zone (IUCN II)
Geographe	Special Purpose Zone (Mining)
Jurien	National Park Zone (IUCN II)
Jurien	Special Purpose Zone (IUCN VI)
Kimberley	Multiple Use Zone (IUCN VI)
Mermaid Reef	National Park Zone (IUCN II)
Montebello	Multiple Use Zone (IUCN VI)
Ningaloo	National Park Zone (IUCN II)
Ningaloo	Recreational Use Zone (IUCN IV)
Perth Canyon	Habitat Protection Zone (IUCN IV)
Perth Canyon	Multiple Use Zone (IUCN VI)
Perth Canyon	National Park Zone (IUCN II)
Shark Bay	Multiple Use Zone (IUCN VI)

Name	Label
South-west Corner	Habitat Protection Zone (IUCN IV)
South-west Corner	Multiple Use Zone (IUCN VI)
South-west Corner	National Park Zone (IUCN II)
South-west Corner	Special Purpose Zone (IUCN VI)
South-west Corner	Special Purpose Zone (Mining)
Two Rocks	Multiple Use Zone (IUCN VI)
Two Rocks	National Park Zone (IUCN II)

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Airlie Island	WA
Barrow Island	WA
Bedout Island	WA
Bernier And Dorre Islands	WA
Bessieres Island	WA
Boodie, Double Middle Islands	WA
Bundegi Coastal Park	WA
Cape Range	WA
Dirk Hartog Island	WA
Flinders Bay	WA
Freycinet, Double Islands etc	WA
Gnandaroo Island	WA
Jurabi Coastal Park	WA
Koks Island	WA
Leeuwin-Naturaliste	WA
Little Rocky Island	WA
Locker Island	WA
Lowendal Islands	WA
Montebello Islands	WA
Muiron Islands	WA
Murujuga	WA
Nambung	WA
North Sandy Island	WA
North Turtle Island	WA
Round Island	WA
Seal Island (WA25645)	WA
Serrurier Island	WA
Southern Beekeepers	WA
St Alouarn Island	WA
Unnamed WA15185	WA
Unnamed WA26400	WA
Unnamed WA34039	WA
Unnamed WA36907	WA
Unnamed WA36909	WA
Unnamed WA36910	WA
Unnamed WA36913	WA
Unnamed WA36915	WA
Unnamed WA37338	WA
Unnamed WA37383	WA
Unnamed WA37500	WA
Unnamed WA40322	WA
Unnamed WA40828	WA
Unnamed WA40877	WA
Unnamed WA41080	WA
Unnamed WA44665	WA
Unnamed WA44667	WA
Unnamed WA44672	WA

Name	State
Unnamed WA48858	WA
Victor Island	WA
Wanagarren	WA
Wedge Island	WA
Weld Island	WA
Y Island	WA
Yanchep	WA

Regional Forest Agreements [\[Resource Information \]](#)

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

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 Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Gallus gallus Red Junglefowl, Feral Chicken, Domestic Fowl [917]		Species or species habitat likely to occur within area
Lonchura oryzivora Java Sparrow [59586]		Species or species habitat likely to occur within area
Meleagris gallopavo Wild Turkey [64380]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area

Mammals

Name	Status	Type of Presence
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		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
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		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		
Andropogon gayanus Gamba Grass [66895]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Asparagus declinatus Bridal Veil, Bridal Veil Creeper, Pale Berry Asparagus Fern, Asparagus Fern, South African Creeper [66908]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to 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

Name	Status	Type of Presence
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area
Lycodon aulicus Wolf Snake, Common Wolf Snake, Asian Wolf Snake [83178]		Species or species habitat likely to occur within area
Lygosoma bowringii Christmas Island Grass-skink [1312]		Species or species habitat likely to occur within area
Ramphotyphlops braminus Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		Species or species habitat likely to occur within area

Nationally Important Wetlands [[Resource Information](#)]

Name	State
"The Dales", Christmas Island	EXT
Bundera Sinkhole	WA
Cape Leeuwin System	WA
Cape Range Subterranean Waterways	WA
Exmouth Gulf East	WA
Hosine's Spring, Christmas Island	EXT
Lake Thetis	WA
Learmonth Air Weapons Range - Saline Coastal Flats	WA
Mermaid Reef	EXT
Shark Bay East	WA

Key Ecological Features (Marine) [[Resource Information](#)]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Ancient coastline at 125 m depth contour	North-west
Canyons linking the Argo Abyssal Plain with the	North-west
Canyons linking the Cuvier Abyssal Plain and the	North-west
Commonwealth waters adjacent to Ningaloo Reef	North-west
Continental Slope Demersal Fish Communities	North-west
Exmouth Plateau	North-west
Glomar Shoals	North-west
Mermaid Reef and Commonwealth waters	North-west
Seringapatam Reef and Commonwealth waters in	North-west
Wallaby Saddle	North-west
Albany Canyons group and adjacent shelf break	South-west
Ancient coastline at 90-120m depth	South-west
Cape Mentelle upwelling	South-west
Commonwealth marine environment surrounding	South-west
Commonwealth marine environment within and	South-west
Commonwealth marine environment within and	South-west
Naturaliste Plateau	South-west
Perth Canyon and adjacent shelf break, and other	South-west
Western demersal slope and associated fish	South-west
Western rock lobster	South-west

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 and National Heritage properties, Wetlands of International and National 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.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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.

Coordinates

-31.6953051085439 107.297500618259,-25.9274916304344 102.866944225196,-24.2523510823365 102.448159088171,-10.4667057997328 100.587420581395,-8.24734286178358 101.615724484398,-7.58109378015376 102.44853583576,-7.96365010896528 107.658141026387,-8.13021237959759 110.765717100664,-8.45381907638921 111.084564874769,-8.31718023597904 112.145181855958,-8.48713153069554 113.102347807705,-8.50616721874212 113.523163418757,-8.50107187316837 113.806162957055,-8.7193669241442 114.271265958357,-8.72655289669876 114.46071864425,-8.83005945028333 115.131726647667,-8.86500778398198 115.616616185489,-7.18225645776926 116.419223870685,-7.72048703984495 119.998988493324,-8.78529584023079 119.535588462638,-8.83050559945383 119.764016719196,-10.1612191669309 121.972453964479,-11.8100156387107 122.09507118079,-12.9267873784347 122.730272637372,-14.3734996699737 122.830209999392,-15.8495586475135 122.147304691059,-17.1166216332817 122.075920860659,-18.5044422648986 121.504850219262,-19.538556017646 120.62207018599,-19.7098772100651 119.941544339,-19.4885873366362 119.241982803064,-19.6000055985795 119.171104608391,-20.1282459411972 118.948625003841,-20.1954657153704 118.822513570645,-20.303850163854 118.35483051062,-20.3394231054919 118.125926361612,-20.5692980456682 117.929189151858,-20.6807110213965 117.566070847991,-20.5749897451806 117.190798185988,-20.3768996169237 116.974862099906,-20.576774340963 116.860647971627,-20.6790911643257 116.646942630498,-20.8408945131712 116.43992952243,-20.9970169174967 116.130452032036,-21.2039209467942 115.903876615414,-21.5152199996032 115.412739999951,-21.6262114262163 115.160615999629,-21.8740969783928 114.643167104279,-22.0443465746347 114.413144295773,-22.0354235957223 114.047302165762,-21.9610654393185 114.056225144675,-21.8028207141047 114.17593411177,-21.815961948685 114.078749024148,-22.020551963902 113.961046704442,-22.4756238812371 113.788535781801,-22.6421861518694 113.782587128893,-22.8741835999931 113.883714222034,-23.0901196860746 113.889662874042,-23.5041459013123 113.823037966329,-23.9276899601235 113.527984801158,-24.2791899998186 113.400220000353,-24.5910836888611 113.38093411102,-24.6738195310465 113.27286692357,-25.4560673367382 113.124150610762,-25.5109000001349 112.940689999744,-25.6439499996927 112.933780000347,-25.9769320172987 113.151278144071,-26.1380605184781 113.268940813568,-26.4575031581442 113.383154941847,-26.7287617134822 113.665121070981,-27.0512158580254 113.731151113133,-27.3293748502691 114.003629141971,-27.4587580422498 114.004025718712,-27.8632664130145 113.712541745106,-28.4313627284071 113.804745859334,-29.3914752440872 114.745822686967,-30.2640235951128 114.95688087815,-30.4239233750637 114.96401926128,-30.4810304392034 115.14533419062,-30.7349665176906 115.208247139394,-31.1692181511967 115.212768114957,-31.5725367917395 115.701747352159,-31.8872205096188 115.561359152703,-31.9972705807726 115.427514470816,-32.9456523810525 115.252633625941,-33.7762151152353 114.86417707811,-34.262862480519 114.912337368175,-34.2919590191933 115.186403328151,-34.8780721231299 115.511842568979,-34.9286356697003 116.204860586447,-35.2304702986653 116.809767164023,-35.7806016831211 116.590856751038,-35.3879311576968 113.33895211215,-31.6953051085439 107.297500618259

Acknowledgements

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- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian 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, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-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 E

ABORIGINAL HERITAGE INQUIRY SYSTEM SEARCH REPORTS FOR ABORIGINAL HERITAGE PLACES WITHIN THE EMBA

List of Registered Aboriginal Sites

Search Criteria

2000 Registered Aboriginal Sites in Shapefile - Stickle4H1_LOW_C_EMBA

Disclaimer

The *Aboriginal Heritage Act 1972* preserves all Aboriginal sites in Western Australia whether or not they are registered. Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Planning, Lands and Heritage by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you email the details to the Department at AboriginalHeritage@dplh.wa.gov.au and we will make every effort to rectify it as soon as possible.

South West Settlement ILUA Disclaimer

Your heritage enquiry is on land **within or adjacent to** the following Indigenous Land Use Agreement(s): Yued Indigenous Land Use Agreement, Gnaala Karla Booja Indigenous Land Use Agreement, South West Boojarah #2 Indigenous Land Use Agreement, Whadjuk People Indigenous Land Use Agreement, Wagyl Kaip & Southern Noongar Indigenous Land Use Agreement.

On 8 June 2015, six identical Indigenous Land Use Agreements (ILUAs) were executed across the South West by the Western Australian Government and, respectively, the Yued, Whadjuk People, Gnaala Karla Booja, Ballardong People, South West Boojarah #2 and Wagyl Kaip & Southern Noongar groups, and the South West Aboriginal Land and Sea Council (SWALSC).

The ILUAs bind the parties (including 'the State', which encompasses all State Government Departments and certain State Government agencies) to enter into a Noongar Standard Heritage Agreement (NSHA) when conducting Aboriginal Heritage Surveys in the ILUA areas, unless they have an existing heritage agreement. It is also intended that other State agencies and instrumentalities enter into the NSHA when conducting Aboriginal Heritage Surveys in the ILUA areas. It is recommended a NSHA is entered into, and an 'Activity Notice' issued under the NSHA, if there is a risk that an activity will 'impact' (i.e. by excavating, damaging, destroying or altering in any way) an Aboriginal heritage site. The Aboriginal Heritage Due Diligence Guidelines, which are referenced by the NSHA, provide guidance on how to assess the potential risk to Aboriginal heritage.

Likewise, from 8 June 2015 the Department of Mines, Industry Regulation and Safety (DMIRS) in granting Mineral, Petroleum and related Access Authority tenures within the South West Settlement ILUA areas, will place a condition on these tenures requiring a heritage agreement or a NSHA before any rights can be exercised.

If you are a State Government Department, Agency or Instrumentality, or have a heritage condition placed on your mineral or petroleum title by DMIRS, you should seek advice as to the requirement to use the NSHA for your proposed activity. The full ILUA documents, maps of the ILUA areas and the NSHA template can be found at <https://www.wa.gov.au/organisation/departments-of-the-premier-and-cabinet/south-west-native-title-settlement>.

Further advice can also be sought from the Department of Planning, Lands and Heritage at AboriginalHeritage@dplh.wa.gov.au.

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Coordinate Accuracy

Coordinates (Easting/Northing metres) are based on the GDA 94 Datum. Accuracy is shown as a code in brackets following the coordinates.

List of Registered Aboriginal Sites

Terminology (NB that some terminology has varied over the life of the legislation)

Place ID/Site ID: This a unique ID assigned by the Department of Planning, Lands and Heritage to the place.

Status:

- **Registered Site:** The place has been assessed as meeting Section 5 of the *Aboriginal Heritage Act 1972*.
- **Other Heritage Place which includes:**
 - **Stored Data / Not a Site:** The place has been assessed as not meeting Section 5 of the *Aboriginal Heritage Act 1972*.
 - **Lodged:** Information has been received in relation to the place, but an assessment has not been completed at this *stage* to determine if it meets Section 5 of the *Aboriginal Heritage Act 1972*.

Access and Restrictions:

- **File Restricted = No:** Availability of information that the Department of Planning, Lands and Heritage holds in relation to the place is not restricted in any way.
- **File Restricted = Yes:** Some of the information that the Department of Planning, Lands and Heritage holds in relation to the place is restricted if it is considered culturally sensitive. This information will only be made available if the Department of Planning, Lands and Heritage receives written approval from the informants who provided the information. To request access please contact AboriginalHeritage@dplh.wa.gov.au.
- **Boundary Restricted = No:** Place location is shown as accurately as the information lodged with the Registrar allows.
- **Boundary Restricted = Yes:** To preserve confidentiality the exact location and extent of the place is not displayed on the map. However, the shaded region (generally with an area of at least 4km²) provides a general indication of where the place is located. If you are a landowner and wish to find out more about the exact location of the place, please contact the Department of Planning, Lands and Heritage.
- **Restrictions:**
 - **No Restrictions:** *Anyone* can view the information.
 - **Male Access Only:** Only *males* can view restricted information.
 - **Female Access Only:** Only *females* can view restricted information.

Legacy ID: This is the former unique number that the former Department of Aboriginal Sites assigned to the place. This has been replaced by the Place ID / Site ID.

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Aboriginal Heritage Inquiry System

List of Registered Aboriginal Sites

ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
23	MARYBROOK 1	No	No	No Gender Restrictions	Registered Site	Camp	*Registered Knowledge Holder names available from DAA	333639mE 6272648mN Zone 50 [Unreliable]	S02980
24	MARYBROOK 2	No	No	No Gender Restrictions	Registered Site	Camp	*Registered Knowledge Holder names available from DAA	333639mE 6274648mN Zone 50 [Unreliable]	S02981
108	FINUCANE IS EAST 10	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	672140mE 7750456mN Zone 50 [Reliable]	P07600
110	GAS PIPELINE 115	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477040mE 7721434mN Zone 50 [Reliable]	P07602
111	GAS PIPELINE 116	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	471788mE 7713816mN Zone 50 [Reliable]	P07603
112	GAS PIPELINE 117	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	471769mE 7713808mN Zone 50 [Reliable]	P07604
113	GAS PIPELINE 118	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	471765mE 7713799mN Zone 50 [Reliable]	P07605
114	GAS PIPELINE 119	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	471739mE 7713752mN Zone 50 [Reliable]	P07606
115	GAS PIPELINE 120	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	472765mE 7715456mN Zone 50 [Reliable]	P07607
116	GAS PIPELINE 121	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472738mE 7715421mN Zone 50 [Reliable]	P07608
117	GAS PIPELINE 122	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	472294mE 7714941mN Zone 50 [Reliable]	P07609
118	GAS PIPELINE 123	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472310mE 7714947mN Zone 50 [Reliable]	P07610

Aboriginal Heritage Inquiry System

List of Registered Aboriginal Sites

ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
119	WINJAN.	No	No	No Gender Restrictions	Registered Site	Historical	*Registered Knowledge Holder names available from DAA	392009mE 6456961mN Zone 50 [Reliable]	S02966
120	KOGOLUP LAKE 01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	389819mE 6443595mN Zone 50 [Reliable]	S02967
121	COCKBURN LIGHTHOUSE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	383907mE 6444038mN Zone 50 [Unreliable]	S02968
156	CENTENARY BORE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	798042mE 7459049mN Zone 49 [Reliable]	P07591
159	CORAL BAY 02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	785242mE 7438548mN Zone 49 [Reliable]	P07594
164	FINUCANE IS EAST 09	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	660840mE 7744847mN Zone 50 [Reliable]	P07599
348	ROCKY RIDGE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Skeletal Material / Burial, Shell	*Registered Knowledge Holder names available from DAA	513207mE 7715560mN Zone 50 [Reliable]	P07582
351	BOUNDARY LAKE	No	No	No Gender Restrictions	Registered Site	Fish Trap, Man-Made Structure	*Registered Knowledge Holder names available from DAA	373639mE 6373648mN Zone 50 [Unreliable]	S02963
405	HASTING'S CAVE.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp, Ochre	*Registered Knowledge Holder names available from DAA	316339mE 6651750mN Zone 50 [Reliable]	S02962
407	GAS PIPELINE 98	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477242mE 7721980mN Zone 50 [Reliable]	P07529
408	GAS PIPELINE 99	No	No	No Gender Restrictions	Registered Site	Man-Made Structure, Midden / Scatter	*Registered Knowledge Holder names available from DAA	476885mE 7721040mN Zone 50 [Unreliable]	P07530
409	WARLU THALU	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure, Mythological	*Registered Knowledge Holder names available from DAA	476558mE 7720447mN Zone 50 [Reliable]	P07531

Aboriginal Heritage Inquiry System

List of Registered Aboriginal Sites

ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
410	GAS PIPELINE 100	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	476524mE 7720493mN Zone 50 [Reliable]	P07532
411	GAS PIPELINE 101	No	No	No Gender Restrictions	Registered Site	Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474632mE 7716843mN Zone 50 [Reliable]	P07533
412	GAS PIPELINE 102	Yes	Yes	No Gender Restrictions	Registered Site	Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P07534
413	GAS PIPELINE 103	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474093mE 7716173mN Zone 50 [Reliable]	P07535
414	GAS PIPELINE 104	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	474116mE 7716309mN Zone 50 [Reliable]	P07536
415	GAS PIPELINE 105	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	473466mE 7716039mN Zone 50 [Reliable]	P07537
416	GAS PIPELINE 106	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474136mE 7716173mN Zone 50 [Reliable]	P07538
417	GAS PIPELINE 107	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	471739mE 7713752mN Zone 50 [Reliable]	P07539
418	GAS PIPELINE 108	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474045mE 7708236mN Zone 50 [Reliable]	P07540
419	GAS PIPELINE 109	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	473068mE 7705613mN Zone 50 [Reliable]	P07541
436	WOODS FARM PAINTINGS	No	No	No Gender Restrictions	Registered Site	Painting	*Registered Knowledge Holder names available from DAA	262546mE 6846628mN Zone 50 [Unreliable]	S02941
437	WOODS FARM BLOWOUT	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	262638mE 6845651mN Zone 50 [Unreliable]	S02942

Aboriginal Heritage Inquiry System

List of Registered Aboriginal Sites

ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
438	BULLER RIVER MOUTH-NORTH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	266030mE 6830656mN Zone 50 [Unreliable]	S02943
439	ROYCE FARM Paddock 01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	265463mE 6839328mN Zone 50 [Reliable]	S02944
440	ROYCE FARM QUARRY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	265772mE 6839891mN Zone 50 [Reliable]	S02945
441	ROYCE FARM Paddock 02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	267538mE 6840751mN Zone 50 [Unreliable]	S02946
442	DULCHEWAY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	267808mE 6825563mN Zone 50 [Reliable]	S02947
443	FORTH FARM COMPLEX	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	267797mE 6830199mN Zone 50 [Reliable]	S02948
444	ROYCE FARM BURIAL	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	267590mE 6839621mN Zone 50 [Reliable]	S02949
445	HEMSLEY FARM	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	268565mE 6828430mN Zone 50 [Reliable]	S02950
508	POINT MURAT 03	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	209042mE 7584688mN Zone 50 [Reliable]	P07503
509	POINT MURAT 04	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	208690mE 7584604mN Zone 50 [Reliable]	P07504
557	HARBOUR CITY 03.	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial, Camp	*Registered Knowledge Holder names available from DAA	381610mE 6396966mN Zone 50 [Reliable]	S02921
560	ROEBOURNE MIDDEN	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	518639mE 7718656mN Zone 50 [Unreliable]	P07498

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
561	MOWBOWRA CREEK 01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	198764mE 7564207mN Zone 50 [Reliable]	P07499
562	MOWBOWRA CREEK 02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	199217mE 7564242mN Zone 50 [Reliable]	P07500
563	POINT MURAT 01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	208716mE 7585665mN Zone 50 [Reliable]	P07501
564	POINT MURAT 02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	209079mE 7585539mN Zone 50 [Reliable]	P07502
565	WICKHAM 12	Yes	Yes	Male Access Only	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P07454
568	WICKHAM 15	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	517039mE 7719275mN Zone 50 [Reliable]	P07457
569	WICKHAM 16	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	517139mE 7719495mN Zone 50 [Reliable]	P07458
571	WICKHAM 18	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	516639mE 7718604mN Zone 50 [Reliable]	P07460
572	WICKHAM 19	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	508029mE 7715183mN Zone 50 [Reliable]	P07461
573	WICKHAM 20	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	508368mE 7715040mN Zone 50 [Reliable]	P07462
580	WICKHAM 27	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	505907mE 7715660mN Zone 50 [Reliable]	P07469
584	WICKHAM 31	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	508097mE 7714989mN Zone 50 [Reliable]	P07473

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
600	UPPER BULBARLI WELL 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	782842mE 7398748mN Zone 49 [Reliable]	P07442
604	NOOKANELLUP ROCK SHELTER	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Rockshelter, Arch Deposit, BP Dating: 710 (+/- 60)/2600 (+/- 80), Camp	*Registered Knowledge Holder names available from DAA	409439mE 6144846mN Zone 50 [Reliable]	S02909
613	WICKHAM 3	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	514085mE 7715958mN Zone 50 [Reliable]	P07445
614	WICKHAM 4	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	512747mE 7714225mN Zone 50 [Reliable]	P07446
617	WICKHAM 7	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	508684mE 7715610mN Zone 50 [Reliable]	P07449
618	WICKHAM 8	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	509080mE 7715495mN Zone 50 [Reliable]	P07450
620	WICKHAM 10	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Man-Made Structure, Quarry	*Registered Knowledge Holder names available from DAA	509116mE 7715549mN Zone 50 [Reliable]	P07452
621	WICKHAM 11.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Historical, Midden / Scatter	*Registered Knowledge Holder names available from DAA	510547mE 7715818mN Zone 50 [Reliable]	P07453
628	CAMP THIRTEEN BURIAL	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	800392mE 7559449mN Zone 49 [Reliable]	P07434
635	WITCHCLIFFE ROCKSHELTER.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp	*Registered Knowledge Holder names available from DAA	316938mE 6235047mN Zone 50 [Reliable]	S02887
641	HAMELIN BAY BURIAL GROUND	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	318747mE 6211676mN Zone 50 [Reliable]	S02891
677	SIX MILE CREEK	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	673340mE 7751456mN Zone 50 [Reliable]	P07390

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
678	NYARTAWKA NYUKA	No	No	No Gender Restrictions	Registered Site	Ceremonial	*Registered Knowledge Holder names available from DAA	674040mE 7751656mN Zone 50 [Reliable]	P07391
680	LOCK HOSPITAL.	No	No	No Gender Restrictions	Registered Site	Historical, Man-Made Structure, Midden / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	667239mE 7753438mN Zone 50 [Reliable]	P07393
681	EAST CREEK	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	666450mE 7753125mN Zone 50 [Unreliable]	P07394
682	GNANGARA LAKE SW 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	392589mE 6482099mN Zone 50 [Reliable]	S02880
683	ALBERY.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure, Water Source	*Registered Knowledge Holder names available from DAA	480989mE 7725505mN Zone 50 [Unreliable]	P07396
731	FOUR MILE ENGRAVINGS	No	No	No Gender Restrictions	Registered Site	Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	672715mE 7751763mN Zone 50 [Reliable]	P07389
753	PORT HEDLAND HOTEL	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	668140mE 7753526mN Zone 50 [Reliable]	P07357
756	WINPIKANYA	Yes	Yes	Female Access Only	Registered Site	Ceremonial, Engraving, Grinding Patches / Grooves, Mythological, Camp, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P07360
764	FINUCANE IS EAST 6	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Camp, Other: ?	*Registered Knowledge Holder names available from DAA	660946mE 7745265mN Zone 50 [Reliable]	P07329
767	BUSSELTON: ARMITAGE DRIVE	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial, BP Dating: 536+/-70	*Registered Knowledge Holder names available from DAA	349584mE 6276520mN Zone 50 [Reliable]	S02877
783	SOUTH WEST CREEK 7	No	No	No Gender Restrictions	Registered Site	Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	659140mE 7751156mN Zone 50 [Reliable]	P07335
784	TUNNEL CAVE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit, BP Dating: 1400 - 22000, Camp	*Registered Knowledge Holder names available from DAA	318238mE 6227347mN Zone 50 [Reliable]	S02878

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
791	FINUCANE IS. EAST 1	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662126mE 7752123mN Zone 50 [Reliable]	P07303
792	MAPAYI MIDDEN	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662092mE 7750364mN Zone 50 [Reliable]	P07304
808	SAPPHIRE 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp, Other: 1920'S-1940'S	*Registered Knowledge Holder names available from DAA	278238mE 7586855mN Zone 50 [Reliable]	P07319
811	URALA 94 B	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	273738mE 7591155mN Zone 50 [Unreliable]	P07322
812	URALA 94 C	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	279638mE 7592855mN Zone 50 [Reliable]	P07323
813	URALA 94 D	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	278938mE 7587655mN Zone 50 [Unreliable]	P07324
814	URALA 94 E	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	276538mE 7585755mN Zone 50 [Unreliable]	P07325
873	MONTEBELLO IS: NOALA CAVE.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Rockshelter, BP Dating: 27,220 +/- 640	*Registered Knowledge Holder names available from DAA	348188mE 7741053mN Zone 50 [Reliable]	P07287
901	JONES RIVER (NE) 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	538639mE 7695655mN Zone 50 [Unreliable]	P07261
902	JONES RIVER (NE) 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	537139mE 7694655mN Zone 50 [Reliable]	P07262
904	GEORGE COAST TANK/POOL	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	551939mE 7698755mN Zone 50 [Reliable]	P07264
905	GEORGE COAST WELL	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	551239mE 7699755mN Zone 50 [Reliable]	P07265

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
906	FORTESCUE MOUTH TRACK 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	407839mE 7673655mN Zone 50 [Reliable]	P07266
907	FORTESCUE MOUTH TRACK 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	407839mE 7673755mN Zone 50 [Reliable]	P07267
908	FORTESCUE MOUTH TRACK 3	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	407539mE 7675455mN Zone 50 [Reliable]	P07268
909	FORTESCUE COAST - DUNES	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	408139mE 7676955mN Zone 50 [Reliable]	P07269
910	FORTESCUE MOUTH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	407539mE 7676955mN Zone 50 [Reliable]	P07270
912	40 MILE - EASTERN DUNES	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	435739mE 7695805mN Zone 50 [Reliable]	P07272
913	MAITLAND MOUTH 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	452639mE 7701655mN Zone 50 [Unreliable]	P07273
914	MAITLAND MOUTH 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	452039mE 7701355mN Zone 50 [Reliable]	P07274
916	QUARTZ WELL QUARRY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	564639mE 7701655mN Zone 50 [Unreliable]	P07276
917	SHERLOCK R.- TREVORS MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	561439mE 7705155mN Zone 50 [Reliable]	P07277
918	PADTHUREENA CREEK	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	562539mE 7702955mN Zone 50 [Reliable]	P07278
919	ENDERBY IS.27: GOODWYN VIEW	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	452539mE 7724955mN Zone 50 [Unreliable]	P07279

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
922	DAWSONS CREEK EAST	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	524639mE 7709655mN Zone 50 [Reliable]	P07282
925	MOUNT BEACH DUNE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	520339mE 7714055mN Zone 50 [Reliable]	P07285
926	MONTEBELLO IS: HAYNES CAVE.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Rockshelter, Arch Deposit	*Registered Knowledge Holder names available from DAA	348289mE 7741005mN Zone 50 [Reliable]	P07286
927	ENDERBY IS.16: WHITE BASIN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	453839mE 7723655mN Zone 50 [Unreliable]	P07233
929	ENDERBY IS.18: MANGROVE CK	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	451039mE 7720255mN Zone 50 [Unreliable]	P07235
930	ENDERBY IS.19: MANGROVE CK	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	451139mE 7720655mN Zone 50 [Unreliable]	P07236
931	ENDERBY IS.20: MANGROVE CK	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	450939mE 7720855mN Zone 50 [Unreliable]	P07237
932	ENDERBY IS.21: BACK QUARRY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	449839mE 7720155mN Zone 50 [Unreliable]	P07238
933	ENDERBY IS.22: TEREBRALIA	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	447239mE 7720355mN Zone 50 [Unreliable]	P07239
934	ENDERBY IS.23: GRINDING	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	446939mE 7720455mN Zone 50 [Unreliable]	P07240
936	ENDERBY IS.25: DINGHY MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	447539mE 7720155mN Zone 50 [Unreliable]	P07242
937	ENDERBY IS.26: NORTH POINT	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	453339mE 7725455mN Zone 50 [Unreliable]	P07243

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940	BALLA BALLA CAUSEWAY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Historical, Midden / Scatter	*Registered Knowledge Holder names available from DAA	581939mE 7711455mN Zone 50 [Reliable]	P07246
941	LEPROSARIUM MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	520839mE 7711555mN Zone 50 [Reliable]	P07247
942	MOBILE DUNES MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	521539mE 7711355mN Zone 50 [Reliable]	P07248
944	GEODE MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	507539mE 7715355mN Zone 50 [Reliable]	P07250
945	SHELL POINT	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	506493mE 7715662mN Zone 50 [Reliable]	P07251
949	HAUL ROAD MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	465939mE 7710555mN Zone 50 [Reliable]	P07255
950	GUM TREE VALLEY - TOP	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure, Midden / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	466639mE 7711655mN Zone 50 [Unreliable]	P07256
951	GEORGE RIVER 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	547939mE 7694955mN Zone 50 [Reliable]	P07257
953	LITTLE SHERLOCK R. - LOWER	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	548137mE 7697172mN Zone 50 [Reliable]	P07259
955	MALIMUP JUMP-UP.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	405970mE 6155535mN Zone 50 [Unreliable]	S02865
957	DOGGERUP CREEK 02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	407639mE 6152647mN Zone 50 [Unreliable]	S02867
960	DOGGERUP CREEK 05	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit, Other: ?	*Registered Knowledge Holder names available from DAA	409639mE 6153647mN Zone 50 [Unreliable]	S02870

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966	ROSEMARY IS.11: CHOOKIE BAY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	459339mE 7736355mN Zone 50 [Unreliable]	P07219
967	ROSEMARY IS.12: CHOOKIE BAY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	458839mE 7736655mN Zone 50 [Unreliable]	P07220
968	ROSEMARY IS.13	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	458839mE 7736955mN Zone 50 [Unreliable]	P07221
969	ROSEMARY IS.14	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	458939mE 7736855mN Zone 50 [Unreliable]	P07222
970	ROSEMARY IS.15: AIRSTRIP	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	458739mE 7737855mN Zone 50 [Unreliable]	P07223
971	ROSEMARY IS.16: AIRSTRIP	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	458539mE 7737855mN Zone 50 [Unreliable]	P07224
972	ROSEMARY IS.17: AIRSTRIP	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	458139mE 7737655mN Zone 50 [Unreliable]	P07225
973	ROSEMARY IS.18: DEEP WATER	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	457039mE 7736655mN Zone 50 [Unreliable]	P07226
974	ROSEMARY IS.19: CHITON	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	456839mE 7736355mN Zone 50 [Unreliable]	P07227
975	ROSEMARY IS.20: HALFWAY CK	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	456839mE 7735355mN Zone 50 [Unreliable]	P07228
977	ROSEMARY IS.22	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	458039mE 7734255mN Zone 50 [Unreliable]	P07230
978	ROSEMARY IS.23: WADJURU R/H	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure, Midden / Scatter, Water Source	*Registered Knowledge Holder names available from DAA	455839mE 7734355mN Zone 50 [Unreliable]	P07231

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979	ROSEMARY IS.24: HUNGERFORD	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	456339mE 7734355mN Zone 50 [Unreliable]	P07232
1017	GNANGARA ABORIGINAL CEMETERY	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	391823mE 6482617mN Zone 50 [Reliable]	S02860
1018	DOOGARCH.	No	No	No Gender Restrictions	Registered Site	Mythological, Rockshelter, Camp	*Registered Knowledge Holder names available from DAA	377344mE 6504300mN Zone 50 [Reliable]	S02861
1022	ROLLAH MIDDEN.	No	No	No Gender Restrictions	Registered Site	Historical, Midden / Scatter, Camp	*Registered Knowledge Holder names available from DAA	362637mE 7928261mN Zone 51 [Reliable]	K02894
1023	WANGALNGURRU.	No	No	No Gender Restrictions	Registered Site	Historical, Midden / Scatter, Water Source	*Registered Knowledge Holder names available from DAA	356666mE 7930195mN Zone 51 [Reliable]	K02895
1062	LEGENDRE 11	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	494439mE 7742455mN Zone 50 [Unreliable]	P07204
1063	GREENOUGH RIVER MIDDEN.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Midden / Scatter, Camp	*Registered Knowledge Holder names available from DAA	269079mE 6806349mN Zone 50 [Unreliable]	S02850
1065	BRADLEY ROAD BURIAL	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	282638mE 6803651mN Zone 50 [Unreliable]	S02852
1101	PISTOL RANGE NORTH 01.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure, Midden / Scatter, Rockshelter	*Registered Knowledge Holder names available from DAA	474639mE 7714755mN Zone 50 [Unreliable]	P07191
1102	PISTOL RANGE NORTH 02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	474839mE 7714855mN Zone 50 [Unreliable]	P07192
1103	LEGENDRE HILL	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	492639mE 7742455mN Zone 50 [Unreliable]	P07193
1104	LEGENDRE 01.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell, Water Source	*Registered Knowledge Holder names available from DAA	492639mE 7742655mN Zone 50 [Unreliable]	P07194

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1105	LEGENDRE 02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	494939mE 7742055mN Zone 50 [Unreliable]	P07195
1106	LEGENDRE 03.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	491739mE 7743455mN Zone 50 [Unreliable]	P07196
1109	LEGENDRE 06.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	494439mE 7742455mN Zone 50 [Unreliable]	P07199
1110	LEGENDRE 07.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	494139mE 7742455mN Zone 50 [Unreliable]	P07200
1112	LEGENDRE 09.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	488639mE 7744555mN Zone 50 [Unreliable]	P07202
1113	LEGENDRE 10.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Rockshelter, Shell	*Registered Knowledge Holder names available from DAA	486839mE 7745455mN Zone 50 [Unreliable]	P07203
1296	STOKES INLET	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Other: retouched glass	*Registered Knowledge Holder names available from DAA	328808mE 6257435mN Zone 51 [Reliable]	W01897
1413	YOUNG RIVER BRIDGE WEST	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	329037mE 6262956mN Zone 51 [Unreliable]	W01749
1414	YOUNG RIVER BRIDGE CAMP.	No	No	No Gender Restrictions	Registered Site	Camp, Hunting Place	*Registered Knowledge Holder names available from DAA	329137mE 6263156mN Zone 51 [Reliable]	W01750
1635	STOKES INLET OCHRE QUARRY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	333137mE 6258856mN Zone 51 [Reliable]	W01539
1636	WALITCH BENWENERUP	Yes	Yes	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	W01540
1712	FANNY COVE	No	No	No Gender Restrictions	Registered Site	Historical, Camp	*Registered Knowledge Holder names available from DAA	329636mE 6253656mN Zone 51 [Unreliable]	W01455

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2145	MARGARET COVE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	315136mE 6250956mN Zone 51 [Unreliable]	W01073
2146	FANNY COVE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	332737mE 6252256mN Zone 51 [Unreliable]	W01074
3166	HURLINGHAM ROAD	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	393574mE 6461919mN Zone 50 [Reliable]	S00692
3169	GNANGARA LAKE SE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	393727mE 6482237mN Zone 50 [Unreliable]	S00695
3186	YONDERUP CAVE	Yes	Yes	No Gender Restrictions	Registered Site	Skeletal Material / Burial, Other: PA 77	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S00544
3203	FRESHWATER PARADE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	384733mE 6460207mN Zone 50 [Reliable]	S00675
3247	HARVEY ESTUARY 17a:CHOPPER.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp, Other: ?	*Registered Knowledge Holder names available from DAA	374639mE 6380648mN Zone 50 [Unreliable]	S00316
3251	HARVEY ESTUARY 21:DAM.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp, Other: ?	*Registered Knowledge Holder names available from DAA	376639mE 6376648mN Zone 50 [Unreliable]	S00320
3256	LAKE CLIFTON 2:BRIDGE.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp, Other: ?	*Registered Knowledge Holder names available from DAA	375639mE 6375648mN Zone 50 [Unreliable]	S00325
3277	MORFITT'S CAVE.	Yes	Yes	No Gender Restrictions	Registered Site	Engraving, Arch Deposit, Other: ?	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S00225
3282	PEEL INLET 1:KANGAROO FLAT.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp, Other: ?	*Registered Knowledge Holder names available from DAA	377402mE 6396081mN Zone 50 [Unreliable]	S00300
3292	THOMSONS LAKE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	388883mE 6441585mN Zone 50 [Reliable]	S00188

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3295	NORTH LAKE, COOLBELLUP	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	389389mE 6450199mN Zone 50 [Reliable]	S00191
3298	BOORAGOON LAKE.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp	*Registered Knowledge Holder names available from DAA	390687mE 6454060mN Zone 50 [Reliable]	S00194
3314	BARRAGUP FISH TRAP.	No	No	No Gender Restrictions	Registered Site	Fish Trap, Camp, Meeting Place	*Registered Knowledge Holder names available from DAA	384075mE 6398699mN Zone 50 [Reliable]	S00210
3316	LAKE JOONDALUP WEST	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	383972mE 6488885mN Zone 50 [Reliable]	S00160
3318	LAKE MONGER NW & W.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp	*Registered Knowledge Holder names available from DAA	388676mE 6467249mN Zone 50 [Reliable]	S00162
3319	GNANGARA LAKE SW.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp	*Registered Knowledge Holder names available from DAA	392519mE 6481849mN Zone 50 [Reliable]	S00163
3323	LAKE MONGER VELODROME.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp, Other: ?	*Registered Knowledge Holder names available from DAA	389578mE 6466964mN Zone 50 [Reliable]	S00167
3332	EGG ISLAND, HARVEY ESTUARY	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S00176
3340	BARRAGUP, MANDURAH.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp	*Registered Knowledge Holder names available from DAA	384239mE 6398498mN Zone 50 [Unreliable]	S00184
3355	KARAKIN LAKES 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	353639mE 6560650mN Zone 50 [Unreliable]	S00147
3356	QUINS CASTLE.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp	*Registered Knowledge Holder names available from DAA	355639mE 6561650mN Zone 50 [Unreliable]	S00148
3359	MILLBANK NORTH.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp	*Registered Knowledge Holder names available from DAA	358639mE 6555650mN Zone 50 [Unreliable]	S00151

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3367	BARRAGUP CROSSING	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	384579mE 6398732mN Zone 50 [Reliable]	S02819
3371	GNANGARRA SCARRED TREE	No	No	No Gender Restrictions	Registered Site	Modified Tree	*Registered Knowledge Holder names available from DAA	393474mE 6481506mN Zone 50 [Reliable]	S02828
3373	BARRAGUP LAKE 01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	387489mE 6399898mN Zone 50 [Unreliable]	S02839
3394	YANCHEP BEACH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	370476mE 6509809mN Zone 50 [Reliable]	S02759
3407	TAMALA PARK TREES	No	No	No Gender Restrictions	Registered Site	Modified Tree	*Registered Knowledge Holder names available from DAA	380000mE 6491300mN Zone 50 [Unreliable]	S02786
3418	ROTTNEST: PEACOCK HILL	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	361694mE 6459229mN Zone 50 [Reliable]	S02700
3419	FREMANTLE: CANTONMENT HILL.	No	No	No Gender Restrictions	Registered Site	Ceremonial, Mythological, Camp, Named Place, Plant Resource	*Registered Knowledge Holder names available from DAA	382525mE 6453972mN Zone 50 [Unreliable]	S02701
3428	HAMMOND ROAD SWAMP.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Mythological, Hunting Place, Water Source	*Registered Knowledge Holder names available from DAA	391139mE 6444249mN Zone 50 [Reliable]	S02730
3429	BARTRAM ROAD SWAMPS.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Mythological, Hunting Place, Water Source	*Registered Knowledge Holder names available from DAA	391689mE 6443349mN Zone 50 [Reliable]	S02731
3440	ROTTNEST: CYCLEWAY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	361474mE 6459580mN Zone 50 [Reliable]	S02750
3442	LAKE GWELUP	No	No	No Gender Restrictions	Registered Site	Ceremonial	*Registered Knowledge Holder names available from DAA	385369mE 6472669mN Zone 50 [Reliable]	S02752
3447	MATHER RESERVE, BANJUP.	No	No	No Gender Restrictions	Registered Site	Mythological, Hunting Place	*Registered Knowledge Holder names available from DAA	393838mE 6443023mN Zone 50 [Reliable]	S02672

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3467	ROTTNEST: TRANSIT CELL	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	362138mE 6459231mN Zone 50 [Reliable]	S02698
3471	ROTARY PARK, ROCKINGHAM	No	No	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	378450mE 6428304mN Zone 50 [Reliable]	S02625
3482	KARAKIN LAKES 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	353639mE 6561650mN Zone 50 [Unreliable]	S02651
3484	KARAKIN LAKES 4	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	354639mE 6562650mN Zone 50 [Unreliable]	S02653
3486	HARVEY ESTUARY 17b:YELLOW.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp, Other: ?	*Registered Knowledge Holder names available from DAA	374639mE 6380648mN Zone 50 [Unreliable]	S02655
3501	LAKE GWELUP	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	385489mE 6472369mN Zone 50 [Reliable]	S02569
3502	KINGS PARK SCARRED TREE	No	No	No Gender Restrictions	Registered Site	Modified Tree	*Registered Knowledge Holder names available from DAA	390362mE 6463125mN Zone 50 [Reliable]	S02570
3504	JOONDALUP WAUGAL EGG	Yes	Yes	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S02572
3505	JOONDALUP DRIVE TREES	No	No	No Gender Restrictions	Registered Site	Modified Tree, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	384589mE 6484249mN Zone 50 [Reliable]	S02573
3509	KARLI SPRING.	No	No	No Gender Restrictions	Registered Site	Mythological, Water Source	*Registered Knowledge Holder names available from DAA	373739mE 6499949mN Zone 50 [Reliable]	S02589
3532	JOONDALUP CAVES	Yes	Yes	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S02538
3534	SLOANS RESERVE ARTEFACTS.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit, Other: ?	*Registered Knowledge Holder names available from DAA	387164mE 6430249mN Zone 50 [Reliable]	S02546

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3540	ROTTNEST: LODGE/QUAD.	No	No	No Gender Restrictions	Registered Site	Ceremonial, Historical, Repository / Cache	*Registered Knowledge Holder names available from DAA	362020mE 6459118mN Zone 50 [Reliable]	S02555
3548	MOORE RIVER BURIAL	No	No	No Gender Restrictions	Registered Site	Man-Made Structure, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	367594mE 6535762mN Zone 50 [Unreliable]	S02430
3567	MINDARIE WAUGAL	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S02471
3568	WALLY'S CAMP.	No	No	No Gender Restrictions	Registered Site	Camp	*Registered Knowledge Holder names available from DAA	391139mE 6428749mN Zone 50 [Reliable]	S02491
3573	STONES LAKE.	No	No	No Gender Restrictions	Registered Site	Mythological, Camp, Hunting Place	*Registered Knowledge Holder names available from DAA	393034mE 6465414mN Zone 50 [Unreliable]	S02378
3582	SERPENTINE RIVER	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial, Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S02407
3589	HEIRISSON ISLAND.	No	No	No Gender Restrictions	Registered Site	Mythological, Camp, Hunting Place, Meeting Place, Plant Resource	*Registered Knowledge Holder names available from DAA	394357mE 6462806mN Zone 50 [Reliable]	S02415
3593	GUDINUP	No	No	No Gender Restrictions	Registered Site	Ceremonial	*Registered Knowledge Holder names available from DAA	388652mE 6464707mN Zone 50 [Reliable]	S02419
3596	ROCKY BAY	Yes	Yes	No Gender Restrictions	Registered Site	Mythological, Named Place	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S02422
3630	MURDOCH UNIVERSITY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	390511mE 6451750mN Zone 50 [Reliable]	S02309
3640	LAKE JOONDALUP SOUTH-WEST	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	385767mE 6483497mN Zone 50 [Reliable]	S02321
3653	MOORE RIVER	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	358639mE 6530649mN Zone 50 [Unreliable]	S02269

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3673	MULLALOO DESERT NORTH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	380089mE 6484169mN Zone 50 [Reliable]	S02300
3674	YULEMA STREET, MULLALOO	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	380779mE 6483714mN Zone 50 [Reliable]	S02301
3675	GOEGRUP LAKE 2.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Fish Trap, Camp, Hunting Place	*Registered Knowledge Holder names available from DAA	386569mE 6400748mN Zone 50 [Reliable]	S02226
3676	COODANUP CAMPS.	No	No	No Gender Restrictions	Registered Site	Camp, Hunting Place	*Registered Knowledge Holder names available from DAA	384205mE 6395283mN Zone 50 [Reliable]	S02227
3703	SPRING STREET	Yes	Yes	No Gender Restrictions	Registered Site	Camp, Named Place, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S02203
3704	KINGS PARK WAUGAL.	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial, Mythological, Plant Resource, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S02204
3705	FORESHORE CAMPING GROUND.	No	No	No Gender Restrictions	Registered Site	Camp, Hunting Place	*Registered Knowledge Holder names available from DAA	391434mE 6460355mN Zone 50 [Unreliable]	S02205
3707	ROBB JETTY CAMP.	No	No	No Gender Restrictions	Registered Site	Historical, Man-Made Structure, Camp	*Registered Knowledge Holder names available from DAA	382506mE 6449223mN Zone 50 [Reliable]	S02207
3709	NORTH LAKE AND BIBRA LAKE.	No	No	No Gender Restrictions	Registered Site	Mythological, Camp, Hunting Place	*Registered Knowledge Holder names available from DAA	389282mE 6449283mN Zone 50 [Reliable]	S02209
3710	THOMAS OVAL.	No	No	No Gender Restrictions	Registered Site	Camp	*Registered Knowledge Holder names available from DAA	386556mE 6433043mN Zone 50 [Reliable]	S02210
3711	SLOANS RESERVE.	No	No	No Gender Restrictions	Registered Site	Camp, Hunting Place	*Registered Knowledge Holder names available from DAA	387181mE 6430628mN Zone 50 [Reliable]	S02211
3724	WINJAN'S CAMP.	Yes	Yes	No Gender Restrictions	Registered Site	Camp, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S02224

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3734	STEPHENSON AVENUE.	No	No	No Gender Restrictions	Registered Site	Camp, Plant Resource	*Registered Knowledge Holder names available from DAA	384088mE 6463542mN Zone 50 [Reliable]	S02181
3736	JOLIMONT SWAMP.	No	No	No Gender Restrictions	Registered Site	Camp, Hunting Place, Water Source	*Registered Knowledge Holder names available from DAA	387528mE 6465075mN Zone 50 [Reliable]	S02183
3738	DOG SWAMP.	Yes	Yes	No Gender Restrictions	Registered Site	Mythological, Quarry, Camp, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S02185
3739	LAKE GOOLLELAL.	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial, Camp, Hunting Place	*Registered Knowledge Holder names available from DAA	387833mE 6479841mN Zone 50 [Unreliable]	S02186
3740	LAKE JOONDALUP.	No	No	No Gender Restrictions	Registered Site	Mythological, Camp, Hunting Place	*Registered Knowledge Holder names available from DAA	384995mE 6486531mN Zone 50 [Reliable]	S02187
3741	LAKE MARIGINIUP.	No	No	No Gender Restrictions	Registered Site	Mythological, Hunting Place	*Registered Knowledge Holder names available from DAA	387858mE 6489483mN Zone 50 [Reliable]	S02188
3742	LOCH McNESS,WAGARDU SPRING.	No	No	No Gender Restrictions	Registered Site	Ceremonial, Mythological, Camp, Massacre, Meeting Place, Water Source	*Registered Knowledge Holder names available from DAA	374020mE 6510678mN Zone 50 [Unreliable]	S02189
3743	EMU SWAMP RESERVE	No	No	No Gender Restrictions	Registered Site	Historical, Camp, Hunting Place, Meeting Place, Water Source	*Registered Knowledge Holder names available from DAA	393975mE 6476207mN Zone 50 [Reliable]	S02190
3754	MT ELIZA WAUGAL	No	No	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	390599mE 6463641mN Zone 50 [Reliable]	S02144
3761	KINGS PARK.	No	No	No Gender Restrictions	Registered Site	Ceremonial, Hunting Place	*Registered Knowledge Holder names available from DAA	390883mE 6463548mN Zone 50 [Reliable]	S02154
3772	GNANGARA LAKE.	No	No	No Gender Restrictions	Registered Site	Historical, Mythological, Hunting Place	*Registered Knowledge Holder names available from DAA	392898mE 6482623mN Zone 50 [Reliable]	S02165
3780	ROTTNEST: LONGREACH BAY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	361505mE 6459844mN Zone 50 [Reliable]	S02116

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3781	Wadjemup Aboriginal Prisoners Cemetery (ROTTNEST)	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	361889mE 6459235mN Zone 50 [Reliable]	S02118
3782	ROTTNEST: GOLF COURSE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	361589mE 6459396mN Zone 50 [Reliable]	S02119
3787	MOUNTS BAY ROAD.	Yes	Yes	No Gender Restrictions	Registered Site	Mythological, Camp, Named Place, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S02126
3788	LAKE MONGER.	No	No	No Gender Restrictions	Registered Site	Mythological, Quarry, Skeletal Material / Burial, Camp, Hunting Place, Ochre	*Registered Knowledge Holder names available from DAA	389139mE 6466796mN Zone 50 [Reliable]	S02127
3789	PERTH TOWN HALL.	No	No	No Gender Restrictions	Registered Site	Camp	*Registered Knowledge Holder names available from DAA	392311mE 6463996mN Zone 50 [Reliable]	S02128
3791	MATILDA BAY.	No	No	No Gender Restrictions	Registered Site	Ceremonial, Camp, Water Source	*Registered Knowledge Holder names available from DAA	388977mE 6460480mN Zone 50 [Reliable]	S02130
3792	HYDE PARK.	No	No	No Gender Restrictions	Registered Site	Camp, Hunting Place, Meeting Place	*Registered Knowledge Holder names available from DAA	392519mE 6465883mN Zone 50 [Reliable]	S02131
3794	Lake Jualbup (Shenton Park Lake)	No	No	No Gender Restrictions	Registered Site	Camp	*Registered Knowledge Holder names available from DAA	387749mE 6463539mN Zone 50 [Reliable]	S02133
3798	GOVERNMENT HOUSE.	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial, Camp, Water Source	*Registered Knowledge Holder names available from DAA	392483mE 6463698mN Zone 50 [Unreliable]	S02137
3799	VICTORIA SQUARE	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	392875mE 6463944mN Zone 50 [Unreliable]	S02138
3863	WANJEEP - PEEL	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	381739mE 6396648mN Zone 50 [Unreliable]	S01828
3865	BOONGALA CLOSE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	394069mE 6458459mN Zone 50 [Unreliable]	S01830

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
4044	LANDSDALE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	393815mE 6478996mN Zone 50 [Unreliable]	S01343
4103	SWAMP 81	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	388375mE 6447322mN Zone 50 [Reliable]	S01289
4106	NORTH LAKE SW	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	388894mE 6449964mN Zone 50 [Reliable]	S01292
4357	WATTLEUP ROAD SWAMP	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	389072mE 6439443mN Zone 50 [Reliable]	S00769
4358	MASON ROAD SWAMP	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	390339mE 6446829mN Zone 50 [Reliable]	S00770
4391	RAILWAY RESERVE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	268638mE 6819851mN Zone 50 [Reliable]	S02830
4392	SPALDING PARK 02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	268638mE 6819751mN Zone 50 [Reliable]	S02831
4394	MEERUP DUNES 01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	405639mE 6160647mN Zone 50 [Unreliable]	S02834
4397	DUNE SWALES 01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	381639mE 6179647mN Zone 50 [Unreliable]	S02837
4398	DUNE SWALES 02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	387639mE 6175647mN Zone 50 [Unreliable]	S02838
4400	JINGIEE LAKE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Other: Archaeological deposit?	*Registered Knowledge Holder names available from DAA	317886mE 6286314mN Zone 50 [Reliable]	S02847
4402	WONNERUP SCARRED TREE	No	No	No Gender Restrictions	Registered Site	Modified Tree	*Registered Knowledge Holder names available from DAA	354539mE 6277448mN Zone 50 [Reliable]	S02849

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4404	ORCHESTRA SHELL CAVE.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Arch Deposit, BP Dating: 6500BP to 1730BP, Other: PA 19, NE	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S00051
4406	COMO	No	No	No Gender Restrictions	Registered Site	Fish Trap	*Registered Knowledge Holder names available from DAA	390914mE 6461063mN Zone 50 [Reliable]	S00053
4433	OAKAJEE SPRINGS SCATTER	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	268504mE 6833689mN Zone 50 [Reliable]	S02815
4436	PODDY POINT BURIAL	Yes	Yes	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S02820
4482	LAKE JASPER 06	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Other: PA 079	*Registered Knowledge Holder names available from DAA	378808mE 6190561mN Zone 50 [Unreliable]	S02714
4485	PARRY INLET FISH TRAP	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Fish Trap	*Registered Knowledge Holder names available from DAA	513240mE 6125846mN Zone 50 [Reliable]	S02717
4488	COALMINE BEACH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Historical, Mythological, Arch Deposit, Other: Excavation	*Registered Knowledge Holder names available from DAA	476791mE 6127818mN Zone 50 [Reliable]	S02720
4489	NEWDEGATE ISLAND	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	473740mE 6126046mN Zone 50 [Reliable]	S02721
4491	LYNTON STATION	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	234838mE 6876852mN Zone 50 [Unreliable]	S02725
4499	BLACK POINT	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit, BP Dating: ?, Water Source	*Registered Knowledge Holder names available from DAA	366303mE 6190106mN Zone 50 [Unreliable]	S02626
4514	MEEKADARRIBEE CAVE	No	No	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	315390mE 6244055mN Zone 50 [Unreliable]	S02656
4516	LAKE JASPER 04	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry, Other: NE. PA 079	*Registered Knowledge Holder names available from DAA	379477mE 6191870mN Zone 50 [Unreliable]	S02658

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4517	LAKE JASPER 07.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp, Other: ?. NE. PA079	*Registered Knowledge Holder names available from DAA	377348mE 6192092mN Zone 50 [Unreliable]	S02659
4518	LAKE JASPER 10	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Other: NE. PA 079	*Registered Knowledge Holder names available from DAA	380426mE 6190299mN Zone 50 [Unreliable]	S02660
4531	BULLER RIVER NORTH.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Skeletal Material / Burial, Camp	*Registered Knowledge Holder names available from DAA	264742mE 6833501mN Zone 50 [Reliable]	S02592
4532	BULLER RIVER NORTH REBURIAL	Yes	Yes	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S02593
4534	LAKE JASPER 05	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Other: NE. PA 079	*Registered Knowledge Holder names available from DAA	378921mE 6191228mN Zone 50 [Unreliable]	S02595
4535	LAKE JASPER 08	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, BP Dating: 3810 +/- 60 BP, Other: NE. PA 079	*Registered Knowledge Holder names available from DAA	379397mE 6190789mN Zone 50 [Unreliable]	S02596
4536	LAKE JASPER 09	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Other: NE. PA 079	*Registered Knowledge Holder names available from DAA	379658mE 6190741mN Zone 50 [Unreliable]	S02597
4537	ELLENSBROOK FARM	No	No	No Gender Restrictions	Registered Site	Historical, Mission	*Registered Knowledge Holder names available from DAA	314338mE 6246147mN Zone 50 [Unreliable]	S02598
4554	CRUSOE BEACH ARRANGEMENT	No	No	No Gender Restrictions	Registered Site	Fish Trap, Man-Made Structure	*Registered Knowledge Holder names available from DAA	539040mE 6128546mN Zone 50 [Unreliable]	S02531
4593	THE GAP 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	489640mE 6122646mN Zone 50 [Unreliable]	S02511
4598	LAKE JASPER 02.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry, Arch Deposit, BP Dating: 3400 +/- 60BP, Other: NE. PA 079.	*Registered Knowledge Holder names available from DAA	379827mE 6191590mN Zone 50 [Unreliable]	S02449
4599	LAKE JASPER 03.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit, Other: NE. PA 079	*Registered Knowledge Holder names available from DAA	377935mE 6191139mN Zone 50 [Unreliable]	S02450

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4600	MARBALUP FISH TRAPS	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Fish Trap, Man-Made Structure	*Registered Knowledge Holder names available from DAA	542344mE 6126266mN Zone 50 [Reliable]	S02451
4624	PADBURY YAM GROUND.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Plant Resource	*Registered Knowledge Holder names available from DAA	319639mE 6657650mN Zone 50 [Unreliable]	S02343
4631	GREENOUGH FLATS BURIAL	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	279638mE 6793651mN Zone 50 [Unreliable]	S02366
4640	MULLERING BROOK	No	No	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	356073mE 6614968mN Zone 50 [Reliable]	S02381
4647	LUCKY BAY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	221638mE 6897652mN Zone 50 [Unreliable]	S02446
4657	ELLEN BROOK	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	314738mE 6246547mN Zone 50 [Unreliable]	S02249
4667	GREENOUGH RIVER	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	271638mE 6801651mN Zone 50 [Unreliable]	S02275
4700	POINT IRWIN QUARRY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	492640mE 6120646mN Zone 50 [Unreliable]	S02123
4732	GRAVES	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	235913mE 6876386mN Zone 50 [Reliable]	S01991
4760	ENEABBA STONE ARRANGEMENT	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	316269mE 6685757mN Zone 50 [Unreliable]	S01963
4762	KEMPTON ST MIDDEN	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	267558mE 6818781mN Zone 50 [Reliable]	S01965
4774	GERALDTON PIPELINE 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	285138mE 6802901mN Zone 50 [Unreliable]	S01977



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4775	GERALDTON PIPELINE 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	288338mE 6802951mN Zone 50 [Unreliable]	S01978
4786	PEACEFUL BAY	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	489640mE 6122646mN Zone 50 [Unreliable]	S01907
4803	OLD KUDARDUP CAVE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Painting, Rockshelter	*Registered Knowledge Holder names available from DAA	321638mE 6205647mN Zone 50 [Unreliable]	S01942
4882	Kybra (DUNNET'S FARM)	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial, Engraving, Other: Failed PA 163	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S01786
4893	OAKAJEE RIVER 01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	264733mE 6840633mN Zone 50 [Reliable]	S01721
4896	OAKAJEE RIVER 04	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	264051mE 6837088mN Zone 50 [Reliable]	S01724
4898	OAKAJEE RIVER 06	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	264462mE 6837317mN Zone 50 [Reliable]	S01726
4901	OAKAJEE RIVER 09	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	265138mE 6837443mN Zone 50 [Reliable]	S01729
4902	OAKAJEE RIVER 10	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	265214mE 6837172mN Zone 50 [Reliable]	S01730
4903	OAKAJEE RIVER 11	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	265634mE 6837222mN Zone 50 [Reliable]	S01731
4904	OAKAJEE RIVER 12	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	265720mE 6837373mN Zone 50 [Reliable]	S01732
4905	OAKAJEE RIVER 13	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	265944mE 6837829mN Zone 50 [Reliable]	S01733

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4908	OAKAJEE RIVER 16	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	266255mE 6838452mN Zone 50 [Reliable]	S01736
4909	OAKAJEE RIVER 17	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	266600mE 6837020mN Zone 50 [Reliable]	S01737
4910	LIGHTS BEACH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	524840mE 6124496mN Zone 50 [Reliable]	S01738
4932	KORILYA STUD	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	351996mE 6276955mN Zone 50 [Unreliable]	S01700
4940	BOWES RIVER MOUTH SOUTH.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Skeletal Material / Burial, Camp, Other: ?	*Registered Knowledge Holder names available from DAA	250738mE 6854751mN Zone 50 [Unreliable]	S01714
4943	CONSPICUOUS BEACH 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	485140mE 6122546mN Zone 50 [Unreliable]	S01717
4944	FOUL BAY EAST	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	502240mE 6123846mN Zone 50 [Reliable]	S01718
4945	BOAT HARBOUR	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	506890mE 6123246mN Zone 50 [Reliable]	S01719
4999	DOUBTFUL ISLAND BAY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	734142mE 6192347mN Zone 50 [Reliable]	S01649
5143	YETCHENO SITE	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S01390
5173	GOAT HILL 1.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Rockshelter	*Registered Knowledge Holder names available from DAA	264788mE 6846701mN Zone 50 [Reliable]	S01340
5174	RUNNING FOX SHELTER.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Rockshelter	*Registered Knowledge Holder names available from DAA	264638mE 6846451mN Zone 50 [Unreliable]	S01341

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5177	SKIPPY ROCKS	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	327829mE 6196976mN Zone 50 [Unreliable]	S01345
5181	NORNALUP NATIONAL PARK	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	493640mE 6121646mN Zone 50 [Unreliable]	S01353
5191	RACECOURSE Paddock 1.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Skeletal Material / Burial, Other: PA, NE	*Registered Knowledge Holder names available from DAA	263669mE 6859383mN Zone 50 [Reliable]	S01383
5277	WHITE WATER BURIAL SITE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	250338mE 6864451mN Zone 50 [Unreliable]	S00998
5278	DONNELLY RIVER	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S01000
5279	FLAT ROCKS	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	283638mE 6788651mN Zone 50 [Unreliable]	S01001
5283	ELLEN BROOK COMPLEX.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Mythological, Arch Deposit	*Registered Knowledge Holder names available from DAA	314638mE 6246347mN Zone 50 [Unreliable]	S01005
5285	WILLANUP SPRING	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	315229mE 6286599mN Zone 50 [Reliable]	S01007
5287	SOUTH GATES BURIAL SITE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	268738mE 6808451mN Zone 50 [Unreliable]	S01009
5327	MAMMOTH CAVE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	318238mE 6229647mN Zone 50 [Reliable]	S00992
5334	BURNSIDE	No	No	No Gender Restrictions	Registered Site	Historical, Skeletal Material / Burial, Camp, Mission	*Registered Knowledge Holder names available from DAA	316888mE 6242647mN Zone 50 [Reliable]	S00937
5335	CONSPICUOUS CLIFF	No	No	No Gender Restrictions	Registered Site	Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	486640mE 6121646mN Zone 50 [Unreliable]	S00938

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5338	MIDDLE HEAD MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	311639mE 6650650mN Zone 50 [Unreliable]	S00941
5465	DRUMMONDS COVE	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	265638mE 6829651mN Zone 50 [Unreliable]	S00668
5467	WOOLAWAR GULLY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	258738mE 6845451mN Zone 50 [Reliable]	S00734
5476	ELLEN BROOK	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	314638mE 6246047mN Zone 50 [Reliable]	S00768
5482	JENKINS HUT VALLEY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	312639mE 6764651mN Zone 50 [Unreliable]	S00794
5511	DUNSBOROUGH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	323939mE 6279948mN Zone 50 [Reliable]	S00657
5513	QUININUP BROOK 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	314488mE 6264097mN Zone 50 [Unreliable]	S00663
5514	QUININUP BROOK 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Man-Made Structure, Water Source, Other: Blowout	*Registered Knowledge Holder names available from DAA	314188mE 6264097mN Zone 50 [Unreliable]	S00664
5515	QUININUP BROOK 3	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Man-Made Structure, Camp, Water Source, Other: Blowout	*Registered Knowledge Holder names available from DAA	314138mE 6264147mN Zone 50 [Unreliable]	S00665
5556	TAYLORS FARM, NORTHAMPTON.	No	No	No Gender Restrictions	Registered Site	Painting, Camp	*Registered Knowledge Holder names available from DAA	242638mE 6874652mN Zone 50 [Unreliable]	S00001
5557	LYNTON STATION	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	243638mE 6871652mN Zone 50 [Unreliable]	S00002
5558	HORROCKS BEACH.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp	*Registered Knowledge Holder names available from DAA	251138mE 6854551mN Zone 50 [Unreliable]	S00003

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5559	WILLI GULLI COMPLEX	No	No	No Gender Restrictions	Registered Site	Painting, Other: PA 37	*Registered Knowledge Holder names available from DAA	252107mE 6856265mN Zone 50 [Reliable]	S00004
5560	NORTHAMPTON	Yes	Yes	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S00005
5561	CHAPMAN RIVER MOUTH	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	267699mE 6819936mN Zone 50 [Unreliable]	S00006
5632	DONGARA	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	299638mE 6762651mN Zone 50 [Unreliable]	S00514
5659	WILLYABRUP BROOK	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	314638mE 6259648mN Zone 50 [Unreliable]	S00481
5660	CAPE CLAIRAULT	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	314138mE 6270548mN Zone 50 [Reliable]	S00482
5662	FISH CREEK	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	434639mE 6139647mN Zone 50 [Unreliable]	S00484
5672	HUTT RIVER	No	No	No Gender Restrictions	Registered Site	Painting	*Registered Knowledge Holder names available from DAA	235638mE 6875652mN Zone 50 [Unreliable]	S00500
5708	MUTTON BIRD ISLAND.	No	No	No Gender Restrictions	Registered Site	Other: FOOD RESOURCE	*Registered Knowledge Holder names available from DAA	563640mE 6121646mN Zone 50 [Unreliable]	S00414
5709	BORANUP SAND, AUGUSTA	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	321280mE 6214868mN Zone 50 [Reliable]	S00415
5762	DEVIL'S LAIR	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit, BP Dating: 33000BP, Other: PERMIT 163	*Registered Knowledge Holder names available from DAA	322204mE 6220096mN Zone 50 [Reliable]	S00363
5764	HARDY INLET.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit, Camp	*Registered Knowledge Holder names available from DAA	333189mE 6204797mN Zone 50 [Unreliable]	S00365

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5765	ARUMVALE.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit, BP Dating: 18400BP to 9200BP, Camp	*Registered Knowledge Holder names available from DAA	322638mE 6216647mN Zone 50 [Unreliable]	S00366
5770	SCOTT RIVER TRENCH 1.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp	*Registered Knowledge Holder names available from DAA	335439mE 6202847mN Zone 50 [Reliable]	S00371
5771	BRENNAN FORD/SCOTT RIVER.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp	*Registered Knowledge Holder names available from DAA	338639mE 6208647mN Zone 50 [Unreliable]	S00372
5773	MALIMUP (Black Head)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Arch Deposit, Camp, Shell	*Registered Knowledge Holder names available from DAA	405212mE 6153082mN Zone 50 [Unreliable]	S00374
5783	BROKE INLET	No	No	No Gender Restrictions	Registered Site	Fish Trap	*Registered Knowledge Holder names available from DAA	452639mE 6135647mN Zone 50 [Unreliable]	S00384
5794	DEEPDENE CLIFFS.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Rockshelter	*Registered Knowledge Holder names available from DAA	320935mE 6206369mN Zone 50 [Reliable]	S00297
5847	COWARAMUP POINT	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Arch Deposit, Camp, Shell	*Registered Knowledge Holder names available from DAA	312933mE 6250954mN Zone 50 [Unreliable]	S00239
5848	CLIFFS AT WALLCLIFFE.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Mythological, Rockshelter	*Registered Knowledge Holder names available from DAA	314506mE 6238986mN Zone 50 [Reliable]	S00240
5850	ELLEN BROOK.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp	*Registered Knowledge Holder names available from DAA	314538mE 6246147mN Zone 50 [Unreliable]	S00242
5917	IRWIN PARK STATION	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	309639mE 6764651mN Zone 50 [Unreliable]	S00121
5920	GRIFFIN GAS 23	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	299739mE 7592755mN Zone 50 [Reliable]	P07181
5927	WEST INTERCOURSE SCATTER	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	460839mE 7709955mN Zone 50 [Unreliable]	P07188

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5928	WEST INTERCOURSE MOUNDS 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Midden / Scatter, Other: PERMIT 125 (E BRADSHAW -CORE)	*Registered Knowledge Holder names available from DAA	459939mE 7709555mN Zone 50 [Reliable]	P07189
5929	WEST INTERCOURSE MOUNDS 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	458739mE 7708355mN Zone 50 [Unreliable]	P07190
5946	WEST INTERCOURSE ISLAND 11	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	459839mE 7712655mN Zone 50 [Unreliable]	P07153
5951	Griffin Gas 01	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	277914mE 7593101mN Zone 50 [Reliable]	P07159
5952	GRIFFIN GAS 02	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	277836mE 7593278mN Zone 50 [Reliable]	P07160
5953	GRIFFIN GAS 03	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	277733mE 7593174mN Zone 50 [Reliable]	P07161
5954	GRIFFIN GAS 04	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	277685mE 7593254mN Zone 50 [Reliable]	P07162
5955	GRIFFIN GAS 05	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	277781mE 7593367mN Zone 50 [Reliable]	P07163
5966	GRIFFIN GAS 16	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	292697mE 7592756mN Zone 50 [Reliable]	P07174
5968	GRIFFIN GAS 18	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	294739mE 7592755mN Zone 50 [Reliable]	P07176
5969	GRIFFIN GAS 19	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	295339mE 7592755mN Zone 50 [Reliable]	P07177
5970	GRIFFIN GAS 20	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	295539mE 7592755mN Zone 50 [Reliable]	P07178

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5971	GRIFFIN GAS 21	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	296039mE 7592755mN Zone 50 [Reliable]	P07179
5972	GRIFFIN GAS 22	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	299539mE 7592755mN Zone 50 [Reliable]	P07180
5999	WEST INTERCOURSE ISLAND 09.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Water Source	*Registered Knowledge Holder names available from DAA	459739mE 7712655mN Zone 50 [Unreliable]	P07151
6000	WEST INTERCOURSE ISLAND 10	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	459739mE 7712705mN Zone 50 [Unreliable]	P07152
6013	ROEBOURNE WORKERS SITE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	518039mE 7717955mN Zone 50 [Reliable]	P07111
6014	ABLE MINE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	519543mE 7720052mN Zone 50 [Reliable]	P07112
6015	KING BAY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474589mE 7718055mN Zone 50 [Reliable]	P07113
6017	YARDIE CREEK CARAVAN BURIAL	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	191538mE 7576555mN Zone 50 [Unreliable]	P07115
6021	PORT HEDLAND TOWNSITE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	671092mE 7753870mN Zone 50 [Unreliable]	P07119
6022	BEAGLE BEACH 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	576489mE 7718755mN Zone 50 [Reliable]	P07120
6023	WRECK POINT, DEPUCH ISLAND	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure, Midden / Scatter	*Registered Knowledge Holder names available from DAA	576039mE 7720055mN Zone 50 [Reliable]	P07121
6040	WILSON STREET B.	No	No	No Gender Restrictions	Registered Site	Engraving, Water Source, Other: FORMER	*Registered Knowledge Holder names available from DAA	670088mE 7752286mN Zone 50 [Reliable]	P07087

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6041	WILSON STREET C.	No	No	No Gender Restrictions	Registered Site	Engraving, Shell, Other: ?	*Registered Knowledge Holder names available from DAA	670140mE 7751156mN Zone 50 [Reliable]	P07088
6044	DEPUCH IS: NARROW GORGE.	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves, Shell, Water Source	*Registered Knowledge Holder names available from DAA	576089mE 7720055mN Zone 50 [Unreliable]	P07091
6045	TJALKU WARRA BURIAL	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	676992mE 7742964mN Zone 50 [Reliable]	P07092
6060	CAPE CUVIER	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	743392mE 7318648mN Zone 49 [Reliable]	P07053
6075	KANGAROO PAW VALLEY.	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure, Midden / Scatter, Water Source	*Registered Knowledge Holder names available from DAA	476489mE 7716005mN Zone 50 [Unreliable]	P07068
6078	ROSEMARY ISLAND 10	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	456639mE 7734755mN Zone 50 [Reliable]	P07019
6079	ENDERBY ISLAND 12	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	454739mE 7724505mN Zone 50 [Reliable]	P07020
6080	ENDERBY ISLAND 13	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	455239mE 7724555mN Zone 50 [Reliable]	P07021
6081	ENDERBY ISLAND 14	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	455239mE 7724155mN Zone 50 [Reliable]	P07022
6082	ENDERBY ISLAND 15	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	454839mE 7724255mN Zone 50 [Reliable]	P07023
6117	MOWBOWRA POOL.	No	No	No Gender Restrictions	Registered Site	Grinding Patches / Grooves, Camp, Other: ?	*Registered Knowledge Holder names available from DAA	202138mE 7564155mN Zone 50 [Reliable]	P07006
6118	QUALING POOL.	No	No	No Gender Restrictions	Registered Site	Camp, Other: ?	*Registered Knowledge Holder names available from DAA	202138mE 7562155mN Zone 50 [Reliable]	P07007

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6158	POINCIANA NURSERY MIDDEN.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter, Arch Deposit, BP Dating: 2500, Camp	*Registered Knowledge Holder names available from DAA	474507mE 7713861mN Zone 50 [Reliable]	P06943
6159	ANADARA SHELTER.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter, Rockshelter, Arch Deposit, BP Dating: 5930	*Registered Knowledge Holder names available from DAA	466139mE 7710705mN Zone 50 [Reliable]	P06944
6182	EAST LEWIS ISLAND: SW.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter, Camp	*Registered Knowledge Holder names available from DAA	462239mE 7719055mN Zone 50 [Reliable]	P06915
6183	EAST LEWIS ISLAND: NE.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Quarry, Camp	*Registered Knowledge Holder names available from DAA	466239mE 7722255mN Zone 50 [Reliable]	P06916
6184	ENDERBY ISLAND 09: SE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Fish Trap, Midden / Scatter	*Registered Knowledge Holder names available from DAA	453689mE 7720355mN Zone 50 [Reliable]	P06917
6185	ENDERBY ISLAND 10: N.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter, Quarry, Camp	*Registered Knowledge Holder names available from DAA	453839mE 7723555mN Zone 50 [Reliable]	P06918
6186	ENDERBY ISLAND 11: NE.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Engraving, Grinding Patches / Grooves, Man-Made Structure, Camp	*Registered Knowledge Holder names available from DAA	456139mE 7724055mN Zone 50 [Reliable]	P06919
6187	ANGEL ISLAND: NW.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Midden / Scatter, Rockshelter	*Registered Knowledge Holder names available from DAA	479939mE 7736005mN Zone 50 [Reliable]	P06920
6226	COORINJINNA POOL	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	583239mE 7711105mN Zone 50 [Reliable]	P06907
6227	MALUS ISLAND.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure, Camp	*Registered Knowledge Holder names available from DAA	466039mE 7731155mN Zone 50 [Reliable]	P06908
6228	WEST LEWIS ISLAND: SW.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter, Quarry, Camp, Water Source, Other: ?, (FORMER	*Registered Knowledge Holder names available from DAA	459539mE 7722755mN Zone 50 [Reliable]	P06909

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6229	WEST LEWIS ISLAND: NW ARM 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Engraving, Grinding Patches / Grooves, Man-Made Structure	*Registered Knowledge Holder names available from DAA	462438mE 7727355mN Zone 50 [Reliable]	P06910
6230	WEST LEWIS ISLAND: NW ARM 2	Yes	Yes	Male Access Only	Registered Site	Artefacts / Scatter, Ceremonial, Engraving, Grinding Patches / Grooves, Man-Made Structure	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P06911
6231	WEST LEWIS ISLAND: NE	No	No	No Gender Restrictions	Registered Site	Engraving, Fish Trap, Grinding Patches / Grooves, Man-Made Structure	*Registered Knowledge Holder names available from DAA	465316mE 7726809mN Zone 50 [Reliable]	P06912
6232	WEST LEWIS ISLAND: N	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	466239mE 7728255mN Zone 50 [Reliable]	P06913
6233	EAST LEWIS ISLAND: S.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter, Camp	*Registered Knowledge Holder names available from DAA	462389mE 7718755mN Zone 50 [Reliable]	P06914
6246	WICKHAM MIDDEN	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	514739mE 7717755mN Zone 50 [Reliable]	P06716
6248	MT ANKETEL 2	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	507539mE 7715255mN Zone 50 [Reliable]	P06718
6295	BITTERNS	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	695340mE 7757756mN Zone 50 [Unreliable]	P06664
6296	LIMESTONE QUARRY 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	700640mE 7765656mN Zone 50 [Unreliable]	P06665
6297	LIMESTONE QUARRY 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	700340mE 7768956mN Zone 50 [Unreliable]	P06666
6311	POINT MURAT.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Skeletal Material / Burial, Camp, Other: ?	*Registered Knowledge Holder names available from DAA	208538mE 7584405mN Zone 50 [Reliable]	P06628
6321	ANDERSON ST, PORT HEDLAND.	No	No	No Gender Restrictions	Registered Site	Engraving, Camp	*Registered Knowledge Holder names available from DAA	666765mE 7753296mN Zone 50 [Reliable]	P06638

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6325	COWERIE WELL	Yes	Yes	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P06642
6332	PORT HEDLAND MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	671189mE 7751432mN Zone 50 [Reliable]	P06649
6334	MUNDA STATION BURIAL 1	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	612139mE 7742155mN Zone 50 [Unreliable]	P06651
6335	MUNDA STATION BURIAL 2	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	613139mE 7742255mN Zone 50 [Unreliable]	P06652
6375	MUD FLATS 1	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	568789mE 7712505mN Zone 50 [Reliable]	P06586
6376	MUD FLATS 2	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	571039mE 7714555mN Zone 50 [Reliable]	P06587
6498	DIRK HARTOG ISLAND	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	695143mE 7175147mN Zone 49 [Unreliable]	P06448
6534	URALA DUNE.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	275938mE 7591055mN Zone 50 [Reliable]	P06431
6535	URALA STATION SOUTH	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	274838mE 7591155mN Zone 50 [Reliable]	P06432
6536	URALA DUNE RIDGE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	278038mE 7589655mN Zone 50 [Reliable]	P06433
6537	URALA SAND RIDGE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	279988mE 7590655mN Zone 50 [Reliable]	P06434
6541	URALA STATION WEST	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P06438

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6542	URALA BURIAL	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	274138mE 7590155mN Zone 50 [Unreliable]	P06439
6555	MAITLAND RIVER BRIDGE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	459686mE 7694780mN Zone 50 [Reliable]	P06400
6566	TABBA TABBA MOUTH 1.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Midden / Scatter, Skeletal Material / Burial, Camp, Hunting Place	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P06411
6567	TABBA TABBA MOUTH 2	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	692840mE 7756956mN Zone 50 [Unreliable]	P06412
6568	TABBA TABBA MOUTH 3	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P06413
6569	TABBA TABBA MOUTH 4	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	696040mE 7757056mN Zone 50 [Reliable]	P06414
6572	OLD RACECOURSE CAMP.	Yes	Yes	No Gender Restrictions	Registered Site	Camp	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P06367
6573	OLD RACECOURSE CEREMONIAL.	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial, Camp, Meeting Place	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P06368
6574	BEADON CREEK MIDDEN.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Arch Deposit, Other: ?	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P06369
6575	JINTA 1 MIDDEN	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P06370
6596	POINT ANDERSON.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Camp, Hunting Place, Shell, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P06341
6601	BELLEFIN PRONG 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	732242mE 7099446mN Zone 49 [Reliable]	P06346

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6606	CRAYFISH BAY 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Water Source	*Registered Knowledge Holder names available from DAA	729642mE 7083846mN Zone 49 [Unreliable]	P06351
6607	CRAYFISH BAY 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	729642mE 7084646mN Zone 49 [Unreliable]	P06352
6608	ZUYTDORP POINT	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	729442mE 7078146mN Zone 49 [Unreliable]	P06353
6616	CORAL BAY ACCESS 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	784342mE 7438148mN Zone 49 [Unreliable]	P06361
6617	BURUBARLADJI	Yes	Yes	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P06362
6618	DEW TALU.	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P06363
6619	JINTA 1.	Yes	Yes	No Gender Restrictions	Registered Site	Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P06364
6620	JINTA 2.	Yes	Yes	No Gender Restrictions	Registered Site	Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P06365
6723	MULANDA 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	784742mE 7441148mN Zone 49 [Unreliable]	P06257
6724	MULANDA 3	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	784842mE 7441248mN Zone 49 [Unreliable]	P06258
6725	MULANDA 4	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	785541mE 7441198mN Zone 49 [Unreliable]	P06259
6750	WAGOE FARM BURIAL	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	215638mE 6914652mN Zone 50 [Unreliable]	P06231

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6754	OSPREY BAY 6	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	792942mE 7538749mN Zone 49 [Reliable]	P06165
6755	OSPREY BAY INTERDUNAL 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	792342mE 7537149mN Zone 49 [Unreliable]	P06166
6756	OSPREY BAY INTERDUNAL 2	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	792642mE 7537149mN Zone 49 [Reliable]	P06167
6757	BLOODWOOD CREEK MIDDEN 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	794942mE 7544549mN Zone 49 [Reliable]	P06168
6758	BLOODWOOD CREEK MIDDEN 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	794942mE 7545049mN Zone 49 [Reliable]	P06169
6759	BLOODWOOD CREEK MIDDEN 3	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	795142mE 7544949mN Zone 49 [Reliable]	P06170
6760	BLOODWOOD CREEK SHORELINE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	794942mE 7545249mN Zone 49 [Reliable]	P06171
6761	LOW POINT MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	802992mE 7566299mN Zone 49 [Reliable]	P06172
6762	MILYERING MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	801342mE 7561449mN Zone 49 [Reliable]	P06173
6763	YARDIE ROCKSHELTERS NORTH.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Rockshelter	*Registered Knowledge Holder names available from DAA	791542mE 7530249mN Zone 49 [Unreliable]	P06174
6764	CAMP 17 SOUTH MIDDENS	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	799042mE 7555649mN Zone 49 [Unreliable]	P06175
6765	CAMP 17 NORTH MIDDENS	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	799042mE 7555849mN Zone 49 [Unreliable]	P06176

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6766	DAMPIER ISLAND WEST 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	465239mE 7712555mN Zone 50 [Reliable]	P06177
6767	DAMPIER ISLAND WEST 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	464939mE 7712355mN Zone 50 [Reliable]	P06178
6768	DAMPIER ISLAND WEST 3	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	463839mE 7711375mN Zone 50 [Reliable]	P06179
6769	MULANDA 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	784550mE 7441050mN Zone 49 [Reliable]	P06180
6782	28 MILE CREEK NORTH 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	795242mE 7545949mN Zone 49 [Unreliable]	P06140
6784	MANDU MANDU CREEK SOUTH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	796642mE 7548649mN Zone 49 [Unreliable]	P06142
6785	MANDU MANDU CREEK NORTH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	796642mE 7548649mN Zone 49 [Unreliable]	P06143
6787	MANDU MANDU ROCKSHELTERS.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Rockshelter, Arch Deposit, Other: ?	*Registered Knowledge Holder names available from DAA	797242mE 7547449mN Zone 49 [Reliable]	P06145
6790	YARDIE CREEK SOUTH 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	788942mE 7527749mN Zone 49 [Reliable]	P06148
6791	YARDIE CREEK SOUTH 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	790342mE 7528149mN Zone 49 [Reliable]	P06149
6792	MULANDA BLUFF MIDDEN.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, BP Dating: 7,140	*Registered Knowledge Holder names available from DAA	786642mE 7439948mN Zone 49 [Reliable]	P06150
6793	ROAD ALIGNMENT 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	794942mE 7541649mN Zone 49 [Unreliable]	P06151

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6794	ROAD ALIGNMENT 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	794942mE 7541449mN Zone 49 [Unreliable]	P06152
6795	ROAD ALIGNMENT 3	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	794842mE 7541249mN Zone 49 [Reliable]	P06153
6797	YARDIE WELL ROCKSHELTER.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Rockshelter, Arch Deposit, BP Dating: 10, 490+/-180BP, Other: ?	*Registered Knowledge Holder names available from DAA	791542mE 7530449mN Zone 49 [Reliable]	P06155
6798	YARDIE INTERDUNAL SWALE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	789942mE 7528849mN Zone 49 [Reliable]	P06156
6799	YARDIE BEACH MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	789842mE 7529049mN Zone 49 [Reliable]	P06157
6800	OYSTER STACKS MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	797042mE 7549849mN Zone 49 [Reliable]	P06158
6802	OSPREY BAY 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	792742mE 7538149mN Zone 49 [Reliable]	P06160
6803	OSPREY BAY 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	792742mE 7538049mN Zone 49 [Reliable]	P06161
6804	OSPREY BAY 3	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	792542mE 7537849mN Zone 49 [Reliable]	P06162
6805	OSPREY BAY 4	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	792342mE 7537049mN Zone 49 [Reliable]	P06163
6806	OSPREY BAY 5	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	792742mE 7538149mN Zone 49 [Reliable]	P06164
6813	SAMS CREEK MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	519457mE 7719973mN Zone 50 [Reliable]	P06118

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6827	CORAL BAY SKELETON	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	785143mE 7445149mN Zone 49 [Unreliable]	P06132
6833	WEST MOORE ISLAND	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	570539mE 7718055mN Zone 50 [Reliable]	P06138
6966	ENDERBY ISLAND 08	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	455571mE 7723794mN Zone 50 [Unreliable]	P05955
7055	CONZINC BURIAL & MIDDEN	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P05882
7056	CALCRETE FALLS.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter, Camp, Water Source	*Registered Knowledge Holder names available from DAA	480039mE 7725055mN Zone 50 [Unreliable]	P05883
7057	URALA MIDDEN 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	273638mE 7589705mN Zone 50 [Reliable]	P05888
7058	URALA MIDDEN 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	276038mE 7590655mN Zone 50 [Reliable]	P05889
7059	FOUR MILE CREEK MIDDEN	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	298839mE 7600855mN Zone 50 [Unreliable]	P05890
7062	BALLA BALLA BURIAL	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Man-Made Structure, Midden / Scatter, Quarry, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	581952mE 7713597mN Zone 50 [Unreliable]	P05893
7070	MIDDEN HILL	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	791042mE 6990045mN Zone 49 [Unreliable]	P05842
7071	ZUYTDORP WRECK SITE-MIDDEN1	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	790842mE 6989945mN Zone 49 [Unreliable]	P05843
7072	ZUYTDORP WRECK SITE-MIDDEN2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, BP Dating: 4000+/-78BP	*Registered Knowledge Holder names available from DAA	790842mE 6990245mN Zone 49 [Unreliable]	P05844

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7073	ROAD MIDDEN	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	791642mE 6989645mN Zone 49 [Unreliable]	P05845
7074	SOUTH GULLY SITES	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	791642mE 6989845mN Zone 49 [Unreliable]	P05846
7075	SOAK SITE 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	212638mE 6984652mN Zone 50 [Unreliable]	P05847
7076	SOAK SITE 2/KELLY'S SOAK	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	212638mE 6984652mN Zone 50 [Unreliable]	P05848
7077	ZUYTDORP MIDDEN SOUTH 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	204638mE 6980652mN Zone 50 [Unreliable]	P05849
7078	ZUYTDORP MIDDEN SOUTH 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	204638mE 6978652mN Zone 50 [Unreliable]	P05850
7083	HARDING MOUTH CAMP.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Water Source	*Registered Knowledge Holder names available from DAA	521042mE 7711079mN Zone 50 [Reliable]	P05857
7084	HARDING HILL MIDDEN.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter, Water Source	*Registered Knowledge Holder names available from DAA	525469mE 7708870mN Zone 50 [Reliable]	P05858
7085	WADJUDUKUBRA 1.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	532639mE 7706655mN Zone 50 [Unreliable]	P05859
7086	WADJUDUKUBRA 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	534639mE 7705655mN Zone 50 [Unreliable]	P05860
7087	WADJUDUKUBRA 3	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	533639mE 7706655mN Zone 50 [Unreliable]	P05861
7119	CLIFF TOP SITE	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	791142mE 6989945mN Zone 49 [Unreliable]	P05839

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7120	A FRAME SITE	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	791042mE 6989745mN Zone 49 [Unreliable]	P05840
7121	CAMP HILL, ZUYTDORP WRECK	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	791042mE 6989545mN Zone 49 [Unreliable]	P05841
7123	BERNIER ISLAND	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	716459mE 7249035mN Zone 49 [Unreliable]	P05789
7124	DORRE ISLAND	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	711750mE 7220260mN Zone 49 [Unreliable]	P05790
7126	MESA CAMP	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	798442mE 7554749mN Zone 49 [Unreliable]	P05792
7127	EAST INTERCOURSE ISLAND	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	466639mE 7716655mN Zone 50 [Unreliable]	P05793
7133	ANGEL ISLAND BEACON	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	478839mE 7732655mN Zone 50 [Reliable]	P05799
7138	QUOBBA DUNES.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Skeletal Material / Burial, Camp	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P05804
7139	SAND LEASE BURIALS.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Man-Made Structure, Midden / Scatter, Skeletal Material / Burial, Arch Deposit, Other: ?	*Registered Knowledge Holder names available from DAA	475439mE 7714355mN Zone 50 [Reliable]	P05805
7186	BULA-GUDA	Yes	Yes	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P05743
7203	BAUBOODJOO POINT (Bruboodjoo Midden Site)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Camp, Hunting Place	*Registered Knowledge Holder names available from DAA	789242mE 7456149mN Zone 49 [Reliable]	P05707
7205	TWIN HILL FISHING PLACE.	No	No	No Gender Restrictions	Registered Site	Hunting Place	*Registered Knowledge Holder names available from DAA	787042mE 7467649mN Zone 49 [Unreliable]	P05709

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7206	WEALJUGOO MIDDEN.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Camp, Hunting Place	*Registered Knowledge Holder names available from DAA	776584mE 7504740mN Zone 49 [Reliable]	P05710
7209	BULBARLI POINT COMPLEX.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Camp, Water Source	*Registered Knowledge Holder names available from DAA	778042mE 7393048mN Zone 49 [Reliable]	P05713
7211	MAUD LANDING.	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial, Camp, Meeting Place, Water Source	*Registered Knowledge Holder names available from DAA	784292mE 7441048mN Zone 49 [Unreliable]	P05715
7254	SANDY BAY NORTH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	793442mE 7539949mN Zone 49 [Reliable]	P05652
7265	LAKE SIDE VIEW	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	800942mE 7560549mN Zone 49 [Reliable]	P05664
7266	WALKING TRAIL SITE 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	192638mE 7555655mN Zone 50 [Unreliable]	P05665
7269	BALLA BALLA	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	580639mE 7712655mN Zone 50 [Unreliable]	P05668
7286	KAPOK WELL BURIAL	Yes	Yes	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P05632
7298	YARDIE CREEK ROCKSHELTERS	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	790635mE 7529704mN Zone 49 [Reliable]	P05644
7299	YARDIE CREEK	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	789642mE 7528649mN Zone 49 [Unreliable]	P05645
7300	MANDU MANDU CK ROCKSHELTERS	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P05646
7301	CAMP 17 CREEK EAST	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	800342mE 7555749mN Zone 49 [Reliable]	P05647

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7303	TULKI WELL MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	798642mE 7554249mN Zone 49 [Reliable]	P05649
7304	PILGRAMUNNA BAY MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	794642mE 7543349mN Zone 49 [Reliable]	P05650
7305	MANGROVE BAY.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Skeletal Material / Burial, Hunting Place	*Registered Knowledge Holder names available from DAA	804142mE 7568149mN Zone 49 [Reliable]	P05651
7316	HEARSON COVE WEST	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	479739mE 7719355mN Zone 50 [Unreliable]	P05611
7332	URALA STATION 12	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	282038mE 7597555mN Zone 50 [Reliable]	P05574
7334	URALA STATION 14	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	282538mE 7597255mN Zone 50 [Reliable]	P05576
7371	URALA STATION CROSSING 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	286838mE 7594455mN Zone 50 [Reliable]	P05559
7372	URALA STATION CROSSING 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	287838mE 7592955mN Zone 50 [Reliable]	P05560
7373	URALA STATION 01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	279638mE 7588955mN Zone 50 [Reliable]	P05561
7374	URALA STATION 02.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Camp	*Registered Knowledge Holder names available from DAA	279938mE 7590355mN Zone 50 [Reliable]	P05562
7379	URALA STATION 07	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	284638mE 7595755mN Zone 50 [Reliable]	P05567
7381	URALA STATION 09	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Skeletal Material / Burial, Camp	*Registered Knowledge Holder names available from DAA	277045mE 7592515mN Zone 50 [Reliable]	P05569

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7382	ROCKY POINT MIDDEN COMPLEX	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	278538mE 7594655mN Zone 50 [Reliable]	P05570
7383	ROCKY POINT EAST	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	279238mE 7594855mN Zone 50 [Reliable]	P05571
7384	URALA STATION 10	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	280238mE 7593955mN Zone 50 [Reliable]	P05572
7385	URALA STATION 11	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	282238mE 7597555mN Zone 50 [Reliable]	P05573
7441	WATERING COVE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	480439mE 7723155mN Zone 50 [Unreliable]	P05467
7442	WATERING COVE (Burrup Peninsula J12)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	481039mE 7723755mN Zone 50 [Unreliable]	P05468
7443	DAMPIER SANDPIT	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	476639mE 7715155mN Zone 50 [Unreliable]	P05469
7511	POPES NOSE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	518939mE 7719055mN Zone 50 [Reliable]	P05431
7784	BUNNEENYA.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Water Source	*Registered Knowledge Holder names available from DAA	780640mE 7783456mN Zone 50 [Unreliable]	P05053
7785	WALUBIDI-MARINGDJINE.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Water Source	*Registered Knowledge Holder names available from DAA	781090mE 7783956mN Zone 50 [Unreliable]	P05054
7787	WEST HILL NORTH	Yes	Yes	Male Access Only	Registered Site	Engraving, Man-Made Structure, Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P05060
7826	COORINDJANNA POOL	No	No	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	583373mE 7710445mN Zone 50 [Reliable]	P05029

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7827	BALLA POOL SCATTER.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter, Camp	*Registered Knowledge Holder names available from DAA	583339mE 7711105mN Zone 50 [Unreliable]	P05030
7828	GOVERNMENT WELL.	No	No	No Gender Restrictions	Registered Site	Camp, Water Source	*Registered Knowledge Holder names available from DAA	598389mE 7713205mN Zone 50 [Unreliable]	P05032
7837	MERRIMERICA HILL	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial, Mythological, Repository / Cache	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P05052
7859	CAPE LAMBERT BURIAL	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	518689mE 7722305mN Zone 50 [Unreliable]	P05009
7866	EAST LEWIS MIDDEN 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	463039mE 7720355mN Zone 50 [Reliable]	P04966
7899	MALUS ISLAND	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	466439mE 7731055mN Zone 50 [Reliable]	P04947
7906	DELAMBRE ISLAND SOUTH.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Water Source	*Registered Knowledge Holder names available from DAA	508039mE 7737955mN Zone 50 [Unreliable]	P04954
7907	ROE POINT, EAST LEWIS	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	465239mE 7719355mN Zone 50 [Reliable]	P04955
7908	EAST LEWIS ISLAND	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	465639mE 7721755mN Zone 50 [Unreliable]	P04956
7910	CONZINC ISLAND 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	476839mE 7728755mN Zone 50 [Reliable]	P04958
7911	CONZINC ISLAND 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	476939mE 7728655mN Zone 50 [Reliable]	P04959
7914	EAST LEWIS MIDDEN 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	464139mE 7719655mN Zone 50 [Reliable]	P04962

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
8008	CAPE LAMBERT MIDDEN 01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	512639mE 7716655mN Zone 50 [Unreliable]	P04659
8014	CAPE LAMBERT MIDDEN 07	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	517939mE 7722255mN Zone 50 [Reliable]	P04665
8042	CAJUPUT WELL MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	471269mE 7704087mN Zone 50 [Reliable]	P04642
8043	CAJUPUT WELL SCATTER 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	472339mE 7703755mN Zone 50 [Unreliable]	P04643
8053	MIAREE POOL STOCKYARDS	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	459489mE 7693655mN Zone 50 [Reliable]	P04601
8065	BORROW PIT 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	473439mE 7704755mN Zone 50 [Reliable]	P04613
8066	BORROW PIT 4	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	464039mE 7699455mN Zone 50 [Reliable]	P04614
8067	CHEEDY WELL NORTH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	464539mE 7699255mN Zone 50 [Reliable]	P04615
8068	CHEEDY WELL NORTH-EAST	No	No	No Gender Restrictions	Registered Site	Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	464839mE 7699455mN Zone 50 [Reliable]	P04616
8069	BORROW PIT 5	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	462639mE 7697955mN Zone 50 [Reliable]	P04617
8286	NATGAS 259	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	457639mE 7695055mN Zone 50 [Reliable]	P04397
8287	NATGAS 260 (RTM-Dampier 067a)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry, Shell	*Registered Knowledge Holder names available from DAA	467339mE 7700655mN Zone 50 [Reliable]	P04398

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8288	NATGAS 264	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475910mE 7719849mN Zone 50 [Reliable]	P04399
8289	NATGAS 265	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	475836mE 7719776mN Zone 50 [Reliable]	P04400
8290	NATGAS 266	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475849mE 7719736mN Zone 50 [Reliable]	P04401
8291	NATGAS 267	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475960mE 7719873mN Zone 50 [Reliable]	P04402
8299	BEADON CREEK	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	313139mE 7609155mN Zone 50 [Reliable]	P04351
8300	CORAL BAY	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	784442mE 7430398mN Zone 49 [Unreliable]	P04352
8301	NINGALOO STATION	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	775891mE 7493649mN Zone 49 [Unreliable]	P04353
8302	WARROORA	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	786642mE 7420648mN Zone 49 [Unreliable]	P04354
8797	POINT SAMSON 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	520139mE 7718055mN Zone 50 [Reliable]	P03722
8798	ROEBOURNE - PT SAMSON RD	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	516639mE 7716855mN Zone 50 [Reliable]	P03723
8857	NATGAS 157	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	450583mE 7691845mN Zone 50 [Reliable]	P03611
8858	NATGAS 158	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	472710mE 7714216mN Zone 50 [Reliable]	P03612

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
8859	NATGAS 159	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	473136mE 7714725mN Zone 50 [Unreliable]	P03613
8860	NATGAS 160	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	473639mE 7714655mN Zone 50 [Unreliable]	P03614
8861	NATGAS 161	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	473639mE 7714656mN Zone 50 [Unreliable]	P03615
8896	HAUL ROAD SOUTH 12	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	474914mE 7719484mN Zone 50 [Reliable]	P03594
8919	KARRATHA AIRPORT EAST	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	478239mE 7710155mN Zone 50 [Reliable]	P03562
8920	ONSLOW 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	304068mE 7606217mN Zone 50 [Reliable]	P03563
8925	ANADARA MIDDEN.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Hunting Place	*Registered Knowledge Holder names available from DAA	518139mE 7719355mN Zone 50 [Unreliable]	P03568
8926	JINTUPI MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	518439mE 7719055mN Zone 50 [Unreliable]	P03569
8927	TEN MILE WELL BURIAL	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	783642mE 7480649mN Zone 49 [Reliable]	P03570
8938	VICTORIA DAY SITE.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Rockshelter	*Registered Knowledge Holder names available from DAA	475813mE 7722476mN Zone 50 [Reliable]	P03529
8943	SLEEPING ROO	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	477579mE 7722235mN Zone 50 [Reliable]	P03534
8949	SETTLERS BEACH, COSSACK	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	520139mE 7714855mN Zone 50 [Reliable]	P03540

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
8964	SUPPLY BASE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474602mE 7719649mN Zone 50 [Reliable]	P03501
8965	OLD ROCK	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	478523mE 7723245mN Zone 50 [Reliable]	P03502
8966	ACCESS ROAD 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	478584mE 7723213mN Zone 50 [Reliable]	P03503
8967	ACCESS ROAD 2	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477581mE 7722567mN Zone 50 [Reliable]	P03504
8968	ACCESS ROAD 6	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477538mE 7722449mN Zone 50 [Reliable]	P03505
8969	ACCESS ROAD 7	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	477468mE 7722378mN Zone 50 [Reliable]	P03506
8970	ACCESS ROAD 8	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477330mE 7722032mN Zone 50 [Reliable]	P03507
8971	SPLIT CAMP	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	475482mE 7721453mN Zone 50 [Reliable]	P03508
8972	LONELY TURTLE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475340mE 7721566mN Zone 50 [Reliable]	P03509
8973	BOONGAREE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	475312mE 7721373mN Zone 50 [Reliable]	P03510
8974	FLATTENED TREES	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475866mE 7721803mN Zone 50 [Reliable]	P03511
8975	EAGLES PERCH	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475959mE 7721677mN Zone 50 [Reliable]	P03512

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
8976	COASTAL VALLEY 1	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475934mE 7721607mN Zone 50 [Reliable]	P03513
8977	JUNCTION SLOPES	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475857mE 7721680mN Zone 50 [Reliable]	P03514
8978	ACCESS ROAD 3	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477406mE 7722043mN Zone 50 [Reliable]	P03515
8980	ACCESS ROAD 5	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	477173mE 7722271mN Zone 50 [Reliable]	P03517
8981	BURIED TERRACE	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	477147mE 7722413mN Zone 50 [Reliable]	P03518
8982	BRIDGE CREEK	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	478237mE 7723106mN Zone 50 [Reliable]	P03519
8983	MANGROVE CREEK	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves, Man-Made Structure	*Registered Knowledge Holder names available from DAA	477660mE 7723188mN Zone 50 [Reliable]	P03520
8984	BORROWED ROCK SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477683mE 7723059mN Zone 50 [Reliable]	P03521
8985	COASTAL VALLEY 2	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475775mE 7721866mN Zone 50 [Reliable]	P03522
8986	BUTLERS PASS EAST	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477463mE 7722030mN Zone 50 [Reliable]	P03523
8987	WATERFALL VALLEY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	477624mE 7722210mN Zone 50 [Reliable]	P03524
8988	SPLIT KNEE RIDGE 1	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477725mE 7722565mN Zone 50 [Reliable]	P03525

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
8989	SPLIT KNEE RIDGE 2	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477821mE 7722709mN Zone 50 [Reliable]	P03526
8990	JOINED CIRCLES	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477906mE 7722855mN Zone 50 [Reliable]	P03527
9011	FLAT HEAD	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474868mE 7720689mN Zone 50 [Reliable]	P03492
9012	LONELY FISH	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474865mE 7720648mN Zone 50 [Reliable]	P03493
9013	STONY CREEK	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	474918mE 7720561mN Zone 50 [Reliable]	P03494
9015	PINNACLE HILL	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	474834mE 7720524mN Zone 50 [Reliable]	P03496
9016	EXTENDED VIEW	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474711mE 7720467mN Zone 50 [Reliable]	P03497
9017	EASTERN SLOPE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474770mE 7720637mN Zone 50 [Reliable]	P03498
9018	NORTHERN SLOPE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	474739mE 7720723mN Zone 50 [Reliable]	P03499
9019	CRICKETERS BEACH QUARRY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	474794mE 7720726mN Zone 50 [Reliable]	P03500
9021	GRANITE REST	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	472936mE 7714836mN Zone 50 [Reliable]	P03447
9022	LIGHT ROCKS	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	472936mE 7714836mN Zone 50 [Reliable]	P03448



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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9025	CLUMP SCATTER	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	472936mE 7714836mN Zone 50 [Reliable]	P03451
9027	KANGAROO ROCKS	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	473220mE 7715921mN Zone 50 [Reliable]	P03453
9028	M.O.F. LAYDOWN AREA 1	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474034mE 7720316mN Zone 50 [Reliable]	P03454
9030	PECKED TURTLE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474327mE 7720381mN Zone 50 [Reliable]	P03456
9032	BEACH FRONT	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474292mE 7720510mN Zone 50 [Reliable]	P03458
9033	BOONGAREE COAST 1	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474779mE 7720998mN Zone 50 [Reliable]	P03459
9034	BOONGAREE COAST 2	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474782mE 7720886mN Zone 50 [Reliable]	P03460
9035	BOONGAREE COAST 3.	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Rockshelter	*Registered Knowledge Holder names available from DAA	474674mE 7720858mN Zone 50 [Reliable]	P03461
9036	CRICKETERS BEACH QUARRY 1	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474835mE 7720942mN Zone 50 [Reliable]	P03462
9037	BOONGAREE COAST 4	No	No	No Gender Restrictions	Registered Site	Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474857mE 7720899mN Zone 50 [Reliable]	P03463
9038	BOONGAREE COAST 5	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474840mE 7720837mN Zone 50 [Reliable]	P03464
9039	BOONGAREE COAST 6	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474797mE 7720802mN Zone 50 [Reliable]	P03465

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9040	BOONGAREE COAST 7	No	No	No Gender Restrictions	Registered Site	Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474848mE 7720784mN Zone 50 [Reliable]	P03466
9041	BOONGAREE COAST 8	No	No	No Gender Restrictions	Registered Site	Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474830mE 7720752mN Zone 50 [Reliable]	P03467
9047	MANGROVE ROCKS	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	477474mE 7723016mN Zone 50 [Reliable]	P03321
9048	MANGROVE TURTLE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	477414mE 7722995mN Zone 50 [Reliable]	P03322
9049	CRACKED FIGURES	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	477459mE 7723026mN Zone 50 [Reliable]	P03323
9050	BROKEN COMB	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	477458mE 7723008mN Zone 50 [Reliable]	P03324
9051	BIRD FEET	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	477464mE 7722962mN Zone 50 [Reliable]	P03325
9052	GARDEN RAKE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477438mE 7722950mN Zone 50 [Reliable]	P03326
9053	FAKE FLAKE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	477466mE 7722929mN Zone 50 [Reliable]	P03327
9054	HEADLESS MEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	477464mE 7722906mN Zone 50 [Reliable]	P03328
9056	ROWING MEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	477501mE 7723036mN Zone 50 [Reliable]	P03330
9057	LONELY ROCK	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477526mE 7723023mN Zone 50 [Reliable]	P03331

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9058	SLEEPY SNAKE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477508mE 7723088mN Zone 50 [Reliable]	P03332
9059	CREEPING SLUG	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477604mE 7723179mN Zone 50 [Reliable]	P03333
9061	COBBLE BEACH 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	473712mE 7720019mN Zone 50 [Reliable]	P03350
9062	COBBLE BEACH 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	473873mE 7720114mN Zone 50 [Reliable]	P03351
9063	COBBLE BEACH 3	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Quarry	*Registered Knowledge Holder names available from DAA	473878mE 7720148mN Zone 50 [Reliable]	P03352
9064	LITTLE FOOT KNOLL	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475188mE 7718933mN Zone 50 [Reliable]	P03435
9065	NETTED ROCK	No	No	No Gender Restrictions	Registered Site	Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	475094mE 7718935mN Zone 50 [Reliable]	P03436
9066	DISAPPEARING TURTLE	No	No	No Gender Restrictions	Registered Site	Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	475074mE 7718907mN Zone 50 [Reliable]	P03437
9069	KISSING BIRDS	Yes	Yes	No Gender Restrictions	Registered Site	Engraving, Other: New info received - Lot 575-29, 30 & 36 (BMIEA)	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P03440
9070	SPOTTED SLUGS	Yes	Yes	No Gender Restrictions	Registered Site	Engraving, Other: New info received - Lot 575-29, 30 & 36 (BMIEA)	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P03441
9071	DANCING DOGS	Yes	Yes	No Gender Restrictions	Registered Site	Engraving, Other: New info received - Lot 575-29, 30 & 36 (BMIEA)	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P03442
9072	SMASHED ROO	Yes	Yes	No Gender Restrictions	Registered Site	Engraving, Other: New info received - Lot 575-29, 30 & 36 (BMIEA)	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P03443

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9073	ROCK SHOT	Yes	Yes	No Gender Restrictions	Registered Site	Engraving, Other: New info received - Lot 575-29, 30 & 36 (BMIEA)	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P03444
9081	MOTH HILL	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477778mE 7723416mN Zone 50 [Reliable]	P03300
9082	FISH FACE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477750mE 7723366mN Zone 50 [Reliable]	P03301
9083	SMASHED TREE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	477697mE 7723318mN Zone 50 [Reliable]	P03302
9084	SANDY ROCKS	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477653mE 7723309mN Zone 50 [Reliable]	P03303
9085	SANDCASTLE SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477576mE 7723220mN Zone 50 [Reliable]	P03304
9086	MANGROVE SEA	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477478mE 7723252mN Zone 50 [Reliable]	P03305
9088	LITTLE MEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	477514mE 7723156mN Zone 50 [Reliable]	P03307
9089	WEST BANK	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477481mE 7723113mN Zone 50 [Reliable]	P03308
9090	TWO-TONE WALLABY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	477546mE 7723097mN Zone 50 [Reliable]	P03309
9091	BIG BIRDS SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477594mE 7723146mN Zone 50 [Reliable]	P03310
9092	DANCING DUCK	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	477634mE 7723140mN Zone 50 [Reliable]	P03311

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9093	GRINDING PATCH DOME	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	477669mE 7723141mN Zone 50 [Reliable]	P03312
9094	MANY TREES	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	477641mE 7723197mN Zone 50 [Reliable]	P03313
9095	WELL WORN SITE	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	477670mE 7723219mN Zone 50 [Reliable]	P03314
9096	LITTLE MOUND SITE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	477731mE 7723195mN Zone 50 [Reliable]	P03315
9097	TWIN ROCKS	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477541mE 7723124mN Zone 50 [Reliable]	P03316
9098	FRYING PAN	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	477436mE 7723093mN Zone 50 [Reliable]	P03317
9099	TEREBRALIUM 1	No	No	No Gender Restrictions	Registered Site	Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	477424mE 7723067mN Zone 50 [Reliable]	P03318
9100	WITHNELL BAY INLAND	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	477733mE 7723328mN Zone 50 [Reliable]	P03319
9101	TEREBRALIUM 2	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	477551mE 7723101mN Zone 50 [Reliable]	P03320
9209	SALT WATER ACCESS ROAD 4	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474843mE 7717599mN Zone 50 [Reliable]	P03100
9210	SALT WATER ACCESS ROAD 5	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	474653mE 7717427mN Zone 50 [Reliable]	P03101
9211	SALT WATER ACCESS ROAD 3	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	474783mE 7717779mN Zone 50 [Reliable]	P03102

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9212	SALT WATER ACCESS ROAD 2.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure, Rockshelter	*Registered Knowledge Holder names available from DAA	474793mE 7717827mN Zone 50 [Reliable]	P03103
9213	SALT WATER ACCESS ROAD 1	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	474784mE 7717728mN Zone 50 [Reliable]	P03104
9214	SALT WATER ACCESS ROAD 6.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure, Water Source	*Registered Knowledge Holder names available from DAA	474721mE 7717771mN Zone 50 [Reliable]	P03105
9215	HAUL ROAD SOUTH 06.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Water Source, Other: New info received - Lot 575-29, 30 & 36 (BMIEA)	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P03107
9216	HAUL ROAD SOUTH 07	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Other: New info received - Lot 575-29, 30 & 36 (BMIEA)	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P03108
9217	HAUL ROAD SOUTH 08	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474851mE 7719439mN Zone 50 [Reliable]	P03109
9218	HAUL ROAD SOUTH 09	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474760mE 7719474mN Zone 50 [Reliable]	P03110
9219	HAUL ROAD SOUTH 10	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474788mE 7719506mN Zone 50 [Reliable]	P03111
9220	HAUL ROAD SOUTH 11	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474897mE 7719443mN Zone 50 [Reliable]	P03112
9235	PUMP ROAD	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475082mE 7717978mN Zone 50 [Reliable]	P03070
9236	MIDDEN ROAD 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Quarry	*Registered Knowledge Holder names available from DAA	475163mE 7718009mN Zone 50 [Reliable]	P03071

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9237	MIDDEN ROAD 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	475014mE 7717919mN Zone 50 [Reliable]	P03072
9238	NO NAME QUARRY	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475722mE 7721734mN Zone 50 [Reliable]	P03073
9239	BLADE QUARRY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	475321mE 7720697mN Zone 50 [Reliable]	P03074
9240	HAUL ROAD WEST	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475267mE 7720846mN Zone 50 [Reliable]	P03075
9241	ENGRAVED PANEL	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	475290mE 7720883mN Zone 50 [Reliable]	P03076
9242	PARALLEL ARCS	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474694mE 7719961mN Zone 50 [Reliable]	P03077
9245	TURTLE AND FISH	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	474675mE 7719805mN Zone 50 [Reliable]	P03080
9246	STEEP KNOLL	Yes	Yes	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure, Other: New info received - Lot 575-03 (BMIEA)	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P03081
9247	HAUL ROAD VALLEY	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475368mE 7721040mN Zone 50 [Reliable]	P03082
9248	HAUL ROAD VALLEY WEST	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475523mE 7721209mN Zone 50 [Reliable]	P03083
9249	SKYWARD ENGRAVING	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475169mE 7720615mN Zone 50 [Reliable]	P03084
9250	VALLEY FLOOR	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475301mE 7720784mN Zone 50 [Reliable]	P03085

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9251	FISHNET SITE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	475276mE 7720782mN Zone 50 [Reliable]	P03086
9252	HAUL ROAD VALLEY EAST	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475342mE 7720810mN Zone 50 [Reliable]	P03087
9253	MIDDEN ROAD 3	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	475128mE 7717778mN Zone 50 [Reliable]	P03088
9254	PECKED HUMANS	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	475369mE 7720873mN Zone 50 [Reliable]	P03089
9255	THE THYLACINES	Yes	Yes	Male Access Only	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P03090
9256	FOUR HUMANS	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475614mE 7721226mN Zone 50 [Reliable]	P03091
9257	NO NAME QUARRY 6	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	475662mE 7721682mN Zone 50 [Reliable]	P03092
9258	NO NAME QUARRY 7	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Quarry	*Registered Knowledge Holder names available from DAA	475531mE 7721458mN Zone 50 [Reliable]	P03093
9259	VALLEY HIDE	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	474677mE 7720054mN Zone 50 [Reliable]	P03094
9260	UNDER A CURRAJONG	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	474943mE 7719436mN Zone 50 [Reliable]	P03098
9263	NO NAME QUARRY 4	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	475594mE 7721504mN Zone 50 [Reliable]	P03039
9264	HAUL ROAD	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	474720mE 7719833mN Zone 50 [Reliable]	P03040

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9266	NO NAME QUARRY 5	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	475606mE 7721818mN Zone 50 [Reliable]	P03042
9267	HAUL ROAD SOUTH 05	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Quarry	*Registered Knowledge Holder names available from DAA	474742mE 7719689mN Zone 50 [Reliable]	P03043
9268	BORROW PIT 3A	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	473749mE 7715681mN Zone 50 [Reliable]	P03044
9269	BORROW PIT 3 (b)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	473747mE 7715727mN Zone 50 [Reliable]	P03045
9270	BORROW PIT 3 (c)	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	473610mE 7716069mN Zone 50 [Reliable]	P03046
9271	BORROW PIT 3 (d)	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	473704mE 7716126mN Zone 50 [Reliable]	P03047
9272	BORROW PIT 3 (e)	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	473789mE 7716168mN Zone 50 [Reliable]	P03048
9275	BORROW PIT 5	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	476123mE 7718239mN Zone 50 [Reliable]	P03051
9276	HAUL ROAD WEST	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475181mE 7720738mN Zone 50 [Reliable]	P03052
9277	THE FISHERMAN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	475213mE 7720787mN Zone 50 [Reliable]	P03053
9278	EAGLES NEST	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475098mE 7720528mN Zone 50 [Reliable]	P03054
9279	BOTTOM OF THE LEDGE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474656mE 7720293mN Zone 50 [Reliable]	P03055

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9281	JETTY ROAD 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	474389mE 7720379mN Zone 50 [Reliable]	P03057
9282	LOWER DRILL HOLE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Man-Made Structure, Quarry	*Registered Knowledge Holder names available from DAA	474161mE 7720392mN Zone 50 [Reliable]	P03058
9283	POLITICAL QUARRY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure, Quarry	*Registered Knowledge Holder names available from DAA	474298mE 7720348mN Zone 50 [Reliable]	P03064
9286	PUMP ROAD QUARRY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	475223mE 7717728mN Zone 50 [Reliable]	P03067
9288	PUMP ROAD ACCESS	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475054mE 7717858mN Zone 50 [Reliable]	P03069
9295	BORROW PIT 5	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	476139mE 7717955mN Zone 50 [Reliable]	P03014
9296	BORROW PIT 5 - SOUTH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	476274mE 7717963mN Zone 50 [Reliable]	P03015
9297	SCREENING AREA 1	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure, Other: Standing Stone	*Registered Knowledge Holder names available from DAA	475413mE 7719434mN Zone 50 [Reliable]	P03016
9298	SCREENING AREA 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	475498mE 7719145mN Zone 50 [Reliable]	P03017
9299	SCREENING AREA 3	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	475421mE 7719074mN Zone 50 [Reliable]	P03018
9300	SCREENING AREA 4, KING BAY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	475573mE 7719214mN Zone 50 [Reliable]	P03019
9301	SCREENING AREA 5, KING BAY	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475409mE 7719168mN Zone 50 [Reliable]	P03020

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9302	SCREENING AREA 6, KING BAY	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475473mE 7719178mN Zone 50 [Reliable]	P03021
9304	BORROW PIT 4	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475275mE 7716904mN Zone 50 [Reliable]	P03025
9305	BORROW PIT 4	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475350mE 7716950mN Zone 50 [Reliable]	P03026
9307	KANGAROO TANKS	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475350mE 7717588mN Zone 50 [Reliable]	P03028
9309	HAUL ROAD SOUTH 02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	474831mE 7719498mN Zone 50 [Reliable]	P03031
9310	HAUL ROAD SOUTH 03	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474858mE 7719506mN Zone 50 [Reliable]	P03032
9311	HAUL ROAD SOUTH 04	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	474926mE 7719469mN Zone 50 [Reliable]	P03033
9312	BORROW PIT 7	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	477387mE 7718404mN Zone 50 [Reliable]	P03034
9313	FROG GORGE 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	475816mE 7721933mN Zone 50 [Reliable]	P03035
9396	JOCULAR MAN SITE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	474648mE 7716695mN Zone 50 [Reliable]	P02771
9397	EMU FACE VALLEY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474816mE 7716640mN Zone 50 [Reliable]	P02772
9400	SWAMP CASTLE	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475592mE 7717825mN Zone 50 [Reliable]	P02775

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9401	SNAKE ROCK	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475993mE 7718812mN Zone 50 [Reliable]	P02776
9402	TOMS PIT	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	474130mE 7719833mN Zone 50 [Reliable]	P02777
9403	DRY CREEK SCATTER (D)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474125mE 7719678mN Zone 50 [Reliable]	P02778
9404	HAUL AND JETTY ROADS	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	474719mE 7720170mN Zone 50 [Reliable]	P02779
9405	JOEYS KNOLL	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	472814mE 7714486mN Zone 50 [Reliable]	P02780
9406	STAIRWAY TO HEAVEN	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	473139mE 7715305mN Zone 50 [Reliable]	P02782
9425	LOST FELLOWS	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	473090mE 7715589mN Zone 50 [Reliable]	P02743
9426	DESERT PATHWAY	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	473157mE 7715637mN Zone 50 [Reliable]	P02744
9427	HEROS HILL	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	473063mE 7715668mN Zone 50 [Reliable]	P02745
9428	CLARKES FOLLY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	473259mE 7715734mN Zone 50 [Reliable]	P02746
9431	ECHIDNAS LEAP	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	480051mE 7724370mN Zone 50 [Reliable]	P02749
9432	HEAT STRIKE HILL	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	473492mE 7715827mN Zone 50 [Reliable]	P02750

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9433	FAT MAN KNOLL	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	473540mE 7715801mN Zone 50 [Reliable]	P02751
9434	DAMPIER	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure, Quarry	*Registered Knowledge Holder names available from DAA	472939mE 7715605mN Zone 50 [Reliable]	P02752
9435	DAMPIER KING BAY SOUTH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	475639mE 7718655mN Zone 50 [Unreliable]	P02753
9436	HEARSON BAY ROAD - KING BAY A	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474678mE 7717252mN Zone 50 [Reliable]	P02754
9437	HEARSON BAY ROAD - KING BAY B	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Man-Made Structure, Midden / Scatter	*Registered Knowledge Holder names available from DAA	473675mE 7717197mN Zone 50 [Reliable]	P02755
9438	DAMPIER	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475165mE 7717191mN Zone 50 [Reliable]	P02756
9439	KING BAY SOUTH EAST	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	476322mE 7718232mN Zone 50 [Reliable]	P02757
9441	WOMBATS LEAP	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	480051mE 7724370mN Zone 50 [Reliable]	P02761
9443	DRY MEAL CAMP	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	473921mE 7715933mN Zone 50 [Reliable]	P02763
9446	DINGOS LEAP	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	480051mE 7724370mN Zone 50 [Reliable]	P02766
9447	QUICK STOP ART SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474166mE 7716240mN Zone 50 [Reliable]	P02767
9448	TEARDROP ART SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474297mE 7716339mN Zone 50 [Reliable]	P02768

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9449	RIDGETOP ART SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474357mE 7716350mN Zone 50 [Reliable]	P02769
9450	MARVISTA	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474577mE 7716616mN Zone 50 [Reliable]	P02770
9451	WEEROONGOORA	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476176mE 7722746mN Zone 50 [Reliable]	P02714
9452	RIVER GUM	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	473615mE 7716871mN Zone 50 [Reliable]	P02715
9453	KNOBBY KNOLL	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474111mE 7717237mN Zone 50 [Reliable]	P02716
9454	INCISED KNOLL	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	471969mE 7714528mN Zone 50 [Reliable]	P02717
9455	STRAY SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472305mE 7714562mN Zone 50 [Reliable]	P02718
9456	LINEAR RIDGE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472286mE 7714748mN Zone 50 [Reliable]	P02719
9457	PIPELINE TERRACES	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	472617mE 7714814mN Zone 50 [Reliable]	P02720
9458	SMALL RIDGE SITE	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	472530mE 7714885mN Zone 50 [Reliable]	P02721
9459	GRANOPHYRE OUTCROP	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472763mE 7714855mN Zone 50 [Reliable]	P02722
9460	HIDDEN HIDE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472793mE 7714935mN Zone 50 [Reliable]	P02723

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9461	MEDIAN STRIP	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472177mE 7714923mN Zone 50 [Reliable]	P02724
9463	MYSTIC EYES	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472366mE 7714942mN Zone 50 [Reliable]	P02726
9464	FIG TREE KNOLLS	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472314mE 7714975mN Zone 50 [Reliable]	P02727
9465	SPINIFEX KNOLL	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472418mE 7714992mN Zone 50 [Reliable]	P02728
9466	CORE SITE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	472556mE 7715072mN Zone 50 [Reliable]	P02729
9467	ROUGH SKETCH	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472571mE 7715126mN Zone 50 [Reliable]	P02730
9468	PIPE DREAM LOOKOUT	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472606mE 7715085mN Zone 50 [Reliable]	P02731
9469	FAINT LINE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472624mE 7715112mN Zone 50 [Reliable]	P02732
9470	ISOLATED SCREE SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472662mE 7715130mN Zone 50 [Reliable]	P02733
9471	MANDARIN KNOLL	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	472796mE 7715124mN Zone 50 [Reliable]	P02734
9472	OLD MAN SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472697mE 7715199mN Zone 50 [Reliable]	P02735
9473	ROCKY OUTLOOK	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	472764mE 7715230mN Zone 50 [Reliable]	P02736

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9474	THOUGHTFUL MAN SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472963mE 7715270mN Zone 50 [Reliable]	P02737
9475	LOW OUTCROP SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472875mE 7715335mN Zone 50 [Unreliable]	P02738
9476	TEREBRALIA MIDDEN (D)	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	474831mE 7719103mN Zone 50 [Reliable]	P02739
9477	DUMP SITE (S,D)	No	No	No Gender Restrictions	Registered Site	Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474844mE 7719138mN Zone 50 [Reliable]	P02740
9478	HIGHWAY 91	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	473033mE 7715490mN Zone 50 [Reliable]	P02741
9479	DRD AREA C-36	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	479361mE 7726831mN Zone 50 [Reliable]	P02687
9481	DRD AREA C-38	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	479674mE 7727000mN Zone 50 [Reliable]	P02689
9482	DRD AREA C-39	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	480102mE 7727026mN Zone 50 [Reliable]	P02690
9484	DRD AREA C-41	No	No	No Gender Restrictions	Registered Site	Man-Made Structure, Quarry	*Registered Knowledge Holder names available from DAA	480530mE 7727472mN Zone 50 [Reliable]	P02692
9485	DRD AREA C-42 (Burrup Peninsula R1)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure, Midden / Scatter, Quarry, Shell, Water Source, Other: ?	*Registered Knowledge Holder names available from DAA	480307mE 7727715mN Zone 50 [Reliable]	P02693
9487	DRD AREA C-44	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	480339mE 7727922mN Zone 50 [Reliable]	P02695
9488	DRD AREA C-45	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	480202mE 7727984mN Zone 50 [Reliable]	P02696

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9490	DRD AREA D-02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474389mE 7713855mN Zone 50 [Reliable]	P02698
9491	DRD AREA D-03	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	473895mE 7714485mN Zone 50 [Reliable]	P02699
9492	DRD AREA D-04	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474636mE 7714927mN Zone 50 [Reliable]	P02700
9494	TRIDENT ROCK	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477022mE 7722925mN Zone 50 [Reliable]	P02702
9496	THREE TRACKS	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477289mE 7723148mN Zone 50 [Reliable]	P02704
9497	COMES A TIME	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477308mE 7723107mN Zone 50 [Reliable]	P02705
9498	MUDDLED MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	476388mE 7722514mN Zone 50 [Reliable]	P02706
9499	STINGRAY ROCK	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477254mE 7723071mN Zone 50 [Reliable]	P02707
9502	EXFOLIATED OUTCROP	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474687mE 7718973mN Zone 50 [Reliable]	P02710
9503	CORROBOREE (S,D)	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474685mE 7719031mN Zone 50 [Reliable]	P02711
9504	BO (S,D)	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474486mE 7719002mN Zone 50 [Reliable]	P02712
9506	DRD AREA C-08	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	478914mE 7724680mN Zone 50 [Reliable]	P02659

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9507	DRD AREA C-09	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure, Midden / Scatter	*Registered Knowledge Holder names available from DAA	479004mE 7724798mN Zone 50 [Reliable]	P02660
9508	DRD AREA C-10	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	479124mE 7724820mN Zone 50 [Reliable]	P02661
9509	DRD AREA C-11	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	479169mE 7724880mN Zone 50 [Reliable]	P02662
9511	DRD AREA C-13	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	479269mE 7725195mN Zone 50 [Reliable]	P02664
9512	DRD AREA C-14	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	478985mE 7725199mN Zone 50 [Reliable]	P02665
9513	DRD AREA C-15	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	479126mE 7725326mN Zone 50 [Reliable]	P02666
9515	DRD AREA C-17	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure, Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	478871mE 7725578mN Zone 50 [Reliable]	P02668
9517	DRD AREA C-19 (Burrup Peninsula N9)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	478880mE 7725712mN Zone 50 [Reliable]	P02670
9518	DRD AREA C-20	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	479014mE 7725720mN Zone 50 [Reliable]	P02671
9519	DRD AREA C-21	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	478865mE 7726076mN Zone 50 [Reliable]	P02672
9523	DRD AREA C-25	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	479234mE 7726805mN Zone 50 [Reliable]	P02676
9524	DRD AREA C-26	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	479247mE 7726841mN Zone 50 [Reliable]	P02677

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9525	DRD AREA C-27	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	479246mE 7726903mN Zone 50 [Reliable]	P02678
9526	DRD AREA C-28	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	479400mE 7726331mN Zone 50 [Reliable]	P02679
9527	DRD AREA C-29	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	479507mE 7726375mN Zone 50 [Reliable]	P02680
9528	DRD AREA C-30	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	479896mE 7726635mN Zone 50 [Reliable]	P02681
9529	DRD AREA C-31	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Man-Made Structure	*Registered Knowledge Holder names available from DAA	479449mE 7726660mN Zone 50 [Reliable]	P02682
9530	DRD AREA C-32	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	479717mE 7726688mN Zone 50 [Reliable]	P02683
9532	DRD AREA C-34 (Burrup Peninsula P4)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Shell	*Registered Knowledge Holder names available from DAA	479515mE 7726690mN Zone 50 [Reliable]	P02685
9533	DRD AREA C-35	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	479617mE 7726830mN Zone 50 [Reliable]	P02686
9534	LAST MOTIF SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476925mE 7722796mN Zone 50 [Reliable]	P02632
9535	TOMS FIRST ENGRAVING	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477000mE 7722787mN Zone 50 [Reliable]	P02633
9536	EIGHTEEN GEOMETRIC SITE	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	477237mE 7723000mN Zone 50 [Reliable]	P02634
9537	SKIPPY SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477222mE 7722956mN Zone 50 [Reliable]	P02635

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9538	FLAT ROCK SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477102mE 7722826mN Zone 50 [Reliable]	P02636
9539	DANCING GROUND	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477272mE 7722995mN Zone 50 [Reliable]	P02637
9540	FINAL CIRCUIT	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477313mE 7723007mN Zone 50 [Reliable]	P02638
9541	FADED OUTLINES	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477360mE 7722885mN Zone 50 [Reliable]	P02639
9542	LITTLE KNOLL	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477205mE 7722855mN Zone 50 [Reliable]	P02640
9543	P.T. KNOLL	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477204mE 7722831mN Zone 50 [Reliable]	P02641
9544	DOUBLE J SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476974mE 7723034mN Zone 50 [Reliable]	P02642
9545	FISSURED ROCK	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476852mE 7722719mN Zone 50 [Reliable]	P02643
9548	SCREE RIDGE	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	477158mE 7723012mN Zone 50 [Reliable]	P02646
9549	GAILS ROCK	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	477115mE 7723145mN Zone 50 [Reliable]	P02647
9550	COMMODORE ROCKS	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477123mE 7723036mN Zone 50 [Reliable]	P02648
9551	CHANGED SITE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	475299mE 7718862mN Zone 50 [Reliable]	P02649

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9552	FISHTAIL SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477078mE 7722969mN Zone 50 [Reliable]	P02650
9553	SITE FOR SORE EYES	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477033mE 7722939mN Zone 50 [Reliable]	P02651
9556	DRD AREA C-03	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	478264mE 7723802mN Zone 50 [Reliable]	P02654
9557	DRD AREA C-04	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	478416mE 7724147mN Zone 50 [Reliable]	P02655
9558	DRD AREA C-05	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	478501mE 7724292mN Zone 50 [Reliable]	P02656
9559	DRD AREA C-06	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	478759mE 7724400mN Zone 50 [Reliable]	P02657
9560	DRD AREA C-07	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure, Midden / Scatter	*Registered Knowledge Holder names available from DAA	478699mE 7724575mN Zone 50 [Reliable]	P02658
9561	LONG KNOLL	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476902mE 7723295mN Zone 50 [Reliable]	P02604
9562	JIMS LOOKOUT	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476891mE 7723279mN Zone 50 [Reliable]	P02605
9563	TEAR DROP	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476915mE 7723256mN Zone 50 [Reliable]	P02606
9564	DRY STREAM CHANNEL	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	477044mE 7723394mN Zone 50 [Reliable]	P02607
9565	CLUSTERED MOTIFS	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477079mE 7723379mN Zone 50 [Reliable]	P02608

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9567	FULL CIRCLE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477321mE 7723437mN Zone 50 [Reliable]	P02610
9568	EAGLE ROCK	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477244mE 7723435mN Zone 50 [Reliable]	P02611
9569	ERICS SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477236mE 7723420mN Zone 50 [Reliable]	P02612
9570	OCEAN VIEWS	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477186mE 7723357mN Zone 50 [Reliable]	P02613
9571	BAYVIEW	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477221mE 7723333mN Zone 50 [Reliable]	P02614
9572	SANDPIT KNOLL	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477230mE 7723321mN Zone 50 [Reliable]	P02615
9573	CLOSE TO THE EDGE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477254mE 7723316mN Zone 50 [Reliable]	P02616
9574	AFTERNOON RESPITE	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	477182mE 7723265mN Zone 50 [Reliable]	P02617
9575	BROKEN ROCKS	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477220mE 7723254mN Zone 50 [Reliable]	P02618
9576	CIRCLE KNOLL	No	No	No Gender Restrictions	Registered Site	Grinding Patches / Grooves, Man-Made Structure	*Registered Knowledge Holder names available from DAA	477239mE 7723209mN Zone 50 [Reliable]	P02619
9577	SHARK ROCK	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477301mE 7723350mN Zone 50 [Reliable]	P02620
9578	CAMELOT	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477302mE 7723327mN Zone 50 [Reliable]	P02621

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9579	SCREE SLOPE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477285mE 7723306mN Zone 50 [Reliable]	P02622
9580	SCARECROW KNOLL	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477269mE 7723314mN Zone 50 [Reliable]	P02623
9581	CROW KNOLL	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	477318mE 7723286mN Zone 50 [Reliable]	P02624
9582	STICK MAN	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477325mE 7723248mN Zone 50 [Reliable]	P02625
9583	GECKO KNOLL	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477324mE 7723292mN Zone 50 [Reliable]	P02626
9585	IN BETWEEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	477353mE 7723209mN Zone 50 [Reliable]	P02628
9586	SANDFLY ROCKS	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves, Man-Made Structure, Midden / Scatter	*Registered Knowledge Holder names available from DAA	477327mE 7723030mN Zone 50 [Reliable]	P02629
9587	LINEAR RIDGE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477401mE 7723275mN Zone 50 [Reliable]	P02630
9588	PEBBLE MOUND SITE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	476645mE 7723040mN Zone 50 [Reliable]	P02631
9589	HOLE IN WALL	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	479639mE 7725805mN Zone 50 [Reliable]	P02577
9590	HAWKSBILL ROCK	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475724mE 7722376mN Zone 50 [Reliable]	P02578
9592	MANGROVE BEACH 2	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477266mE 7723003mN Zone 50 [Reliable]	P02580

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9593	MANGROVE CREEK 3	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477247mE 7722993mN Zone 50 [Reliable]	P02581
9594	ISOLATED OUTCROP	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476638mE 7722378mN Zone 50 [Reliable]	P02582
9595	FADED PANEL	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476754mE 7722563mN Zone 50 [Reliable]	P02583
9596	GRAVEL BANDIT SHELTERS.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Man-Made Structure, Midden / Scatter, Rockshelter	*Registered Knowledge Holder names available from DAA	480639mE 7723155mN Zone 50 [Reliable]	P02584
9597	DUNGONG MIDDEN	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Midden / Scatter, BP Dating: 2270 +/- 100 BP	*Registered Knowledge Holder names available from DAA	475908mE 7718881mN Zone 50 [Reliable]	P02585
9598	DUNGONG INCREASE SITE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure, Midden / Scatter	*Registered Knowledge Holder names available from DAA	475835mE 7719087mN Zone 50 [Reliable]	P02586
9599	BORROW PIT VIEWS	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	475930mE 7719206mN Zone 50 [Reliable]	P02587
9600	STREAM CHANNEL (DPA_314_1 DPA_314_2 DPA_314_3 DPA_314_4)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	475742mE 7719229mN Zone 50 [Reliable]	P02588
9603	HARD ROCK CAFE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	479689mE 7726055mN Zone 50 [Reliable]	P02591
9604	BELLE-AIR	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	479789mE 7726055mN Zone 50 [Reliable]	P02592
9606	FIG TREE VALLEY (Burrup Peninsula Q15 & 17)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure, Shell	*Registered Knowledge Holder names available from DAA	481289mE 7727055mN Zone 50 [Unreliable]	P02594
9607	CASPER POOLS.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Midden / Scatter, Water Source	*Registered Knowledge Holder names available from DAA	477039mE 7716955mN Zone 50 [Reliable]	P02595

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9608	FULL MOON SITE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	478545mE 7719731mN Zone 50 [Reliable]	P02596
9610	BIRD NEST DUNE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	476023mE 7718380mN Zone 50 [Reliable]	P02598
9611	SALT FLATS 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	475885mE 7718399mN Zone 50 [Reliable]	P02599
9612	SALT FLATS 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	475691mE 7718271mN Zone 50 [Reliable]	P02600
9613	MUDDY VIEW	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476909mE 7718406mN Zone 50 [Reliable]	P02601
9614	PIPE DREAM	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477224mE 7718398mN Zone 50 [Reliable]	P02602
9615	WHITE SANDS	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477166mE 7723482mN Zone 50 [Reliable]	P02603
9621	FISH TRAP MIDDEN	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	475036mE 7719027mN Zone 50 [Reliable]	P02554
9622	TIDAL FISH TRAP	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	475021mE 7719045mN Zone 50 [Reliable]	P02555
9623	DISCRETE MIDDEN	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	475038mE 7718974mN Zone 50 [Reliable]	P02556
9624	CIRCULAR MIDDEN	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	475094mE 7718997mN Zone 50 [Reliable]	P02557
9625	PEERA	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	475101mE 7718969mN Zone 50 [Reliable]	P02558



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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9626	GEOMETRIC SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475067mE 7719095mN Zone 50 [Reliable]	P02559
9627	ROCKY SITE	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	475059mE 7719014mN Zone 50 [Reliable]	P02560
9629	CROW TRAP	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	474618mE 7719540mN Zone 50 [Reliable]	P02562
9631	J SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474636mE 7719419mN Zone 50 [Reliable]	P02564
9632	RECLINING STICKMAN SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474587mE 7719486mN Zone 50 [Reliable]	P02565
9633	BORROW PIT 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	472800mE 7714701mN Zone 50 [Reliable]	P02566
9634	THE RETURN	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472379mE 7714500mN Zone 50 [Reliable]	P02567
9635	FIRE QUARRY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	477471mE 7719723mN Zone 50 [Reliable]	P02568
9636	CLAYPAN SCATTER	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	476011mE 7723028mN Zone 50 [Reliable]	P02569
9637	STORM BEACH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	475979mE 7722967mN Zone 50 [Reliable]	P02570
9641	DRIVING LESSON SITE	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	476210mE 7718976mN Zone 50 [Reliable]	P02574
9642	PENGUIN LEAP	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	480051mE 7724370mN Zone 50 [Reliable]	P02575



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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9643	HEROS LEAP	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	480051mE 7724370mN Zone 50 [Reliable]	P02576
9644	OVAL ART SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476619mE 7722335mN Zone 50 [Reliable]	P02521
9645	CIRCLE ART SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476442mE 7722378mN Zone 50 [Reliable]	P02522
9646	TETRAPOD ART SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476457mE 7722261mN Zone 50 [Reliable]	P02523
9647	DANCING MEN	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476471mE 7722316mN Zone 50 [Reliable]	P02524
9648	BOG VIEW	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476392mE 7722381mN Zone 50 [Reliable]	P02525
9650	PECKED LINE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476352mE 7722379mN Zone 50 [Reliable]	P02527
9651	WESTERN MARGIN	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476326mE 7722368mN Zone 50 [Reliable]	P02528
9652	BIRD TRACK ART	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476346mE 7722325mN Zone 50 [Reliable]	P02529
9653	LOFTY TERRACE	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	476317mE 7722314mN Zone 50 [Reliable]	P02530
9654	SHELTER VIEW	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476289mE 7722362mN Zone 50 [Reliable]	P02531
9655	MIXED BAG ART	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	476261mE 7722396mN Zone 50 [Reliable]	P02532

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9656	DOGS HEAD	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476265mE 7722335mN Zone 50 [Reliable]	P02533
9658	HOT WATER ISLAND	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476164mE 7722315mN Zone 50 [Reliable]	P02535
9659	MARGINAL MEAL	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475625mE 7722089mN Zone 50 [Reliable]	P02536
9660	LITTLE BERTHA	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	475887mE 7722105mN Zone 50 [Reliable]	P02537
9661	HIGH SEAS	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	475997mE 7722027mN Zone 50 [Reliable]	P02538
9662	EASTERN MARGIN	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476083mE 7722111mN Zone 50 [Reliable]	P02539
9663	STICKMAN ENGRAVING	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476349mE 7722085mN Zone 50 [Reliable]	P02540
9664	DRY CREEK ENGRAVINGS	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476509mE 7722095mN Zone 50 [Reliable]	P02541
9665	BURNING SPEAR	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476619mE 7722155mN Zone 50 [Reliable]	P02542
9666	ROADSIDE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476749mE 7722150mN Zone 50 [Reliable]	P02543
9667	GRANOPHYRE OUTCROPPING SITE	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	476828mE 7722227mN Zone 50 [Reliable]	P02544
9669	TRENCHTOWN	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	476969mE 7722280mN Zone 50 [Reliable]	P02546

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9672	NERITA TRAP	No	No	No Gender Restrictions	Registered Site	Fish Trap, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474852mE 7718949mN Zone 50 [Reliable]	P02493
9675	LOVERS LEAP	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	480051mE 7724370mN Zone 50 [Reliable]	P02496
9676	BANDICOOTS LEAP	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	480051mE 7724370mN Zone 50 [Reliable]	P02497
9677	EMUS LEAP	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	480051mE 7724370mN Zone 50 [Reliable]	P02498
9678	THYLACINE LEAP	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	480051mE 7724370mN Zone 50 [Reliable]	P02499
9679	WILD HARRY'S DREAM	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	481639mE 7723655mN Zone 50 [Unreliable]	P02500
9680	LONELY FELLOW	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474967mE 7717243mN Zone 50 [Reliable]	P02501
9681	MIDDEN VIEW	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	475821mE 7722230mN Zone 50 [Reliable]	P02502
9683	WILDCAT ROAD	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475890mE 7722247mN Zone 50 [Reliable]	P02504
9684	SHALLOW MIDDENS	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	475810mE 7722258mN Zone 50 [Reliable]	P02505
9685	ETCHINGS	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	475897mE 7722216mN Zone 50 [Reliable]	P02506
9686	ANCIENT VIEW	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475907mE 7722203mN Zone 50 [Reliable]	P02507

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9688	MATHEMATICIANS SCRIBBLES	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476104mE 7722184mN Zone 50 [Reliable]	P02509
9689	ANCIENT CIPHERS	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476424mE 7722719mN Zone 50 [Reliable]	P02510
9690	GORDONS LOOKOUT	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476490mE 7722660mN Zone 50 [Reliable]	P02511
9691	HINDU SCRIPT	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476583mE 7722676mN Zone 50 [Reliable]	P02512
9692	CREEKS EDGE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476709mE 7722637mN Zone 50 [Reliable]	P02513
9693	WISHFUL THINKING	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477374mE 7722915mN Zone 50 [Reliable]	P02514
9694	CREEK TERRACE	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	477052mE 7722412mN Zone 50 [Reliable]	P02515
9695	THE WALL	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	476977mE 7722249mN Zone 50 [Reliable]	P02516
9696	BLAST PERCH	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476968mE 7722228mN Zone 50 [Reliable]	P02517
9697	DUSTY ROAD	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure, Midden / Scatter	*Registered Knowledge Holder names available from DAA	476802mE 7722388mN Zone 50 [Reliable]	P02518
9698	PLAIN VIEW	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	476589mE 7722246mN Zone 50 [Reliable]	P02519
9699	PECKED LINES	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476606mE 7722347mN Zone 50 [Reliable]	P02520

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9701	BORROW PIT 6 LAYDOWN 13	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476686mE 7721377mN Zone 50 [Reliable]	P02467
9702	RUBBISH DUMP 13	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	478454mE 7722331mN Zone 50 [Reliable]	P02468
9703	RUBBISH DUMP 12	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	478467mE 7722343mN Zone 50 [Reliable]	P02469
9704	RUBBISH DUMP 14	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	478497mE 7722332mN Zone 50 [Reliable]	P02470
9705	RUBBISH DUMP 11	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	478472mE 7722480mN Zone 50 [Reliable]	P02471
9706	RUBBISH DUMP 10	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	478479mE 7722510mN Zone 50 [Reliable]	P02472
9707	RUBBISH DUMP 09	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	478546mE 7722530mN Zone 50 [Reliable]	P02473
9708	RUBBISH DUMP 08	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	478500mE 7722630mN Zone 50 [Reliable]	P02474
9709	RUBBISH DUMP 16	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	478568mE 7722301mN Zone 50 [Reliable]	P02475
9710	RUBBISH DUMP 17	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	478673mE 7722262mN Zone 50 [Reliable]	P02476
9711	RUBBISH DUMP 18	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	478633mE 7722190mN Zone 50 [Reliable]	P02477
9712	RUBBISH DUMP 15	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	478482mE 7722304mN Zone 50 [Reliable]	P02478

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9713	RUBBISH DUMP 07	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	478270mE 7722498mN Zone 50 [Reliable]	P02479
9714	RUBBISH DUMP 06	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	478237mE 7722547mN Zone 50 [Reliable]	P02480
9715	RUBBISH DUMP 04	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves, Man-Made Structure	*Registered Knowledge Holder names available from DAA	478233mE 7722608mN Zone 50 [Reliable]	P02481
9716	RUBBISH DUMP 05	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	478243mE 7722582mN Zone 50 [Reliable]	P02482
9717	RUBBISH DUMP 03	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	478262mE 7722647mN Zone 50 [Reliable]	P02483
9718	RUBBISH DUMP 02	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	478220mE 7722631mN Zone 50 [Reliable]	P02484
9719	RUBBISH DUMP 01	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	478243mE 7722679mN Zone 50 [Reliable]	P02485
9720	FREE LUNCH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	475987mE 7722409mN Zone 50 [Reliable]	P02486
9721	EAGLE-WOMAN SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476130mE 7722488mN Zone 50 [Reliable]	P02487
9722	DRILLERS HILL	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	476048mE 7722540mN Zone 50 [Reliable]	P02488
9723	DAVES DILEMMA	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474359mE 7718893mN Zone 50 [Reliable]	P02489
9724	MECHANISED TEST	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474656mE 7718765mN Zone 50 [Reliable]	P02490

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9725	BALANCING BALLS	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474542mE 7718714mN Zone 50 [Reliable]	P02491
9726	BIG FOOTED FIGURE	No	No	No Gender Restrictions	Registered Site	Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474754mE 7718810mN Zone 50 [Reliable]	P02492
9728	KING BAY EAST T	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure, Quarry	*Registered Knowledge Holder names available from DAA	475144mE 7718933mN Zone 50 [Reliable]	P02440
9735	GIDLEY PASSAGE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	481639mE 7737655mN Zone 50 [Unreliable]	P02447
9737	ENDERBY ISLAND 06: BOILER B	No	No	No Gender Restrictions	Registered Site	Engraving, Quarry	*Registered Knowledge Holder names available from DAA	445139mE 7720655mN Zone 50 [Reliable]	P02449
9740	BORROW PIT 5-2	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476872mE 7720777mN Zone 50 [Reliable]	P02452
9741	BORROW PIT 5-7	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476461mE 7720165mN Zone 50 [Reliable]	P02453
9742	BORROW PIT 5-8	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	476394mE 7720167mN Zone 50 [Reliable]	P02454
9743	BORROW PIT 6 LAYDOWN 01	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	477115mE 7722117mN Zone 50 [Reliable]	P02455
9744	BORROW PIT 6 LAYDOWN 02	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477122mE 7722081mN Zone 50 [Reliable]	P02456
9745	BORROW PIT 6 LAYDOWN 03	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	476774mE 7722060mN Zone 50 [Reliable]	P02457
9746	BORROW PIT 6 LAYDOWN 04	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476527mE 7721732mN Zone 50 [Reliable]	P02458

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9747	BORROW PIT 6 LAYDOWN 06	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	476615mE 7721627mN Zone 50 [Reliable]	P02459
9748	BORROW PIT 6 LAYDOWN 05	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	476554mE 7721641mN Zone 50 [Reliable]	P02460
9749	BORROW PIT 6 LAYDOWN 07	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476555mE 7721581mN Zone 50 [Reliable]	P02461
9750	BORROW PIT 6 LAYDOWN 10	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476342mE 7721454mN Zone 50 [Reliable]	P02462
9751	BORROW PIT 6 LAYDOWN 11	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	476376mE 7721463mN Zone 50 [Reliable]	P02463
9752	BORROW PIT 6 LAYDOWN 08	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	476575mE 7721519mN Zone 50 [Reliable]	P02464
9753	BORROW PIT 6 LAYDOWN 09	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Man-Made Structure	*Registered Knowledge Holder names available from DAA	476498mE 7721400mN Zone 50 [Reliable]	P02465
9754	KING BAY EAST A	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	476025mE 7719092mN Zone 50 [Reliable]	P02409
9755	BORROW AREA 7	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475964mE 7719138mN Zone 50 [Reliable]	P02410
9757	KING BAY EAST B	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475625mE 7719507mN Zone 50 [Reliable]	P02412
9758	KING BAY EAST C	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475732mE 7719501mN Zone 50 [Reliable]	P02413
9759	KING BAY EAST D	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475853mE 7719415mN Zone 50 [Reliable]	P02414



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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9760	HEARSON COVE NORTH A	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	479119mE 7720724mN Zone 50 [Reliable]	P02415
9761	HEARSON COVE NORTH B	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	479119mE 7720226mN Zone 50 [Reliable]	P02416
9762	HEARSON COVE NORTH C	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	479249mE 7720366mN Zone 50 [Reliable]	P02417
9763	HEARSON COVE ROAD 1	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves, Man-Made Structure	*Registered Knowledge Holder names available from DAA	477755mE 7718241mN Zone 50 [Reliable]	P02420
9765	COWRIE COVE SOUTH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Man-Made Structure, Midden / Scatter	*Registered Knowledge Holder names available from DAA	479863mE 7721244mN Zone 50 [Reliable]	P02422
9768	COWRIE COVE SOUTH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	480020mE 7720774mN Zone 50 [Reliable]	P02425
9770	KING BAY EAST E	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475474mE 7719329mN Zone 50 [Reliable]	P02427
9771	KING BAY EAST F	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475276mE 7719185mN Zone 50 [Reliable]	P02428
9772	KING BAY EAST G	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475367mE 7719284mN Zone 50 [Reliable]	P02429
9773	KING BAY EAST H	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475269mE 7719281mN Zone 50 [Reliable]	P02430
9774	KING BAY EAST I	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475463mE 7719234mN Zone 50 [Reliable]	P02431
9775	KING BAY EAST J	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475509mE 7719213mN Zone 50 [Reliable]	P02432

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9776	KING BAY EAST K	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475510mE 7719181mN Zone 50 [Reliable]	P02433
9777	KING BAY EAST L	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Quarry	*Registered Knowledge Holder names available from DAA	475476mE 7719083mN Zone 50 [Reliable]	P02434
9778	KING BAY EAST M	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475514mE 7719038mN Zone 50 [Reliable]	P02435
9779	KING BAY EAST N	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475527mE 7718968mN Zone 50 [Reliable]	P02436
9780	KING BAY EAST O	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	475485mE 7718860mN Zone 50 [Reliable]	P02437
9781	KING BAY EAST P	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	475355mE 7718769mN Zone 50 [Reliable]	P02438
9782	SPEAR THROWER SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475773mE 7722772mN Zone 50 [Reliable]	P02381
9783	PEBBLE BEACH	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475769mE 7722731mN Zone 50 [Reliable]	P02382
9784	STINGRAY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	475699mE 7722708mN Zone 50 [Reliable]	P02383
9785	SAILORS HAT	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475644mE 7722656mN Zone 50 [Reliable]	P02384
9786	SEA VIEW	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475782mE 7722639mN Zone 50 [Reliable]	P02385
9787	VALLEY VIEW 2	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475915mE 7722667mN Zone 50 [Reliable]	P02386

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9788	GRANITE OUTLOOK	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	475637mE 7722611mN Zone 50 [Reliable]	P02387
9789	FLOTSAM BEACH	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475594mE 7722572mN Zone 50 [Reliable]	P02388
9790	FREE-FALL CLIFF	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475534mE 7722479mN Zone 50 [Reliable]	P02389
9791	CIRCLE SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475487mE 7722457mN Zone 50 [Reliable]	P02390
9792	LONELY HUNTER	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475567mE 7722445mN Zone 50 [Reliable]	P02391
9793	JINNA SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475458mE 7722416mN Zone 50 [Reliable]	P02392
9794	FISHERMANS BASKET	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475430mE 7722379mN Zone 50 [Reliable]	P02393
9795	STORM POINT	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475387mE 7722341mN Zone 50 [Reliable]	P02394
9796	MERMAID ROCKS	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475453mE 7722292mN Zone 50 [Reliable]	P02395
9797	LOST PATCH	No	No	No Gender Restrictions	Registered Site	Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	475619mE 7722376mN Zone 50 [Reliable]	P02396
9798	TEABREAK	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475892mE 7722451mN Zone 50 [Reliable]	P02397
9799	CRABBING SITE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475880mE 7722415mN Zone 50 [Reliable]	P02398

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9800	SHIPBOARD VIEW	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475954mE 7722580mN Zone 50 [Reliable]	P02399
9801	WOODSIDE BORROW PIT 5-6	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	476655mE 7720371mN Zone 50 [Reliable]	P02400
9802	BORROW PIT 5-5	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476694mE 7720411mN Zone 50 [Reliable]	P02401
9803	BORROW PIT 5-4	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	476743mE 7720471mN Zone 50 [Reliable]	P02402
9804	BORROW PIT 5-3	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	476858mE 7720712mN Zone 50 [Reliable]	P02403
9805	BORROW PIT 5-1	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	477133mE 7720944mN Zone 50 [Reliable]	P02404
9806	KING BAY EAST Q	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	476986mE 7719662mN Zone 50 [Reliable]	P02405
9807	KING BAY EAST R	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure, Quarry	*Registered Knowledge Holder names available from DAA	477123mE 7719790mN Zone 50 [Reliable]	P02406
9808	BORROW AREA 7-1	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475955mE 7719230mN Zone 50 [Reliable]	P02407
9809	KING BAY EAST S	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476069mE 7719320mN Zone 50 [Reliable]	P02408
9810	ARCHAIC FACE, HAUL ROAD	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475050mE 7720573mN Zone 50 [Reliable]	P02354
9811	DRD AREA A-05	Yes	Yes	No Gender Restrictions	Registered Site	Engraving, Mythological, Other: New info received - Lot 575-03 (BMIEA)	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P02355

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
9812	DRD AREA A-06	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475045mE 7719633mN Zone 50 [Reliable]	P02356
9813	DRD AREA A-07	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter, Other: New info received - Lot 575-29, 30 & 36 (BMIEA)	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P02357
9814	DRD AREA A-08	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475786mE 7721718mN Zone 50 [Reliable]	P02358
9815	DRD AREA A-09	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	473754mE 7720081mN Zone 50 [Reliable]	P02359
9818	CLIMBING MEN COMPLEX (Burrup Peninsula F1)	Yes	Yes	Male Access Only	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P02362
9823	DRD AREA B-02	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477866mE 7722785mN Zone 50 [Reliable]	P02367
9827	DRD AREA A-17	Yes	Yes	Male Access Only	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P02371
9828	DRD AREA A-16	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475658mE 7721226mN Zone 50 [Reliable]	P02372
9843	SURVEYORS VALLEY	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476568mE 7720822mN Zone 50 [Reliable]	P02333
10052	CAPE LAMBERT ENGRAVINGS.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Midden / Scatter, Camp	*Registered Knowledge Holder names available from DAA	516746mE 7720064mN Zone 50 [Reliable]	P02116
10053	CAPE LAMBERT MIDDEN.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Camp	*Registered Knowledge Holder names available from DAA	517092mE 7720109mN Zone 50 [Reliable]	P02117
10055	CAPE LAMBERT LUNETTE.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp	*Registered Knowledge Holder names available from DAA	516496mE 7719357mN Zone 50 [Reliable]	P02119

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
10169	GABBA GABBA GULLY	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	220703mE 6931832mN Zone 50 [Reliable]	P02028
10187	BINDARA SOUTH	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P01992
10210	TAMALA BURIAL	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Skeletal Material / Burial, Shell	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P01961
10222	GIDAMARRA SPRING	No	No	No Gender Restrictions	Registered Site	Other: Proposed PA 088. ACMC Res 50/79	*Registered Knowledge Holder names available from DAA	220759mE 6932803mN Zone 50 [Reliable]	P01973
10225	JIBEENEWAJAR	Yes	Yes	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P01976
10231	NUNGINGAY SPRING	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P01982
10303	KING BAY NORTH	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	473824mE 7720071mN Zone 50 [Reliable]	P01889
10307	WITHNELL BAY	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	478298mE 7723484mN Zone 50 [Reliable]	P01893
10312	WITHNELL BAY EAST	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	478448mE 7723223mN Zone 50 [Reliable]	P01898
10360	KING BAY WOODSIDE 01	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475641mE 7719071mN Zone 50 [Reliable]	P01832
10361	KING BAY WOODSIDE 02	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475582mE 7719067mN Zone 50 [Reliable]	P01833
10362	KING BAY WOODSIDE 03	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475571mE 7719117mN Zone 50 [Reliable]	P01834

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
10363	KING BAY WOODSIDE 04	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475594mE 7719147mN Zone 50 [Reliable]	P01835
10364	KING BAY WOODSIDE 05	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475608mE 7719174mN Zone 50 [Reliable]	P01836
10381	VLAMING HEAD	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial, Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P01799
10555	GAS PIPELINE 05	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476639mE 7721055mN Zone 50 [Unreliable]	P01607
10557	GAS PIPELINE 07	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476467mE 7721020mN Zone 50 [Reliable]	P01609
10558	GAS PIPELINE 08.	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves, Man-Made Structure, Water Source	*Registered Knowledge Holder names available from DAA	476087mE 7719466mN Zone 50 [Reliable]	P01610
10572	GAS PIPELINE 22	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472620mE 7714173mN Zone 50 [Reliable]	P01624
10584	DAMPIER ARCHIPELAGO	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477918mE 7723527mN Zone 50 [Reliable]	P01583
10586	DAMPIER ARCHIPELAGO	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477858mE 7723450mN Zone 50 [Unreliable]	P01585
10615	HEARSON COVE NORTH 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	478212mE 7720465mN Zone 50 [Unreliable]	P01559
11063	TERMINAL ISLAND	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	245952mE 7554671mN Zone 50 [Unreliable]	P01109
11397	PARDOO 1	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Repository / Cache	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P00747

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
11398	PARDOO 3/MERRIMERICA HILL.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Mythological, Skeletal Material / Burial, BP Dating: 1-6,000 BP, Camp, Other: PA 40	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P00748
11402	URALA DUNE BURIAL	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P00752
11449	PARDOO 2.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Skeletal Material / Burial, Camp, Other: PA 44, NE	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P00745
11586	UDA DALU, BOODARIE STN	Yes	Yes	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P00557
11612	DAWSON CREEK BURIAL.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Skeletal Material / Burial, Camp, Water Source	*Registered Knowledge Holder names available from DAA	521662mE 7711139mN Zone 50 [Unreliable]	P00529
11625	DEPUCH ISLAND	No	No	No Gender Restrictions	Registered Site	Engraving, Other: PA 04	*Registered Knowledge Holder names available from DAA	575578mE 7718337mN Zone 50 [Reliable]	P00542
11664	CAPE LAMBERT	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	517748mE 7722516mN Zone 50 [Reliable]	P00528
11677	NW CORNER POINT 5 (Sea Ripple Rock Art)	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	484262mE 7730622mN Zone 50 [Unreliable]	P00489
11716	NW CORNER POINT 4	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	483185mE 7730621mN Zone 50 [Reliable]	P00476
11717	WITHNELL BAY 04	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	477633mE 7722161mN Zone 50 [Unreliable]	P00422
11720	WITHNELL BAY 05 (Burrup Peninsula I2 & I5)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure, Midden / Scatter, Quarry, Shell, Water Source	*Registered Knowledge Holder names available from DAA	478076mE 7723303mN Zone 50 [Reliable]	P00425

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11722	HEARSONS COVE	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	478075mE 7718808mN Zone 50 [Unreliable]	P00427
11724	WITHNELL BAY 09 (Burrup Peninsula M5)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	478449mE 7725420mN Zone 50 [Reliable]	P00429
11728	WITHNELL BAY 10	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	479632mE 7727005mN Zone 50 [Reliable]	P00433
11731	FISH POOL, DAMPIER	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	480032mE 7721510mN Zone 50 [Reliable]	P00436
11736	VIRILI COVE, DAMPIER (Burrup Peninsula K12 &13)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Midden / Scatter, Quarry, Shell	*Registered Knowledge Holder names available from DAA	481212mE 7724465mN Zone 50 [Reliable]	P00442
11739	NW CORNER BEACH 2 (Burrup Peninsula T9)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure, Midden / Scatter, Quarry, Shell	*Registered Knowledge Holder names available from DAA	480964mE 7728812mN Zone 50 [Reliable]	P00445
11754	GOANNA POOL	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Midden / Scatter, Other: Charcoal	*Registered Knowledge Holder names available from DAA	464044mE 7711793mN Zone 50 [Reliable]	P00405
11757	DAMPIER SALT CAUSEWAY 4 (Hunter's Valley)	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	467346mE 7712469mN Zone 50 [Reliable]	P00408
11816	DEVIL CREEK, MARDIE STATION	Yes	Yes	Male Access Only	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P00360
11866	POVERTY WINDMILL, MT WELCOME.	No	No	No Gender Restrictions	Registered Site	Camp	*Registered Knowledge Holder names available from DAA	511000mE 7716236mN Zone 50 [Unreliable]	P00303
11885	PADJARI MANU CAVE (Formerly Bunbury Cave)	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Engraving, Painting, Arch Deposit, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P00267
11943	TWO MILE RIDGE, NELSON POINT	Yes	Yes	No Gender Restrictions	Registered Site	Engraving, Other: PA 02	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P00219

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12069	SOUTH WEST CREEK 1,2,3.	Yes	Yes	No Gender Restrictions	Registered Site	Engraving, Midden / Scatter, Mythological, Camp, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P00088
12071	SOUTH WEST CREEK 4.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Engraving, Man-Made Structure, Midden / Scatter, Arch Deposit, Camp, Other: PA 25	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P00090
12072	SOUTH WEST CREEK 5:BOODARI.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter, Camp, Hunting Place	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P00091
12410	LINTAPITJIN/LOT 2065PORT DR	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Midden / Scatter, Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02819
12470	GULGUDUNG	Yes	Yes	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02774
12522	ONE MILE CAMP.	No	No	No Gender Restrictions	Registered Site	Camp	*Registered Knowledge Holder names available from DAA	419599mE 8017210mN Zone 51 [Reliable]	K02722
12552	CLEMENTSON ST. SITE COMPLEX	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial, Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02700
12793	UNDANDA.	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial, Grinding Patches / Grooves, Midden / Scatter, Mythological, Camp	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02417
12839	BILLINGURRU.	Yes	Yes	Male Access Only	Registered Site	Ceremonial, Mythological, Camp	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02409
12842	INBALMARRA.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Midden / Scatter, Mythological, Quarry, Camp	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02412
12873	ENTRANCE POINT/YINARA.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Mythological, Camp	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02332
12875	BARRED CREEK	Yes	Yes	Male Access Only	Registered Site	Ceremonial	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02334

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12902	KUNDANDU.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Mythological, Camp, Water Source, Other: Part of failed PA 139. ACMC Res 11/89	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02308
12903	MURRJAL.	Yes	Yes	Female Access Only	Registered Site	Artefacts / Scatter, Midden / Scatter, Mythological, Camp, Water Source, Other: Part of failed PA 139. ACMC Res11/89	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02309
12904	RURRJAMAN.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Mythological, Camp, Plant Resource, Water Source, Other: Part of failed PA 139. ACMC Res 11/89	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02310
12906	WILLIES CREEK COMPLEX.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Midden / Scatter, Mythological, Skeletal Material / Burial, Camp, Hunting Place, Named Place, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02312
12908	COCONUT WELL 1.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Mythological, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02314
12909	COCONUT WELL ISLAND	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02315
12912	JURLIRR.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Midden / Scatter, Mythological, Water Source, Other: Failed PA 142. ACMC Res 11/89	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02318
12917	CABLE BEACH 6.	Yes	Yes	No Gender Restrictions	Registered Site	Midden / Scatter, Camp, Meeting Place, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02323
12921	MINYIRR.	Yes	Yes	No Gender Restrictions	Registered Site	Mythological, Water Source, Other: Part of Failed PA 143. ACMC Res 11/89	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02327
12922	JUNGKURR	Yes	Yes	No Gender Restrictions	Registered Site	Mythological, Other: Part of Failed PA 143. ACMC Res 11/89	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02328



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12923	NGAKALYALYA	Yes	Yes	No Gender Restrictions	Registered Site	Mythological, Other: Part of Failed PA 143. APMC Res 11/89	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02329
12924	GANTHEAUME POINT 1	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Mythological, Other: Part of Failed PA143. APMC Res 11/89	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02330
12965	CAPE KERAUDREN 3.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Camp, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02266
12967	CAPE KERAUDREN 5	Yes	Yes	No Gender Restrictions	Registered Site	Midden / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02268
12969	WARRA MURRANGA TALU	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial, Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K02270
13320	WUNDORDA	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Midden / Scatter	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K01927
13321	BULGURGUN.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Mythological, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K01928
13351	NGILIRIRBANJIN	Yes	Yes	Male Access Only	Registered Site	Ceremonial	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K01903
13463	WULLULONG GROUND	Yes	Yes	No Gender Restrictions	Registered Site	Other: Proposed PA 098. APMC Res 23/77 (b)	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K01692
13464	WULLULONG GROUND	Yes	Yes	No Gender Restrictions	Registered Site		*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K01693
13465	WIRGANJU GROUND	Yes	Yes	No Gender Restrictions	Registered Site		*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K01694
13503	WIRRAR.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Skeletal Material / Burial, Camp, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K01677



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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
13504	KARDILAKAN - JAJAL.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Fish Trap, Midden / Scatter, Mythological, Camp, Water Source, Other: Part of Failed PA 139. ACMC Res 11/89	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K01678
13729	RESERVE 21801 BROOME	Yes	Yes	Male Access Only	Registered Site	Artefacts / Scatter, Ceremonial, Man-Made Structure, Mythological, Other: Proposed PA 087. ACMC Res 23/77	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K01380
14266	WURRUNGOO.	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial, Historical, Other: SENTIMENTAL	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K00823
14291	FISHERMENS BEND 1.	Yes	Yes	Male Access Only	Registered Site	Artefacts / Scatter, Midden / Scatter, Mythological, Camp, Water Source, Other: Part of proposed PA 117	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K00849
14312	CAPE VILLARET	Yes	Yes	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K00817
14313	RALLAH WELL	Yes	Yes	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K00818
14341	SHELLBOROUGH 1-3.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Man-Made Structure, Midden / Scatter, Skeletal Material / Burial, Camp, Other: ?	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K00773
14439	BIDIR-NGA:BA	Yes	Yes	No Gender Restrictions	Registered Site	Fish Trap, Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K00657
14444	BEACON HILL	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	416092mE 8009063mN Zone 51 [Reliable]	K00662
14483	N.W. COASTAL HIGHWAY	Yes	Yes	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K00583

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14560	TITIRRKUN/KENNEDY HILL.	Yes	Yes	Male Access Only	Registered Site	Artefacts / Scatter, Ceremonial, Grinding Patches / Grooves, Midden / Scatter, Mythological, Hunting Place, Water Source, Other: Failed PA 140. APMC Res 11/89	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K00500
14609	CABLE BEACH 3.	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Mythological, Camp, Other: Part of Failed PA 143.APMC Res 11/89	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K00496
14894	LAGRANGE	Yes	Yes	No Gender Restrictions	Registered Site	Repository / Cache	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	K00094
15726	EAST INTERCOURSE ISLAND 01	Yes	Yes	Male Access Only	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	P07942
15883	BOODARIE 01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	665564mE 7749723mN Zone 50 [Reliable]	
15894	BOODARIE 16	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	662515mE 7748160mN Zone 50 [Unreliable]	
15900	BOODARIE 25	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	662812mE 7748768mN Zone 50 [Reliable]	
15926	TUBRIDGI 01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	277811mE 7593977mN Zone 50 [Reliable]	
15927	TUBRIDGI 02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	277849mE 7593901mN Zone 50 [Reliable]	
15928	TUBRIDGI 04	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	277838mE 7593830mN Zone 50 [Reliable]	
15929	TUBRIDGI 05	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	277834mE 7593689mN Zone 50 [Reliable]	



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15930	TUBRIDGI 06	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	277865mE 7593559mN Zone 50 [Reliable]	
15931	TUBRIDGI 07	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	277927mE 7593473mN Zone 50 [Reliable]	
15932	TUBRIDGI 08	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	277947mE 7593417mN Zone 50 [Reliable]	
15933	TUBRIDGI 09	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	277969mE 7593332mN Zone 50 [Reliable]	
16222	South West Burrup Peninsula Site 21	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Shell	*Registered Knowledge Holder names available from DAA	464914mE 7712133mN Zone 50 [Reliable]	
16633	SFS 4	No	No	No Gender Restrictions	Registered Site	Modified Tree	*Registered Knowledge Holder names available from DAA	476833mE 7720769mN Zone 50 [Reliable]	
16635	SFS 2	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474693mE 7720093mN Zone 50 [Reliable]	
16687	Dampier Salt Levee 37 Site 3	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	474961mE 7713764mN Zone 50 [Reliable]	
16688	Dampier Salt Levee 37 Site 4	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	474591mE 7713489mN Zone 50 [Unreliable]	
16878	Lake Jasper	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial, Mythological, Camp, Named Place, Natural Feature	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
17193	Ningaloo Station	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	775891mE 7489149mN Zone 49 [Unreliable]	
17215	King Bay Woodside 42	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	474322mE 7718957mN Zone 50 [Reliable]	

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17216	King Bay Woodside 43	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure, Other: stone arrangements	*Registered Knowledge Holder names available from DAA	474287mE 7718890mN Zone 50 [Reliable]	
17217	King Bay Woodside 44	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474298mE 7718851mN Zone 50 [Reliable]	
17218	King Bay Woodside 48	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474383mE 7718846mN Zone 50 [Reliable]	
17219	King Bay Woodside 49	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474410mE 7718824mN Zone 50 [Reliable]	
17220	King Bay Woodside 46	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	474339mE 7718820mN Zone 50 [Reliable]	
17221	King Bay Woodside 45	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	474320mE 7718822mN Zone 50 [Reliable]	
17290	BURRUP SERVICE CORRIDOR 04	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475433mE 7719819mN Zone 50 [Reliable]	
17354	Abba River	No	No	No Gender Restrictions	Registered Site	Historical, Mythological	*Registered Knowledge Holder names available from DAA	360689mE 6270254mN Zone 50 [Reliable]	
17450	NOWERGUP LAKE	No	No	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	379733mE 6499450mN Zone 50 [Reliable]	
17451	PIPIDINNY LAKE	No	No	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	375183mE 6505378mN Zone 50 [Reliable]	
17593	Significant Tree - Nyoongah Community	No	No	No Gender Restrictions	Registered Site	Modified Tree, Mythological, Natural Feature, Other: Message Stick	*Registered Knowledge Holder names available from DAA	391879mE 6482583mN Zone 50 [Reliable]	
17596	Limestone Reef	No	No	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	369301mE 6508657mN Zone 50 [Reliable]	

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17597	Emu Cave	No	No	No Gender Restrictions	Registered Site	Mythological, Natural Feature, Other: Cave	*Registered Knowledge Holder names available from DAA	371098mE 6516058mN Zone 50 [Reliable]	
17599	Yanchep Beach	No	No	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	369739mE 6508075mN Zone 50 [Reliable]	
17849	ROBERTSON PARK	No	No	No Gender Restrictions	Registered Site	Historical, Mythological, Skeletal Material / Burial, Camp, Hunting Place, Meeting Place, Plant Resource, Other: Potential archaeological deposit	*Registered Knowledge Holder names available from DAA	391986mE 6465546mN Zone 50 [Reliable]	
17984	GOEGRUP LAKE	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial, Fish Trap, Historical, Mythological, Skeletal Material / Burial, Camp, Hunting Place, Natural Feature, Plant Resource, Water Source, Other: Rock Crossing	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
18000	Pipeline Corridor 07 (PC-07)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell, Other: 18001 & 18002 are duplicates.	*Registered Knowledge Holder names available from DAA	455548mE 7694253mN Zone 50 [Reliable]	
18096	Yukulyum Spring	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial, Historical, Mythological, Hunting Place, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
18498	Yallingup Brook	Yes	Yes	No Gender Restrictions	Registered Site	Mythological, Natural Feature, Plant Resource, Water Source, Other: Dreaming Legend, Featured in the Ngilgi	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
18733	Burrup engravings compound	Yes	Yes	No Gender Restrictions	Registered Site	Engraving, Repository / Cache	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
18794	Westbank Beach Burial	Yes	Yes	No Gender Restrictions	Registered Site	Skeletal Material / Burial, Other: Isolated Artefacts	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
18808	Cape Preston 05	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	411464mE 7660843mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
18816	Cape Preston 13	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	411230mE 7673064mN Zone 50 [Reliable]	
18819	Cape Preston 16	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	421070mE 7692909mN Zone 50 [Reliable]	
18822	Cape Preston 19	No	No	No Gender Restrictions	Registered Site	Quarry	*Registered Knowledge Holder names available from DAA	417279mE 7695781mN Zone 50 [Reliable]	
18828	Cape Preston 25	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	417647mE 7694189mN Zone 50 [Reliable]	
18831	Cape Preston 28	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	409197mE 7666687mN Zone 50 [Reliable]	
18833	Cape Preston 30	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	409230mE 7670707mN Zone 50 [Reliable]	
18834	Cape Preston 31	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	411765mE 7677418mN Zone 50 [Reliable]	
18848	Cape Preston 45	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	415911mE 7678009mN Zone 50 [Reliable]	
18856	Cape Preston 53	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	417498mE 7683243mN Zone 50 [Reliable]	
18858	Cape Preston 55	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
18865	Cape Preston 62	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	419703mE 7689770mN Zone 50 [Reliable]	
18870	Cape Preston 67	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	416569mE 7670785mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
18937	Yangebup Lake	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial, Historical, Mythological, Plant Resource, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
18938	Thomsons Lake	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial, Historical, Mythological, Plant Resource, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
19210	DRD 110 (Burrup Peninsula D14)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure, Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	479080mE 7720790mN Zone 50 [Reliable]	
19211	DRD 111	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	478867mE 7720650mN Zone 50 [Reliable]	
19288	Mt Potter 3	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	419314mE 7685097mN Zone 50 [Reliable]	
19298	Cape Preston Soak	No	No	No Gender Restrictions	Registered Site	Historical, Midden / Scatter, Mythological, Camp, Water Source	*Registered Knowledge Holder names available from DAA	417802mE 7694273mN Zone 50 [Reliable]	
19422	MX-13	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	478210mE 7719689mN Zone 50 [Reliable]	
19433	MX-09 ARTEFACT SCATTER	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	478234mE 7720641mN Zone 50 [Reliable]	
19434	MX-23 STONE ARRANGEMENT	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	478266mE 7720410mN Zone 50 [Reliable]	
19435	MX-22 ARTEFACT SCATTER	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	478316mE 7720492mN Zone 50 [Reliable]	
19437	MX-21 STONE ARRANGEMENT	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	478281mE 7720418mN Zone 50 [Reliable]	
19439	MX-10 ARTEFACT SCATTER	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	478248mE 7720618mN Zone 50 [Reliable]	

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19440	MX-14 QUARRY AND KNAPPING FLOORS	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	478124mE 7720585mN Zone 50 [Reliable]	
19473	Petroglyph Site 11	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477649mE 7720088mN Zone 50 [Reliable]	
19622	Woodside Extension Area 04	No	No	No Gender Restrictions	Registered Site	Grinding Patches / Grooves, Man-Made Structure	*Registered Knowledge Holder names available from DAA	476509mE 7721131mN Zone 50 [Unreliable]	
19623	Woodside Extension Area 05	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476419mE 7721101mN Zone 50 [Unreliable]	
19627	Woodside Extension Area 10	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476238mE 7721196mN Zone 50 [Reliable]	
19631	Woodside Extension Area 14	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	476134mE 7721116mN Zone 50 [Unreliable]	
19632	Woodside Extension Area 15	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	476139mE 7721076mN Zone 50 [Unreliable]	
19633	Woodside Extension Area 16	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	476064mE 7721140mN Zone 50 [Unreliable]	
19642	Woodside Extension Area 25	Yes	Yes	Male Access Only	Registered Site	Engraving, Grinding Patches / Grooves, Man-Made Structure, Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
19648	Woodside Extension Area 31	Yes	Yes	Male Access Only	Registered Site	Engraving, Repository / Cache	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
19654	Woodside Extension Area 37	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	475784mE 7721100mN Zone 50 [Unreliable]	
19656	Woodside Extension Area 39	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475658mE 7721250mN Zone 50 [Unreliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
19660	Woodside Extension Area 44	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	475458mE 7721241mN Zone 50 [Reliable]	
19702	Woodside Haul Road 05	Yes	Yes	No Gender Restrictions	Registered Site	Engraving, Other: New info received - Lot 575-03 (BMIEA)	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
20008	Gingin Brook Waggy Site	Yes	Yes	No Gender Restrictions	Registered Site	Historical, Mythological, Camp, Hunting Place, Plant Resource, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
20051	Kwelena Mambakort - Wedge Island	Yes	Yes	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Grinding Patches / Grooves, Historical, Midden / Scatter, Rockshelter, Arch Deposit, Camp, Hunting Place, Meeting Place, Shell, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
20074	W7 - Stone Pit	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	476579mE 7719147mN Zone 50 [Reliable]	
20075	W8 - Engravings	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476585mE 7719166mN Zone 50 [Unreliable]	
20076	W9 - Stone pit	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	476399mE 7719511mN Zone 50 [Reliable]	
20077	W10	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476379mE 7719511mN Zone 50 [Reliable]	
20078	W11 - Stone Circle	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	476419mE 7719434mN Zone 50 [Reliable]	
20079	W12 - Stone Circle	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	476449mE 7719433mN Zone 50 [Reliable]	
20080	W15 - Random Peckings	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476429mE 7719453mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
20081	W14 - Stone Circle	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	476467mE 7719281mN Zone 50 [Reliable]	
20082	W13 - Stone Circle	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	476529mE 7719373mN Zone 50 [Reliable]	
20110	BSC058	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477317mE 7722061mN Zone 50 [Reliable]	
20112	WGT06	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477514mE 7722412mN Zone 50 [Reliable]	
20113	WGT08	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477357mE 7722153mN Zone 50 [Reliable]	
20114	WGT09	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477284mE 7722028mN Zone 50 [Reliable]	
20116	WGT012	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	477363mE 7722184mN Zone 50 [Reliable]	
20117	WGT015	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476978mE 7720982mN Zone 50 [Reliable]	
20178	Bold Park	No	No	No Gender Restrictions	Registered Site	Historical, Mythological, Camp, Hunting Place, Plant Resource, Other: Lookout Point	*Registered Knowledge Holder names available from DAA	383679mE 6464902mN Zone 50 [Reliable]	
20287	Ngoorlak Nest	No	No	No Gender Restrictions	Registered Site	Historical, Camp	*Registered Knowledge Holder names available from DAA	381553mE 6400364mN Zone 50 [Reliable]	
20365	DP-002	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472130mE 7715376mN Zone 50 [Reliable]	
20366	DP-003	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472119mE 7715483mN Zone 50 [Reliable]	

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20367	DP-285	Yes	Yes	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
20368	DP-286	Yes	Yes	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
20369	DP-287	Yes	Yes	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
20370	DP-288	Yes	Yes	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
20371	PP-02	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	471103mE 7715948mN Zone 50 [Reliable]	
20372	PP-03	Yes	Yes	Male Access Only	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
20373	PP-20	Yes	Yes	No Gender Restrictions	Registered Site	Man-Made Structure, Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
20374	PP-10	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472569mE 7716911mN Zone 50 [Reliable]	
20375	PP-19	Yes	Yes	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
20376	Woodside Extension Area 02	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves, Man-Made Structure	*Registered Knowledge Holder names available from DAA	476689mE 7721385mN Zone 50 [Reliable]	
20744	Dewar Road Artefact Scatter	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	373490mE 6393158mN Zone 50 [Reliable]	
20763	Koopins Grave	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	324097mE 6278282mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
20764	Caves Road Campsite	Yes	Yes	No Gender Restrictions	Registered Site	Camp	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
20772	Jindalee	Yes	Yes	No Gender Restrictions	Registered Site	Mythological, Natural Feature, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
20793	AIC/03 - Standing Stone	No	No	No Gender Restrictions	Registered Site	Natural Feature, Other: Standing Stone	*Registered Knowledge Holder names available from DAA	472049mE 7713825mN Zone 50 [Unreliable]	
20794	AIC/04 - Humanoid Figure	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472063mE 7713801mN Zone 50 [Unreliable]	
20853	Geraldton Southern Transport Corridor Field Site 04	No	No	No Gender Restrictions	Registered Site	Natural Feature	*Registered Knowledge Holder names available from DAA	264906mE 6813588mN Zone 50 [Reliable]	
20866	Lake Coogee	No	No	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	384822mE 6443772mN Zone 50 [Reliable]	
20909	KDR / EFS 11	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472027mE 7713854mN Zone 50 [Reliable]	
20910	KDR / EFS12	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472023mE 7713932mN Zone 50 [Reliable]	
21122	Parker Point 32 (PP32)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	472757mE 7717118mN Zone 50 [Unreliable]	
21124	Kangaroo Valley (KV22) Human Figure	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472854mE 7717173mN Zone 50 [Reliable]	
21125	Kangaroo Valley (KV23) Human figure	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472853mE 7717135mN Zone 50 [Reliable]	
21126	Kangaroo Valley (KV24) Bird Track	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472806mE 7717055mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
21127	Kangaroo Valley (KV41) Bird tracks / Lines / Amorphous	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472996mE 7717311mN Zone 50 [Reliable]	
21128	Kangaroo Valley (KV42) Anthropomorph	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472822mE 7717116mN Zone 50 [Reliable]	
21129	Kangaroo Valley (KV43) Track / Anthropomorph	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472967mE 7717303mN Zone 50 [Reliable]	
21311	Woodside Extension Area 9	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	476252mE 7721280mN Zone 50 [Unreliable]	
21312	Woodside Extension Area 62	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	477000mE 7723915mN Zone 50 [Unreliable]	
21340	Lake Jingie Waugal Site	No	No	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	318240mE 6285795mN Zone 50 [Reliable]	
21349	Sand Dune Midden	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	518447mE 7718040mN Zone 50 [Unreliable]	
21363	Maitland River Quarry	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry, Arch Deposit	*Registered Knowledge Holder names available from DAA	460211mE 7694253mN Zone 50 [Reliable]	
21364	Maitland River Artefact Scatter	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	458778mE 7693722mN Zone 50 [Unreliable]	
21365	Maitland River Artefact Scatter 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	450403mE 7691764mN Zone 50 [Unreliable]	
21366	Maitland River Artefact Scatter 3	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	447148mE 7691018mN Zone 50 [Reliable]	
21367	Maitland River Artefact Scatter 4	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	446907mE 7690933mN Zone 50 [Unreliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
21368	Maitland River Quarry 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	444974mE 7690373mN Zone 50 [Unreliable]	
21408	Broome Crocodile Farm	Yes	Yes	Male Access Only	Registered Site	Ceremonial, Mythological, Camp	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
21512	Railway 4	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662797mE 7754831mN Zone 50 [Reliable]	
21515	Finucane Island Burial & Midden Site	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	663550mE 7754397mN Zone 50 [Reliable]	
21526	Robe River (Gadjiwura)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Modified Tree, Mythological, Camp, Named Place, Other: sacred place	*Registered Knowledge Holder names available from DAA	442657mE 7593231mN Zone 50 [Reliable]	
21552	Site One	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474659mE 7720251mN Zone 50 [Reliable]	
21553	Site Two	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	474655mE 7720267mN Zone 50 [Reliable]	
21555	Site Four	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	474498mE 7720138mN Zone 50 [Reliable]	
21556	Site Five	No	No	No Gender Restrictions	Registered Site	Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	474465mE 7720125mN Zone 50 [Reliable]	
21557	Site Six	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	474622mE 7720174mN Zone 50 [Reliable]	
21558	Site Seven	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474560mE 7720241mN Zone 50 [Reliable]	
21559	Site Eight	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474550mE 7720096mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
21562	DPA New Port Entrance 01	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	474531mE 7720105mN Zone 50 [Reliable]	
21563	DPA New Port Entrance 02	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	474556mE 7719983mN Zone 50 [Reliable]	
21564	DPA New Port Entrance 03	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474531mE 7720017mN Zone 50 [Reliable]	
21565	DPA New Port Entrance 04	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	474588mE 7720017mN Zone 50 [Reliable]	
21588	Kinsale	No	No	No Gender Restrictions	Registered Site	Mythological, Plant Resource	*Registered Knowledge Holder names available from DAA	376880mE 6494205mN Zone 50 [Reliable]	
21589	Rosslare Soak	No	No	No Gender Restrictions	Registered Site	Ceremonial, Mythological, Camp, Water Source	*Registered Knowledge Holder names available from DAA	376768mE 6493683mN Zone 50 [Reliable]	
21606	Roller/Skate Site 5	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	281238mE 7595354mN Zone 50 [Reliable]	
21607	Roller/Skate Site 2	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	281838mE 7597255mN Zone 50 [Reliable]	
21608	Roller/Skate Site 3	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	281338mE 7595655mN Zone 50 [Reliable]	
21609	Roller/Skate Site 4	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	281301mE 7595354mN Zone 50 [Unreliable]	
21620	Chandala Brook	No	No	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	389626mE 6549540mN Zone 50 [Reliable]	
21621	Kilang Minangaldjkba	No	No	No Gender Restrictions	Registered Site	Water Source	*Registered Knowledge Holder names available from DAA	394127mE 6463219mN Zone 50 [Reliable]	

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21643	Kangaroo Flats AC #1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	377218mE 6396083mN Zone 50 [Reliable]	
21809	Thomsons Reservoir 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	388206mE 6442929mN Zone 50 [Reliable]	
21810	Thomsons Reservoir 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	388001mE 6443151mN Zone 50 [Reliable]	
22014	Stingray Point Osprey Camp	No	No	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	379492mE 6400156mN Zone 50 [Reliable]	
22081	Denmark River	No	No	No Gender Restrictions	Registered Site	Mythological, Water Source	*Registered Knowledge Holder names available from DAA	525893mE 6145210mN Zone 50 [Reliable]	
22111	WCL05-4	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	516850mE 7721170mN Zone 50 [Reliable]	
22112	WCL05-5	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	514570mE 7717735mN Zone 50 [Reliable]	
22507	Somerly Pinnacles	No	No	No Gender Restrictions	Registered Site	Mythological, Natural Feature	*Registered Knowledge Holder names available from DAA	379825mE 6493278mN Zone 50 [Reliable]	
22707	PHPF1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	663514mE 7746787mN Zone 50 [Reliable]	
22722	PHPF48 (FMGP04-075 FMGP04-078 FMGP04-106)	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	664081mE 7748589mN Zone 50 [Reliable]	
22723	PHPF46	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	664179mE 7748879mN Zone 50 [Reliable]	
22726	PHPF60 (FMGP04-097 FMGP04-098)	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662360mE 7748287mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
22729	PHPF68d	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662832mE 7749623mN Zone 50 [Reliable]	
22733	PHPF78	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	663201mE 7749386mN Zone 50 [Reliable]	
22734	PHPF77	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	663109mE 7749084mN Zone 50 [Reliable]	
22735	PHPF76	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	663091mE 7749168mN Zone 50 [Reliable]	
22738	PHPF73	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	662971mE 7749694mN Zone 50 [Reliable]	
22741	PHPF71	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	662901mE 7749680mN Zone 50 [Reliable]	
22742	PHPF70 (FMGP04-011)	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	662974mE 7749513mN Zone 50 [Reliable]	
22746	PHPF68a	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	662895mE 7749540mN Zone 50 [Reliable]	
22748	PHPF66 (FMGP04-014)	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	662810mE 7749287mN Zone 50 [Reliable]	
22752	PHPF7 (FMGP04-110 FMGP04-040 FMGP04-042)	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	663429mE 7747846mN Zone 50 [Reliable]	
22763	PHPF14	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	662557mE 7748327mN Zone 50 [Reliable]	
22766	PHPF17	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	662609mE 7748590mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
22769	PHPF20	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662617mE 7748734mN Zone 50 [Reliable]	
22771	PHPF29	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	663113mE 7748113mN Zone 50 [Reliable]	
22772	PHPF30	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662997mE 7748215mN Zone 50 [Reliable]	
22779	PHPF36	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	663049mE 7748836mN Zone 50 [Reliable]	
22780	PHPF37 (FMGP04-56 FMGP04-061)	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662895mE 7748644mN Zone 50 [Reliable]	
22782	PHPF40	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662739mE 7749007mN Zone 50 [Reliable]	
22783	PHPF39	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662597mE 7748801mN Zone 50 [Reliable]	
22785	PHPF43 (PHPF65 FMGP04-019 FMGP04-087)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	662701mE 7749127mN Zone 50 [Reliable]	
22786	PHPF44 (FMGP04-086)	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662753mE 7749132mN Zone 50 [Reliable]	
22787	PHPF45	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	662681mE 7748998mN Zone 50 [Reliable]	
22788	PHPF49 (FMGP04-041)	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	663560mE 7748014mN Zone 50 [Reliable]	
22791	PHPF52	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	663616mE 7748419mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
22792	PHPF53 (FMGP04-074)	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	663826mE 7748135mN Zone 50 [Reliable]	
22793	PHPF54 (FMGP04-076)	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	663866mE 7748278mN Zone 50 [Reliable]	
22794	PHPF55 (FMGP04-079 FMGP04-080 FMGP04-081 FMGP04-082)	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	664175mE 7747735mN Zone 50 [Reliable]	
22796	PHPF57 (FMGP04-002)	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	663920mE 7751015mN Zone 50 [Reliable]	
22797	PHPF63 (FMGP04-015)	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662670mE 7749250mN Zone 50 [Reliable]	
22798	PHPF64 (FMGP04-016)	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662674mE 7749367mN Zone 50 [Reliable]	
22800	PHPF41 (FMGP04-071 FMGP04-083)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	662841mE 7749008mN Zone 50 [Reliable]	
22801	PHPF13	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662685mE 7747958mN Zone 50 [Reliable]	
22802	PHPF28	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	663093mE 7748206mN Zone 50 [Reliable]	
22804	PHPF81	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	663559mE 7749377mN Zone 50 [Reliable]	
22805	PHPF82	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	663507mE 7749349mN Zone 50 [Reliable]	
22806	PHPF83 (FMGP04-007)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	663306mE 7749246mN Zone 50 [Reliable]	



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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
22835	FMGP04-004	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	663003mE 7749596mN Zone 50 [Reliable]	
22837	FMGP04-018	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662665mE 7749440mN Zone 50 [Reliable]	
22841	FMGP04-029	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662618mE 7748165mN Zone 50 [Reliable]	
22844	FMGP04-032	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662682mE 7748259mN Zone 50 [Reliable]	
22847	FMGP04-035	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662895mE 7748377mN Zone 50 [Reliable]	
22849	FMGP04-037	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662791mE 7748459mN Zone 50 [Reliable]	
22850	FMGP04-043	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	663161mE 7747968mN Zone 50 [Reliable]	
22856	FMGP04-049	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	663024mE 7748208mN Zone 50 [Reliable]	
22863	FMGP04-077	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	664022mE 7748302mN Zone 50 [Reliable]	
22865	FMGP04-94	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	663795mE 7749133mN Zone 50 [Reliable]	
22868	FMGP04-108	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662566mE 7748166mN Zone 50 [Reliable]	
22871	FMGPETH 04-003	No	No	No Gender Restrictions	Registered Site	Camp, Hunting Place	*Registered Knowledge Holder names available from DAA	664501mE 7748316mN Zone 50 [Unreliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
22874	Marapikurrinya Yintha Site	No	No	No Gender Restrictions	Registered Site	Mythological, Named Place	*Registered Knowledge Holder names available from DAA	664961mE 7751743mN Zone 50 [Reliable]	
22878	FMGP04-104	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	664061mE 7748310mN Zone 50 [Reliable]	
22879	FMGP04-105	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	664134mE 7748390mN Zone 50 [Reliable]	
22888	Mooribirdup Ceremonial Grounds	No	No	No Gender Restrictions	Registered Site	Ceremonial, Camp, Named Place, Plant Resource	*Registered Knowledge Holder names available from DAA	378019mE 6427997mN Zone 50 [Reliable]	
23108	Carr Street Burial	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	391646mE 6465495mN Zone 50 [Reliable]	
23263	WGD 01 (Woodside Pluto Survey Area D)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Other: Knapping floor	*Registered Knowledge Holder names available from DAA	478103mE 7719245mN Zone 50 [Reliable]	
23284	DS05-01	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	679642mE 7751335mN Zone 50 [Reliable]	
23286	DS05-03	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	677552mE 7748352mN Zone 50 [Reliable]	
23295	CB 08-36	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	676335mE 7749370mN Zone 50 [Reliable]	
23296	DS05-06	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	676487mE 7749977mN Zone 50 [Reliable]	
23297	DS05-07	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	674535mE 7749718mN Zone 50 [Reliable]	
23298	DS05-08	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	673830mE 7750197mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
23329	Woodside Pluto Area B 49	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476232mE 7720604mN Zone 50 [Reliable]	
23330	Woodside Pluto Area B 48	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476006mE 7720388mN Zone 50 [Reliable]	
23331	Woodside Pluto Area B 47	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	476091mE 7720118mN Zone 50 [Reliable]	
23332	Woodside Pluto Area B 51	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475943mE 7720571mN Zone 50 [Reliable]	
23333	Woodside Pluto Area B 46	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476130mE 7720101mN Zone 50 [Reliable]	
23334	Woodside Pluto Area B 61	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475879mE 7720552mN Zone 50 [Reliable]	
23335	Woodside Pluto Area B 63	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475876mE 7720452mN Zone 50 [Reliable]	
23336	Woodside Pluto Area B 64	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475908mE 7720390mN Zone 50 [Reliable]	
23337	Woodside Pluto Area B 65	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475962mE 7720326mN Zone 50 [Reliable]	
23338	Woodside Pluto Area B 66	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	475782mE 7720416mN Zone 50 [Reliable]	
23339	Woodside Pluto Area B 67	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	475620mE 7719924mN Zone 50 [Reliable]	
23340	Woodside Pluto Area B 68	Yes	Yes	Male Access Only	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	

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23341	Woodside Pluto Area B 69	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475871mE 7720065mN Zone 50 [Reliable]	
23342	Woodside Pluto Area B 70	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475616mE 7719955mN Zone 50 [Reliable]	
23343	Woodside Pluto Area B 71	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475786mE 7720034mN Zone 50 [Reliable]	
23344	Woodside Pluto Area B 72	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	475963mE 7720145mN Zone 50 [Reliable]	
23345	Woodside Pluto Area B 73	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475963mE 7720152mN Zone 50 [Reliable]	
23346	Woodside Pluto Area B 74	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475836mE 7720133mN Zone 50 [Reliable]	
23347	Woodside Pluto Area B 75	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	475822mE 7720273mN Zone 50 [Reliable]	
23348	Woodside Pluto Area B 76	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	475945mE 7720181mN Zone 50 [Reliable]	
23349	Woodside Pluto Area B 77	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475860mE 7720296mN Zone 50 [Reliable]	
23350	Woodside Pluto Area B 78	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475923mE 7720292mN Zone 50 [Reliable]	
23351	Woodside Pluto Area B 79	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476036mE 7720163mN Zone 50 [Reliable]	
23352	Woodside Pluto Area B 80	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475980mE 7720235mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
23353	Woodside Pluto Area B 81	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475263mE 7720053mN Zone 50 [Reliable]	
23354	Woodside Pluto Area B 82	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	475667mE 7720563mN Zone 50 [Reliable]	
23355	Woodside Pluto Area B 83	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475665mE 7720693mN Zone 50 [Reliable]	
23356	Woodside Pluto Area B 84	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	475618mE 7720739mN Zone 50 [Reliable]	
23357	Woodside Pluto Area B 85	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475469mE 7720926mN Zone 50 [Reliable]	
23358	Woodside Pluto Area B 86	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475451mE 7720874mN Zone 50 [Reliable]	
23359	Woodside Pluto Area B 87	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475422mE 7720703mN Zone 50 [Reliable]	
23360	Woodside Pluto Area B 88	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475445mE 7720454mN Zone 50 [Reliable]	
23361	Woodside Pluto Area B 89	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475553mE 7720328mN Zone 50 [Reliable]	
23362	Woodside Pluto Area B 90	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475322mE 7720074mN Zone 50 [Reliable]	
23363	Woodside Pluto Area B 91	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	475282mE 7720186mN Zone 50 [Reliable]	
23364	Woodside Pluto Area B 92	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	475306mE 7720326mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
23365	Woodside Pluto Area B 93	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475291mE 7720350mN Zone 50 [Reliable]	
23366	Woodside Pluto Area B 94	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475157mE 7720494mN Zone 50 [Reliable]	
23367	Woodside Pluto Area B 95	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475091mE 7720466mN Zone 50 [Reliable]	
23368	Woodside Pluto Area B 96	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475046mE 7720431mN Zone 50 [Reliable]	
23369	Woodside Pluto Area B 97	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475093mE 7720319mN Zone 50 [Reliable]	
23370	Woodside Pluto Area B 98	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475098mE 7720289mN Zone 50 [Reliable]	
23371	Woodside Pluto Area B 99	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475218mE 7720143mN Zone 50 [Reliable]	
23372	Woodside Pluto Area B 100	Yes	Yes	Male Access Only	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
23373	Woodside Pluto Area B 101	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475136mE 7720398mN Zone 50 [Reliable]	
23374	Woodside Pluto Area B 102	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	475218mE 7720186mN Zone 50 [Reliable]	
23375	Woodside Pluto Area B 103	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475243mE 7720212mN Zone 50 [Reliable]	
23377	Woodside Pluto Area B 104	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475245mE 7720157mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
23378	Woodside Pluto Area B 105	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476129mE 7720501mN Zone 50 [Reliable]	
23379	Woodside Pluto Area B 106	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476460mE 7720788mN Zone 50 [Reliable]	
23380	Woodside Pluto Area B 107	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476159mE 7720530mN Zone 50 [Reliable]	
23381	Woodside Pluto Area B 1	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476610mE 7720911mN Zone 50 [Reliable]	
23382	Woodside Pluto Area B 2	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476300mE 7720990mN Zone 50 [Reliable]	
23383	Woodside Pluto Area B 3	Yes	Yes	Male Access Only	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
23384	Woodside Pluto Area B 4	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476168mE 7721004mN Zone 50 [Reliable]	
23385	Woodside Pluto Area B 5	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476511mE 7721018mN Zone 50 [Reliable]	
23386	Woodside Pluto Area B 6	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475720mE 7721048mN Zone 50 [Reliable]	
23387	Woodside Pluto Area B 7	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476533mE 7720878mN Zone 50 [Reliable]	
23388	Woodside Pluto Area B 8	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476512mE 7720950mN Zone 50 [Reliable]	
23389	Woodside Pluto Area B 9	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476375mE 7720831mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
23390	Woodside Pluto Area B 10	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476372mE 7720898mN Zone 50 [Reliable]	
23391	Woodside Pluto Area B 11	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	476445mE 7720961mN Zone 50 [Reliable]	
23392	Woodside Pluto Area B 12	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476349mE 7720881mN Zone 50 [Reliable]	
23393	Woodside Pluto Area B 13	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476391mE 7720730mN Zone 50 [Reliable]	
23394	Woodside Pluto Area B 14	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476417mE 7720684mN Zone 50 [Reliable]	
23395	Woodside Pluto Area B 15	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476367mE 7720610mN Zone 50 [Reliable]	
23396	Woodside Pluto Area B 16	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476343mE 7720560mN Zone 50 [Reliable]	
23397	Woodside Pluto Area B 17	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476317mE 7720519mN Zone 50 [Reliable]	
23398	Woodside Pluto Area B 18	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476237mE 7720553mN Zone 50 [Reliable]	
23399	Woodside Pluto Area B 19	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476227mE 7720586mN Zone 50 [Reliable]	
23400	Woodside Pluto Area B 20	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476251mE 7720506mN Zone 50 [Reliable]	
23401	Woodside Pluto Area B 21	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Quarry	*Registered Knowledge Holder names available from DAA	476220mE 7720461mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
23402	Woodside Pluto Area B 22	Yes	Yes	Male Access Only	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
23403	Woodside Pluto Area B 23	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476228mE 7720431mN Zone 50 [Reliable]	
23404	Woodside Pluto Area B 24	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476173mE 7720442mN Zone 50 [Reliable]	
23405	Woodside Pluto Area B 25	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	476168mE 7720357mN Zone 50 [Reliable]	
23406	Woodside Pluto Area B 26	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476178mE 7720377mN Zone 50 [Reliable]	
23407	Woodside Pluto Area B 27	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476145mE 7720370mN Zone 50 [Reliable]	
23408	Woodside Pluto Area B 28	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	476107mE 7720371mN Zone 50 [Reliable]	
23409	Woodside Pluto Area B 29	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476076mE 7720407mN Zone 50 [Reliable]	
23410	Woodside Pluto Area B 30	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	476078mE 7720436mN Zone 50 [Reliable]	
23411	Woodside Pluto Area B 31	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476060mE 7720344mN Zone 50 [Reliable]	
23412	Woodside Pluto Area B 32	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475955mE 7720733mN Zone 50 [Reliable]	
23413	Woodside Pluto Area B 33	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	475983mE 7720691mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
23414	Woodside Pluto Area B 34	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	475987mE 7720667mN Zone 50 [Reliable]	
23415	Woodside Pluto Area B 35	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475952mE 7720643mN Zone 50 [Reliable]	
23416	Woodside Pluto Area B 36	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	476018mE 7720678mN Zone 50 [Reliable]	
23417	Woodside Pluto Area B 37	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	476027mE 7720877mN Zone 50 [Reliable]	
23418	Woodside Pluto Area B 38	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475879mE 7720812mN Zone 50 [Reliable]	
23419	Woodside Pluto Area B 39	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	476046mE 7720750mN Zone 50 [Reliable]	
23420	Woodside Pluto Area B 40	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476091mE 7720831mN Zone 50 [Reliable]	
23421	Woodside Pluto Area B 41	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476128mE 7720610mN Zone 50 [Reliable]	
23422	Woodside Pluto Area B 42	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476208mE 7720899mN Zone 50 [Reliable]	
23423	Woodside Pluto Area B 43	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476214mE 7720689mN Zone 50 [Reliable]	
23424	Woodside Pluto Area B 44	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	476254mE 7720706mN Zone 50 [Reliable]	
23425	Woodside Pluto Area B 45	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476247mE 7720859mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
23426	Woodside Pluto Area B 50	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475919mE 7720508mN Zone 50 [Reliable]	
23427	Woodside Pluto Area B 52	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	475919mE 7720561mN Zone 50 [Reliable]	
23430	Woodside Pluto Area B 53	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	475813mE 7720801mN Zone 50 [Reliable]	
23431	Woodside Pluto Area B 54	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Rockshelter, Arch Deposit	*Registered Knowledge Holder names available from DAA	475874mE 7720808mN Zone 50 [Reliable]	
23433	Woodside Pluto Area B 55	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	475811mE 7720879mN Zone 50 [Reliable]	
23434	Woodside Pluto Area B 56	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	475779mE 7720891mN Zone 50 [Reliable]	
23435	Woodside Pluto Area B 57	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	475775mE 7720921mN Zone 50 [Reliable]	
23436	Woodside Pluto Area B 58	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	475766mE 7720960mN Zone 50 [Reliable]	
23437	Woodside Pluto Area B 59	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	475753mE 7720999mN Zone 50 [Reliable]	
23438	Woodside Pluto Area B 60	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	475756mE 7720727mN Zone 50 [Reliable]	
23439	Woodside Pluto Area B 62	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475839mE 7720500mN Zone 50 [Reliable]	
23440	Woodside Pluto Area B-AG-33	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475249mE 7720339mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
23441	PB011	No	No	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	476177mE 7720349mN Zone 50 [Reliable]	
23443	PB002	No	No	No Gender Restrictions	Registered Site	Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	475458mE 7719954mN Zone 50 [Reliable]	
23444	PE9	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Camp, Hunting Place, Meeting Place, Natural Feature, Plant Resource, Water Source	*Registered Knowledge Holder names available from DAA	475188mE 7720318mN Zone 50 [Reliable]	
23453	PB027	No	No	No Gender Restrictions	Registered Site	Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	476194mE 7720635mN Zone 50 [Reliable]	
23454	PB028	No	No	No Gender Restrictions	Registered Site	Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	476366mE 7720621mN Zone 50 [Reliable]	
23481	PB073	No	No	No Gender Restrictions	Registered Site	Ceremonial, Meeting Place	*Registered Knowledge Holder names available from DAA	475394mE 7720901mN Zone 50 [Unreliable]	
23526	Woodside Pluto Area B-AG-30	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	474985mE 7720344mN Zone 50 [Reliable]	
23527	Woodside Pluto Area B-AG-36	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	475674mE 7720630mN Zone 50 [Reliable]	
23528	Woodside Pluto Area B-AG-37	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Quarry	*Registered Knowledge Holder names available from DAA	475487mE 7720364mN Zone 50 [Reliable]	
23529	Woodside Pluto Area B-AG-38	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	475619mE 7720273mN Zone 50 [Reliable]	
23530	Woodside Pluto Area B-AG-39	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476021mE 7720040mN Zone 50 [Reliable]	
23531	Woodside Pluto Area B-AG-40	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475807mE 7720382mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
23532	Woodside Pluto Area B-AG-41	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475829mE 7720333mN Zone 50 [Reliable]	
23533	Woodside Pluto Area B-AG-42	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	475892mE 7720039mN Zone 50 [Reliable]	
23534	Woodside Pluto Area B-AG-43	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475679mE 7719956mN Zone 50 [Reliable]	
23535	Woodside Pluto Area B-AG-44	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475694mE 7719923mN Zone 50 [Reliable]	
23536	Woodside Pluto Area B-AG-45	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475774mE 7719897mN Zone 50 [Reliable]	
23537	Woodside Pluto Area B-AG-46	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	475987mE 7720310mN Zone 50 [Reliable]	
23541	AG35	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Man-Made Structure	*Registered Knowledge Holder names available from DAA	475305mE 7720208mN Zone 50 [Reliable]	
23542	AG34	No	No	No Gender Restrictions	Registered Site	Ceremonial	*Registered Knowledge Holder names available from DAA	475295mE 7720230mN Zone 50 [Reliable]	
23543	Woodside Pluto Area B-AG-32	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475260mE 7720204mN Zone 50 [Reliable]	
23544	PE10	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Ceremonial, Engraving, Camp, Hunting Place, Meeting Place, Natural Feature, Plant Resource, Water Source	*Registered Knowledge Holder names available from DAA	475856mE 7720626mN Zone 50 [Reliable]	
23548	FMG PAR 06-01 (Shell midden scatter)	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	665348mE 7745614mN Zone 50 [Reliable]	
23597	FMG KAR RL 06-01	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662411mE 7746374mN Zone 50 [Reliable]	



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23598	FMG KAR RL 06-02	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662346mE 7746341mN Zone 50 [Reliable]	
23599	FMG KAR RL 06-03	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	662306mE 7746259mN Zone 50 [Reliable]	
23604	FMG KAR I 06-01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	664305mE 7739594mN Zone 50 [Reliable]	
23605	FMG PAR 06-02	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	665115mE 7745841mN Zone 50 [Reliable]	
23606	FMG PAR 06-03	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	665111mE 7745796mN Zone 50 [Reliable]	
23607	FMG PAR 06-04	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	664936mE 7745837mN Zone 50 [Reliable]	
23643	FMG KAR IX 06-01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	664583mE 7738709mN Zone 50 [Reliable]	
23676	WGTO PB 11	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	476500mE 7720986mN Zone 50 [Reliable]	
23679	WGTO PB 21	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476411mE 7720670mN Zone 50 [Reliable]	
23681	WGTO PB 28	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476293mE 7720476mN Zone 50 [Reliable]	
23682	WGTO PB 31	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476238mE 7720469mN Zone 50 [Reliable]	
23683	WGTO PB 37	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476160mE 7720340mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
23684	WGTO PB 38	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476145mE 7720321mN Zone 50 [Reliable]	
23687	WGTO PB 42	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476176mE 7720270mN Zone 50 [Reliable]	
23690	WGTO PB 47	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476188mE 7720409mN Zone 50 [Reliable]	
23691	WGTO PB 48	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476190mE 7720425mN Zone 50 [Reliable]	
23692	WGTO PB 53	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476215mE 7720515mN Zone 50 [Reliable]	
23698	WGTO PB 73	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476243mE 7720828mN Zone 50 [Reliable]	
23699	WGTO PB 74	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476196mE 7720765mN Zone 50 [Reliable]	
23703	WGTO PB 90	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476227mE 7720999mN Zone 50 [Reliable]	
23704	WGTO PB 92	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476164mE 7720933mN Zone 50 [Reliable]	
23706	WGTO PB 96	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476119mE 7720230mN Zone 50 [Reliable]	
23708	WGTO PB 98	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476085mE 7720287mN Zone 50 [Reliable]	
23710	WGTO PB 100	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476068mE 7720313mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
23711	WGTO PB 101	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476063mE 7720316mN Zone 50 [Reliable]	
23712	WGTO PB 102	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476067mE 7720331mN Zone 50 [Reliable]	
23713	WGTO PB 103	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476055mE 7720331mN Zone 50 [Reliable]	
23718	WGTO PB 109	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475960mE 7720622mN Zone 50 [Reliable]	
23719	WGTO PB 110	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475912mE 7720694mN Zone 50 [Reliable]	
23720	WGTO PB 111	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476134mE 7720247mN Zone 50 [Reliable]	
23721	WGTO PB 112	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476112mE 7720282mN Zone 50 [Reliable]	
23723	WGTO PB 115	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476042mE 7720469mN Zone 50 [Reliable]	
23724	WGTO PB 119	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475879mE 7720861mN Zone 50 [Reliable]	
23725	WGTO PB 124	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475972mE 7720969mN Zone 50 [Reliable]	
23726	WGTO PB 125	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476035mE 7720335mN Zone 50 [Reliable]	
23727	WGTO PB 126	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476028mE 7720340mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
23728	WGTO PB 128	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476014mE 7720399mN Zone 50 [Reliable]	
23729	WGTO PB 131	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475926mE 7720593mN Zone 50 [Reliable]	
23731	WGTO PB 140	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475969mE 7720491mN Zone 50 [Reliable]	
23732	WGTO PB 142	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475306mE 7720093mN Zone 50 [Reliable]	
23733	WGTO PB 143	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475305mE 7720113mN Zone 50 [Reliable]	
23735	WGTO PB 150	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475137mE 7720418mN Zone 50 [Reliable]	
23736	WGTO PB 152	Yes	Yes	Male Access Only	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
23737	WGTO PB 153	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475913mE 7719894mN Zone 50 [Reliable]	
23738	WGTO PB 154	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475854mE 7719916mN Zone 50 [Reliable]	
23742	WGTO PB 180	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475441mE 7720234mN Zone 50 [Reliable]	
23744	WGTO PB 187	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	475416mE 7720787mN Zone 50 [Reliable]	
23746	WGTO PB 191	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475520mE 7720249mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
23747	WGTO PB 195	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475504mE 7720514mN Zone 50 [Reliable]	
23748	WGTO PB 196	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475552mE 7720449mN Zone 50 [Reliable]	
23755	WGTO PB 18	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476431mE 7720730mN Zone 50 [Reliable]	
23756	WGTO PB 23	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476365mE 7720595mN Zone 50 [Reliable]	
23757	WGTO PB 25	No	No	No Gender Restrictions	Registered Site	Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	476326mE 7720534mN Zone 50 [Reliable]	
23759	WGTO PB 32	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476222mE 7720443mN Zone 50 [Reliable]	
23762	WGTO PB 84	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476184mE 7720918mN Zone 50 [Reliable]	
23763	WGTO PB 138	Yes	Yes	Male Access Only	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
23764	WGTO PB 149	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475128mE 7720437mN Zone 50 [Reliable]	
23765	WGTO PB 159	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475886mE 7720060mN Zone 50 [Reliable]	
23767	WGTO PB 190	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475617mE 7720984mN Zone 50 [Reliable]	
23768	WGTO PB 19	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476425mE 7720678mN Zone 50 [Reliable]	

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23769	WGTO PB 83	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476188mE 7720883mN Zone 50 [Reliable]	
23770	WGTO PB 139	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	475998mE 7720369mN Zone 50 [Reliable]	
24311	Walkaway Burial	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Skeletal Material / Burial, Arch Deposit	*Registered Knowledge Holder names available from DAA	280553mE 6800704mN Zone 50 [Reliable]	
24396	Nelson Point Fuel Facility 07-01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter	*Registered Knowledge Holder names available from DAA	665718mE 7752984mN Zone 50 [Reliable]	
24414	Oakajee River	No	No	No Gender Restrictions	Registered Site	Mythological, Natural Feature	*Registered Knowledge Holder names available from DAA	266935mE 6838314mN Zone 50 [Reliable]	
24415	Buller River	No	No	No Gender Restrictions	Registered Site	Mythological, Natural Feature	*Registered Knowledge Holder names available from DAA	269522mE 6831723mN Zone 50 [Reliable]	
24416	Bowes River	No	No	No Gender Restrictions	Registered Site	Mythological, Natural Feature	*Registered Knowledge Holder names available from DAA	266821mE 6860041mN Zone 50 [Reliable]	
24592	Apache Infrastructure Grinding Patch 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	439455mE 7687056mN Zone 50 [Reliable]	
24594	Apache Infrastructure Grinding Patch 4	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Arch Deposit	*Registered Knowledge Holder names available from DAA	439214mE 7686795mN Zone 50 [Reliable]	
24632	WG-33	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	439363mE 7686797mN Zone 50 [Reliable]	
24695	AS086	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	413177mE 7670052mN Zone 50 [Reliable]	
24696	AS003	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	412071mE 7668539mN Zone 50 [Reliable]	

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24698	AS087	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	412103mE 7669024mN Zone 50 [Reliable]	
24699	AS088	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	412109mE 7669283mN Zone 50 [Reliable]	
24701	AS090	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	412110mE 7669375mN Zone 50 [Reliable]	
24705	AS120	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	412303mE 7668066mN Zone 50 [Unreliable]	
24706	AS121	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	413015mE 7669378mN Zone 50 [Reliable]	
24709	AS124	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	412760mE 7669648mN Zone 50 [Reliable]	
24715	AS130	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	412256mE 7669283mN Zone 50 [Reliable]	
24721	Readymix ECAS001	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	472574mE 7713723mN Zone 50 [Reliable]	
24723	Readymix ECE002	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472501mE 7713976mN Zone 50 [Reliable]	
24725	Readymix ECE003	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472489mE 7713993mN Zone 50 [Reliable]	
24726	Readymix ECE004	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472488mE 7713997mN Zone 50 [Reliable]	
24728	Readymix ECE006	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472459mE 7714040mN Zone 50 [Reliable]	

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24761	Greenough River	No	No	No Gender Restrictions	Registered Site	Mythological, Natural Feature	*Registered Knowledge Holder names available from DAA	389523mE 6893919mN Zone 50 [Reliable]	
24762	Wondalo Springs	No	No	No Gender Restrictions	Registered Site	Mythological, Natural Feature	*Registered Knowledge Holder names available from DAA	296552mE 6789342mN Zone 50 [Unreliable]	
24763	Waguwah 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	285552mE 6799088mN Zone 50 [Unreliable]	
24986	AS116	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Rockshelter, Arch Deposit	*Registered Knowledge Holder names available from DAA	412277mE 7668560mN Zone 50 [Reliable]	
25005	WN 07 - 13	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	666726mE 7747489mN Zone 50 [Reliable]	
25008	WN 07 - 16	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	665139mE 7749224mN Zone 50 [Reliable]	
25010	WN 07 - 18	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	666045mE 7749067mN Zone 50 [Reliable]	
25012	WN 07 - 20	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	666220mE 7749123mN Zone 50 [Reliable]	
25013	WN 07 - 21	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	666286mE 7749177mN Zone 50 [Reliable]	
25014	WN 07 - 22	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	666085mE 7749202mN Zone 50 [Reliable]	
25015	WN 07 - 23	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	666102mE 7749474mN Zone 50 [Reliable]	
25016	WN 07 - 24	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	664990mE 7750145mN Zone 50 [Reliable]	

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25022	Beeliar Regional Park 4	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	388988mE 6443673mN Zone 50 [Reliable]	
25621	BD 08-02	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	661001mE 7749997mN Zone 50 [Reliable]	
25632	BD 08-13	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	660657mE 7748473mN Zone 50 [Reliable]	
25633	BD 08-14	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	660292mE 7748891mN Zone 50 [Reliable]	
25634	BD 08-15	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	661025mE 7749665mN Zone 50 [Reliable]	
25636	BD 08-17	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	661133mE 7748676mN Zone 50 [Reliable]	
25646	BD 08-28	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	660906mE 7752027mN Zone 50 [Reliable]	
25647	BD 08-29	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	661562mE 7746409mN Zone 50 [Reliable]	
25648	BD 08-30	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	661671mE 7746348mN Zone 50 [Reliable]	
25649	BD 08-31	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	662261mE 7747142mN Zone 50 [Reliable]	
25650	BD 08-32	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	662199mE 7747020mN Zone 50 [Reliable]	
25651	BD 08-33	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	661770mE 7746609mN Zone 50 [Reliable]	

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25652	BD 08-34	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	661871mE 7746741mN Zone 50 [Reliable]	
25653	BD 08-35	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	661932mE 7746910mN Zone 50 [Reliable]	
25658	BD 08-44	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	661509mE 7745969mN Zone 50 [Reliable]	
25663	HDMSP 04-08	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	662063mE 7749247mN Zone 50 [Reliable]	
25665	FI 08-01	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	662501mE 7754667mN Zone 50 [Reliable]	
25666	FI 08-02	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	662312mE 7754039mN Zone 50 [Reliable]	
25667	FI 08-03	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	662410mE 7754195mN Zone 50 [Reliable]	
25669	Insert B/EA01	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	665816mE 7753006mN Zone 50 [Reliable]	
25714	SP08 - 08/1869	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Historical, Other: 26970 & 26984 are duplicates.	*Registered Knowledge Holder names available from DAA	413371mE 7671161mN Zone 50 [Reliable]	
25716	SP08 - 12/1849	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	413277mE 7669856mN Zone 50 [Reliable]	
25721	SP08 - 27/1863	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	412154mE 7668452mN Zone 50 [Reliable]	
25722	IC 08-01/2305	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	413768mE 7672077mN Zone 50 [Reliable]	

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25723	SP08 - 29/1865	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	412382mE 7668549mN Zone 50 [Reliable]	
25726	IC 08-03/2321	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	414488mE 7672718mN Zone 50 [Reliable]	
25734	SP08 - 14/1850	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	412743mE 7669893mN Zone 50 [Reliable]	
25754	WS 1207 - A	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	412510mE 7669547mN Zone 50 [Reliable]	
25763	GP 08-08 / 1998	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	416774mE 7669883mN Zone 50 [Reliable]	
25769	GP 08-15 / 2005	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Quarry	*Registered Knowledge Holder names available from DAA	419003mE 7669909mN Zone 50 [Reliable]	
25770	GP 08-16 / 2006	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	418743mE 7669884mN Zone 50 [Reliable]	
25771	GP 08-17 / 2113	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Quarry	*Registered Knowledge Holder names available from DAA	418422mE 7669782mN Zone 50 [Reliable]	
25772	GP 08-18 / 2114	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	418202mE 7669807mN Zone 50 [Reliable]	
25773	GP 08-19 / 2115	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	417831mE 7669849mN Zone 50 [Reliable]	
25774	GP 08-20 / 2116	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	416153mE 7669798mN Zone 50 [Reliable]	
25775	GP 08-21 / 2117	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	415320mE 7669914mN Zone 50 [Reliable]	

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25776	GP 08-22 / 2118	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	413938mE 7669919mN Zone 50 [Reliable]	
25777	GP 08-23 / 2231	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure	*Registered Knowledge Holder names available from DAA	416989mE 7669796mN Zone 50 [Reliable]	
25785	WG14	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	416884mE 7669819mN Zone 50 [Reliable]	
25786	WG15	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	416985mE 7669770mN Zone 50 [Reliable]	
25789	WG19	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	417245mE 7669809mN Zone 50 [Reliable]	
25792	WG26	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	418526mE 7669797mN Zone 50 [Reliable]	
25799	WG36	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	415077mE 7669892mN Zone 50 [Reliable]	
25815	Scatter A Cape Preston	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	412743mE 7669032mN Zone 50 [Reliable]	
25816	SP08 - 13/1989	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	412540mE 7670181mN Zone 50 [Reliable]	
25853	P08 - 01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	417725mE 7695500mN Zone 50 [Reliable]	
25854	P08 - 04	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	418204mE 7694572mN Zone 50 [Reliable]	
25855	P08 - 05	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	417647mE 7695238mN Zone 50 [Reliable]	

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25856	P08 - 06	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	417697mE 7695059mN Zone 50 [Reliable]	
25859	ICC 08-02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	419197mE 7692323mN Zone 50 [Reliable]	
25860	ICC 08-03	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	419541mE 7689814mN Zone 50 [Reliable]	
25861	ICC 08-04	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	418731mE 7694028mN Zone 50 [Reliable]	
25862	ICC 08-05	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Man-Made Structure, Quarry	*Registered Knowledge Holder names available from DAA	418602mE 7694739mN Zone 50 [Reliable]	
25863	ICC 08-06	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Quarry, Other: Duplicate of 25596, 25997, 25998, 25999	*Registered Knowledge Holder names available from DAA	419369mE 7692522mN Zone 50 [Reliable]	
25864	ICC 08-07	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	418694mE 7694362mN Zone 50 [Reliable]	
25866	ICC 08-09	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	419374mE 7691440mN Zone 50 [Reliable]	
25867	ICC 08-10	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	419425mE 7690766mN Zone 50 [Reliable]	
25868	ICC 08-14	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Quarry, Shell	*Registered Knowledge Holder names available from DAA	419600mE 7691227mN Zone 50 [Reliable]	
25869	ICC 08-17	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	418590mE 7694315mN Zone 50 [Reliable]	
25870	AA08 - 01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	417766mE 7684364mN Zone 50 [Reliable]	

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25910	AA08 - 02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	417891mE 7684635mN Zone 50 [Reliable]	
25911	AA08 - 03	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	418018mE 7684787mN Zone 50 [Reliable]	
25913	AA08 - 05	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	418094mE 7685043mN Zone 50 [Reliable]	
25914	AA08 - 06	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	417917mE 7684993mN Zone 50 [Reliable]	
25915	AA08 - 07	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	418032mE 7685163mN Zone 50 [Reliable]	
25917	AA08 - 09	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	418332mE 7685602mN Zone 50 [Reliable]	
25918	AA08 - 10	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	418137mE 7685313mN Zone 50 [Reliable]	
25919	AA08 - 11	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	418232mE 7685417mN Zone 50 [Reliable]	
25920	AA08 - 12	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	418573mE 7685742mN Zone 50 [Reliable]	
25923	AA08 - 15	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	418702mE 7685879mN Zone 50 [Reliable]	
25924	AA08 - 16	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	418650mE 7685794mN Zone 50 [Reliable]	
25925	AA08 - 17	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	418739mE 7685926mN Zone 50 [Reliable]	

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25927	AA08 - 19	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	418796mE 7686005mN Zone 50 [Reliable]	
25928	AA08 - 20	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	418835mE 7686081mN Zone 50 [Reliable]	
25931	EU-IC-Q 0802	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	419532mE 7688627mN Zone 50 [Reliable]	
25932	EU-IC-Q 0803	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	419085mE 7686594mN Zone 50 [Reliable]	
25933	EU-IC-Q 0804	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	419585mE 7688402mN Zone 50 [Reliable]	
25934	EU-IC-Q 0805	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	419448mE 7687912mN Zone 50 [Reliable]	
25936	EU-IC-A 0807	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	419414mE 7687361mN Zone 50 [Reliable]	
25937	EU-IC-A 0808	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	419288mE 7686970mN Zone 50 [Reliable]	
25938	EU-IC-A 0814	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	414831mE 7675115mN Zone 50 [Reliable]	
25939	EU-IC-A 0816	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	414947mE 7675537mN Zone 50 [Reliable]	
25940	EU-IC-A 0817	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	414675mE 7674459mN Zone 50 [Reliable]	
25941	EU-IC-A 0818	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	415252mE 7676156mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
25943	EU-IC-M 0828	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	419807mE 7689709mN Zone 50 [Reliable]	
25945	EU-IC-A 0840	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	415597mE 7676883mN Zone 50 [Reliable]	
25946	EU-IC-A 0841	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	415627mE 7677234mN Zone 50 [Reliable]	
25947	EU-IC-A 0842	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	415520mE 7676672mN Zone 50 [Reliable]	
25948	EU-IC-AS 0845	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	416143mE 7678715mN Zone 50 [Reliable]	
25950	EU-IC-AS 0847	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	416294mE 7679185mN Zone 50 [Reliable]	
25951	EU-IC-AS 0850	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	416167mE 7679063mN Zone 50 [Reliable]	
25954	EU-IC-S 0855	No	No	No Gender Restrictions	Registered Site	Shell	*Registered Knowledge Holder names available from DAA	416560mE 7679945mN Zone 50 [Reliable]	
25955	EU-IC-S 0856	No	No	No Gender Restrictions	Registered Site	Shell	*Registered Knowledge Holder names available from DAA	416480mE 7680152mN Zone 50 [Reliable]	
25959	EU-IC-S 0860	No	No	No Gender Restrictions	Registered Site	Shell	*Registered Knowledge Holder names available from DAA	416593mE 7680105mN Zone 50 [Reliable]	
25961	EU-IC-ASM 0862	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	416695mE 7680709mN Zone 50 [Reliable]	
25962	EU-IC-WAM 0874	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Shell, Water Source	*Registered Knowledge Holder names available from DAA	416987mE 7681509mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
25963	EU-IC-AS 0876	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	417237mE 7681988mN Zone 50 [Reliable]	
25966	EU-IC-S 0886	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	417125mE 7681972mN Zone 50 [Reliable]	
25969	EU-IC-Q 0890	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry, Shell	*Registered Knowledge Holder names available from DAA	417284mE 7682348mN Zone 50 [Reliable]	
25972	EU-IC-AE 0893	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	417523mE 7682734mN Zone 50 [Reliable]	
25973	EU-IC-AS 0894	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Water Source	*Registered Knowledge Holder names available from DAA	417437mE 7682906mN Zone 50 [Reliable]	
25974	EU-IC-Q 0896	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	417594mE 7683180mN Zone 50 [Reliable]	
25975	EU-IC-AS 0897	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	417591mE 7683635mN Zone 50 [Reliable]	
25976	EU-IC-AS 0898	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	417686mE 7684021mN Zone 50 [Reliable]	
25977	EU-IC-A 0899	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	414346mE 7673894mN Zone 50 [Reliable]	
25978	EU-IC-A 08100	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	414349mE 7673702mN Zone 50 [Reliable]	
25986	Site No 4	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	419546mE 7689264mN Zone 50 [Reliable]	
25993	Site No 15	No	No	No Gender Restrictions	Registered Site	Quarry	*Registered Knowledge Holder names available from DAA	417941mE 7694671mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
25995	Site No 17	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	419196mE 7692401mN Zone 50 [Reliable]	
26000	Site No 23	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	419331mE 7692196mN Zone 50 [Reliable]	
26005	Site No. 18	Yes	Yes	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
26006	Site No. 25	Yes	Yes	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
26008	Hearson Engravings	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	476412mE 7717983mN Zone 50 [Reliable]	
26013	AS166	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	410205mE 7668957mN Zone 50 [Reliable]	
26014	WS1107 - 4	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	411463mE 7667830mN Zone 50 [Reliable]	
26017	P08 - 02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Midden / Scatter, Quarry, Shell	*Registered Knowledge Holder names available from DAA	417338mE 7694440mN Zone 50 [Reliable]	
26019	P08 - 08	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	417343mE 7693660mN Zone 50 [Reliable]	
26020	P08 - 09	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	417565mE 7693687mN Zone 50 [Reliable]	
26044	SP08 - 58	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	412399mE 7666960mN Zone 50 [Reliable]	
26177	Gracetown Midden 2	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	313477mE 6250583mN Zone 50 [Unreliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
26264	Young River	No	No	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	315933mE 6279194mN Zone 51 [Reliable]	
26265	Oldfield River	No	No	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	278067mE 6282070mN Zone 51 [Reliable]	
26266	Lort River	No	No	No Gender Restrictions	Registered Site	Mythological, Other: weir type fishtraps	*Registered Knowledge Holder names available from DAA	342857mE 6285855mN Zone 51 [Reliable]	
26441	P09 - 01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Shell	*Registered Knowledge Holder names available from DAA	417067mE 7693664mN Zone 50 [Reliable]	
26444	P09 - 04	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	417243mE 7695318mN Zone 50 [Reliable]	
26446	P09 - 06	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	417398mE 7695442mN Zone 50 [Reliable]	
26453	Burrup Peninsula V34	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Shell	*Registered Knowledge Holder names available from DAA	484513mE 7730093mN Zone 50 [Reliable]	
26506	SP 08 - 108	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	414125mE 7671917mN Zone 50 [Reliable]	
26608	SP 08 - 61	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	418088mE 7672316mN Zone 50 [Reliable]	
26611	SP 08 - 64	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	417660mE 7671996mN Zone 50 [Reliable]	
26628	SP 08 - 79	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	418033mE 7672494mN Zone 50 [Reliable]	
26629	SP 08 - 80	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	418099mE 7672224mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
26630	SP 08 - 81	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	417687mE 7672036mN Zone 50 [Reliable]	
26631	SP 08 - 83	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	414411mE 7671720mN Zone 50 [Reliable]	
26632	SP 08 - 84	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	414761mE 7671712mN Zone 50 [Reliable]	
26637	SP 08 - 89	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	417766mE 7673251mN Zone 50 [Reliable]	
26638	SP 08 - 90	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	417974mE 7673211mN Zone 50 [Reliable]	
26639	SP 08 - 91	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	417762mE 7673341mN Zone 50 [Reliable]	
26641	SP 08 - 93	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	417892mE 7673255mN Zone 50 [Reliable]	
26642	SP 08 - 82	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Quarry	*Registered Knowledge Holder names available from DAA	416494mE 7672984mN Zone 50 [Reliable]	
26643	SP 08 - 95	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	417880mE 7673073mN Zone 50 [Reliable]	
26644	SP 08 - 96	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	417762mE 7673269mN Zone 50 [Reliable]	
26711	Cemex Quarry Complex	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Quarry	*Registered Knowledge Holder names available from DAA	473071mE 7714306mN Zone 50 [Reliable]	
26712	Cemex Engraving (CESLE001)	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Arch Deposit	*Registered Knowledge Holder names available from DAA	473169mE 7714302mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
26725	TDA 51	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	417901mE 7672213mN Zone 50 [Reliable]	
26729	TDA 100	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	417648mE 7672929mN Zone 50 [Reliable]	
26730	TDA 101	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	417684mE 7673039mN Zone 50 [Reliable]	
26736	ACHM - 09-05	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	416163mE 7696932mN Zone 50 [Reliable]	
26853	Wilyabrup 3	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	315937mE 6256218mN Zone 50 [Reliable]	
27003	CKAR 08-001	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	664784mE 7746524mN Zone 50 [Reliable]	
27005	CKAR 08-003	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	664865mE 7746728mN Zone 50 [Reliable]	
27007	CKAR 08-005	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	664992mE 7746893mN Zone 50 [Reliable]	
27008	CKAR 08-006	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	664717mE 7747368mN Zone 50 [Reliable]	
27009	CKAR 08-007	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	665154mE 7747181mN Zone 50 [Reliable]	
27011	CKAR 08-009	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	664477mE 7747295mN Zone 50 [Reliable]	
27014	CKAR 08-012	No	No	No Gender Restrictions	Registered Site	Midden / Scatter	*Registered Knowledge Holder names available from DAA	664308mE 7748058mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
27031	SP 09 - 01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	422853mE 7672997mN Zone 50 [Reliable]	
27033	SP 09 - 03	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	424734mE 7679638mN Zone 50 [Reliable]	
27034	SP 09 - 04	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	424290mE 7680009mN Zone 50 [Reliable]	
27035	SP 09 - 05	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	423236mE 7679770mN Zone 50 [Reliable]	
27036	SP 09 - 06	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	425230mE 7680067mN Zone 50 [Reliable]	
27038	SP 09 - 08	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	424869mE 7674613mN Zone 50 [Reliable]	
27039	SP 09 - 09	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	424628mE 7674451mN Zone 50 [Reliable]	
27040	SP 09 - 10	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	424345mE 7674221mN Zone 50 [Reliable]	
27043	SP 09 - 13	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	423655mE 7673618mN Zone 50 [Reliable]	
27044	SP 09 - 14	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	423377mE 7673363mN Zone 50 [Reliable]	
27045	SP 09 - 15	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	423547mE 7673569mN Zone 50 [Reliable]	
27046	SP 09 - 16	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	423465mE 7673478mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
27047	SP 09 - 17	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	424989mE 7674705mN Zone 50 [Reliable]	
27048	SP 09 - 18	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	425076mE 7674816mN Zone 50 [Reliable]	
27049	SP 09 - 19	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	425171mE 7674930mN Zone 50 [Reliable]	
27051	SP 09 - 21	No	No	No Gender Restrictions	Registered Site	Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	425299mE 7675062mN Zone 50 [Reliable]	
27052	SP 09 - 22	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	425289mE 7675129mN Zone 50 [Reliable]	
27053	SP 09 - 23	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	425291mE 7675219mN Zone 50 [Reliable]	
27054	SP 09 - 24	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	425241mE 7675312mN Zone 50 [Reliable]	
27055	SP 09 - 25	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	425253mE 7675538mN Zone 50 [Reliable]	
27057	SP 09 - 27	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	424950mE 7677666mN Zone 50 [Reliable]	
27058	SP 09 - 28	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	425014mE 7677302mN Zone 50 [Reliable]	
27059	SP 09 - 29	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	425050mE 7677092mN Zone 50 [Reliable]	
27060	SP 09 - 30	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	425095mE 7676925mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
27062	SP 09 - 32	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	425173mE 7676347mN Zone 50 [Reliable]	
27195	SP 09 - 35	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	413854mE 7670897mN Zone 50 [Reliable]	
27197	SP 09 - 38	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	413956mE 7670764mN Zone 50 [Reliable]	
27198	SP 09 - 39	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	413995mE 7670746mN Zone 50 [Reliable]	
27200	SP 09 - 41	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	415220mE 7670717mN Zone 50 [Reliable]	
27204	SP 09 - 45	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	416173mE 7670617mN Zone 50 [Reliable]	
27205	SP 09 - 46	No	No	No Gender Restrictions	Registered Site	Quarry	*Registered Knowledge Holder names available from DAA	416384mE 7670618mN Zone 50 [Reliable]	
27206	SP 09 - 47	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	416603mE 7670571mN Zone 50 [Reliable]	
27208	SP 09 - 49	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	417165mE 7670610mN Zone 50 [Reliable]	
27492	SP 09 - 56	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	412233mE 7666221mN Zone 50 [Reliable]	
27561	Sam's Creek Burial Site	Yes	Yes	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
27776	Burr NHP2	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472556mE 7714172mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
27792	Burr NHPS5	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472723mE 7714302mN Zone 50 [Reliable]	
27813	MAI-09 - MD01	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	664880mE 7746619mN Zone 50 [Reliable]	
27814	MAI-09 - MD03	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	664924mE 7746807mN Zone 50 [Reliable]	
27815	MAI-09 - MD04	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	665125mE 7747022mN Zone 50 [Reliable]	
27818	MAI-09 - MD11	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	668230mE 7748055mN Zone 50 [Reliable]	
27819	MAI-09 - MD12	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	668047mE 7747932mN Zone 50 [Reliable]	
27820	MAI-09 - MD13	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	667573mE 7747639mN Zone 50 [Reliable]	
27828	MAI-09 - MD-21	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	665527mE 7747500mN Zone 50 [Reliable]	
27833	MAI-09 - MD-26	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	664937mE 7746592mN Zone 50 [Reliable]	
27835	MAI-09 - MD-28	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	668975mE 7747560mN Zone 50 [Reliable]	
27837	MAI-09 - MD-30	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	664907mE 7746546mN Zone 50 [Reliable]	
27838	MAI-09 - MD-31	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	664894mE 7746883mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
27841	MAI-09 - AS-01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	664849mE 7746493mN Zone 50 [Reliable]	
27936	Kwoorbup Corroborree Ground	No	No	No Gender Restrictions	Registered Site	Ceremonial, Historical, Meeting Place	*Registered Knowledge Holder names available from DAA	532563mE 6131496mN Zone 50 [Reliable]	
28084	ACHM - 09-23	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	410685mE 7669809mN Zone 50 [Reliable]	
28085	ACHM - 09-24	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Quarry	*Registered Knowledge Holder names available from DAA	410240mE 7669639mN Zone 50 [Reliable]	
28185	Jewel Cave	Yes	Yes	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
28309	Main Roads Engraving 01	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	471988mE 7713872mN Zone 50 [Reliable]	
28310	Main Roads Engraving 02	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	471989mE 7713863mN Zone 50 [Reliable]	
28311	Main Roads Engraving 03	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472006mE 7713848mN Zone 50 [Reliable]	
28312	Main Roads Engraving 04	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472006mE 7713843mN Zone 50 [Reliable]	
28313	Main Roads Engraving 07	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472024mE 7713803mN Zone 50 [Reliable]	
28314	Main Roads Engraving 08	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	472017mE 7713804mN Zone 50 [Reliable]	
28594	Wheatstone 12	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	296611mE 7590005mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
28599	Wheatstone 16	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	296695mE 7589720mN Zone 50 [Reliable]	
28612	Wheatstone 26	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	297576mE 7590905mN Zone 50 [Reliable]	
28615	MP08-53	Yes	Yes	No Gender Restrictions	Registered Site	Ceremonial, Mythological, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
28660	MP08 - 17	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter, Camp, Shell	*Registered Knowledge Holder names available from DAA	287776mE 7592313mN Zone 50 [Reliable]	
28662	MP08 - 20	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp	*Registered Knowledge Holder names available from DAA	291307mE 7595779mN Zone 50 [Reliable]	
28663	MP08 - 21	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp	*Registered Knowledge Holder names available from DAA	291360mE 7595143mN Zone 50 [Reliable]	
28664	MP08 - 22	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Camp, Shell	*Registered Knowledge Holder names available from DAA	290587mE 7595199mN Zone 50 [Reliable]	
28666	MP08 - 24	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Camp, Shell	*Registered Knowledge Holder names available from DAA	290390mE 7595308mN Zone 50 [Reliable]	
28667	MP08 - 25	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp, Shell	*Registered Knowledge Holder names available from DAA	292429mE 7594679mN Zone 50 [Reliable]	
28669	MP08 - 27	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp, Shell	*Registered Knowledge Holder names available from DAA	292349mE 7596153mN Zone 50 [Reliable]	
28670	MP08 - 28	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp, Shell	*Registered Knowledge Holder names available from DAA	292344mE 7596265mN Zone 50 [Reliable]	
28676	MP08 - 34	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp	*Registered Knowledge Holder names available from DAA	291369mE 7596469mN Zone 50 [Reliable]	



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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
28677	MP08 - 35	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Arch Deposit	*Registered Knowledge Holder names available from DAA	290313mE 7596281mN Zone 50 [Reliable]	
28678	MP08 - 36	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Camp, Shell	*Registered Knowledge Holder names available from DAA	290409mE 7596566mN Zone 50 [Reliable]	
28679	MP08 - 37	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Camp	*Registered Knowledge Holder names available from DAA	290870mE 7596284mN Zone 50 [Reliable]	
28682	MP08 - 40	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Camp	*Registered Knowledge Holder names available from DAA	290640mE 7595647mN Zone 50 [Reliable]	
28683	MP08 - 41	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter, Camp, Shell	*Registered Knowledge Holder names available from DAA	290047mE 7595888mN Zone 50 [Reliable]	
28684	MP08 - 42	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter, Camp, Shell	*Registered Knowledge Holder names available from DAA	290129mE 7595654mN Zone 50 [Reliable]	
28695	MP08 - 6	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Camp, Shell	*Registered Knowledge Holder names available from DAA	279310mE 7592684mN Zone 50 [Reliable]	
28700	MP08 - 50	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Camp	*Registered Knowledge Holder names available from DAA	277207mE 7593251mN Zone 50 [Reliable]	
28701	MP08 - 52	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Camp, Shell	*Registered Knowledge Holder names available from DAA	277239mE 7593099mN Zone 50 [Reliable]	
28713	Wheatstone 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	293636mE 7599855mN Zone 50 [Reliable]	
28714	Wheatstone 2	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	293348mE 7599818mN Zone 50 [Reliable]	
28716	Wheatstone 4	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	292376mE 7600315mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
29127	Loop 0-01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Repository / Cache	*Registered Knowledge Holder names available from DAA	459861mE 7695663mN Zone 50 [Reliable]	
29128	Loop 0-03	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Repository / Cache	*Registered Knowledge Holder names available from DAA	459355mE 7695480mN Zone 50 [Reliable]	
29129	Loop 0-04	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	452410mE 7692979mN Zone 50 [Reliable]	
29130	Loop 0-05	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	452079mE 7692739mN Zone 50 [Reliable]	
29131	Loop 0-06	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	452179mE 7693135mN Zone 50 [Reliable]	
29132	Loop 0-08	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	448949mE 7692143mN Zone 50 [Reliable]	
29133	Loop 0-09	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	445360mE 7691054mN Zone 50 [Reliable]	
29136	Turkey Nest Loop 0-02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	459660mE 7695661mN Zone 50 [Reliable]	
29181	CL10AS02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	515564mE 7719241mN Zone 50 [Reliable]	
29184	CL10GP05	No	No	No Gender Restrictions	Registered Site	Grinding Patches / Grooves, Arch Deposit	*Registered Knowledge Holder names available from DAA	514682mE 7717088mN Zone 50 [Reliable]	
29192	CL10SS01	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	515484mE 7719286mN Zone 50 [Reliable]	
29195	CL10ENG15	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Arch Deposit	*Registered Knowledge Holder names available from DAA	514725mE 7717156mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
29198	CL10ENG16	Yes	Yes	Male Access Only	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
29205	CL004	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure, Arch Deposit	*Registered Knowledge Holder names available from DAA	514126mE 7716422mN Zone 50 [Reliable]	
29206	CL005	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Man-Made Structure, Arch Deposit, Shell	*Registered Knowledge Holder names available from DAA	514082mE 7716428mN Zone 50 [Reliable]	
29207	CLW7	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	514504mE 7717013mN Zone 50 [Reliable]	
29211	CL 10ENG04	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	514225mE 7716621mN Zone 50 [Reliable]	
29278	Midgegooroo's Execution and Burial	Yes	Yes	Male Access Only	Registered Site	Historical, Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	
29543	Cape Naturaliste Road 1	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	323407mE 6279737mN Zone 50 [Reliable]	
30063	Chapman River (Geraldton)	No	No	No Gender Restrictions	Registered Site	Historical, Mythological, Birth Place, Water Source	*Registered Knowledge Holder names available from DAA	284031mE 6835565mN Zone 50 [Reliable]	
30068	Arrowsmith River	No	No	No Gender Restrictions	Registered Site	Mythological, Water Source	*Registered Knowledge Holder names available from DAA	340264mE 6729578mN Zone 50 [Reliable]	
30132	PIAAS01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	264791mE 6835362mN Zone 50 [Reliable]	
30134	PIAAS03	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	267660mE 6836014mN Zone 50 [Reliable]	
30205	POR04-11-01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	664384mE 7748338mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
30266	WKGAS02	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	268522mE 6835766mN Zone 50 [Reliable]	
30271	WKGST01	No	No	No Gender Restrictions	Registered Site	Modified Tree, Natural Feature	*Registered Knowledge Holder names available from DAA	276247mE 6828823mN Zone 50 [Reliable]	
30351	PIARS12	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	267543mE 6835955mN Zone 50 [Reliable]	
30377	PORP21007	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	660435mE 7749655mN Zone 50 [Reliable]	
30378	PORP21008	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	660439mE 7749521mN Zone 50 [Reliable]	
30379	PORP21012	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Midden / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	660032mE 7749209mN Zone 50 [Reliable]	
30382	PORP21015	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	659795mE 7749339mN Zone 50 [Reliable]	
30384	PORP21017	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	659931mE 7749447mN Zone 50 [Reliable]	
30386	PORP21022	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	660254mE 7750041mN Zone 50 [Reliable]	
30387	PORP21037	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	658293mE 7748979mN Zone 50 [Reliable]	
30388	PORP21038	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	658378mE 7749012mN Zone 50 [Reliable]	
30389	PORP21046	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	658382mE 7748844mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
30444	PIL50-11-06	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DAA	512746mE 7714019mN Zone 50 [Reliable]	
30445	PIL50-11-07	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	512474mE 7713636mN Zone 50 [Reliable]	
30453	PIL50-11-15	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	512204mE 7713281mN Zone 50 [Reliable]	
31095	CL10MD08	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Midden / Scatter	*Registered Knowledge Holder names available from DAA	514428mE 7717485mN Zone 50 [Reliable]	
31097	PIL27-11-57	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	513648mE 7715149mN Zone 50 [Reliable]	
31265	Sister Kate's Childrens Home (Summer Camp)	No	No	No Gender Restrictions	Registered Site	Historical, Camp, Mission, Water Source	*Registered Knowledge Holder names available from DAA	377546mE 6428189mN Zone 50 [Reliable]	
31740	Dunsborough Burial Site and Memorial Area	No	No	No Gender Restrictions	Registered Site	Skeletal Material / Burial	*Registered Knowledge Holder names available from DAA	324941mE 6278759mN Zone 50 [Reliable]	
31742	RIZ 12-01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	384797mE 6429530mN Zone 50 [Reliable]	
31746	Golf Course South Glass Artefact Scatter	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	361571mE 6459258mN Zone 50 [Reliable]	
31747	Golf Course Northeast Site Glass Artefact Scatter	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Arch Deposit	*Registered Knowledge Holder names available from DAA	361770mE 6459601mN Zone 50 [Reliable]	
32041	PIL3381	No	No	No Gender Restrictions	Registered Site	Midden / Scatter, Shell	*Registered Knowledge Holder names available from DAA	662125mE 7754659mN Zone 50 [Reliable]	
32585	CEM-10-06	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Grinding Patches / Grooves, Man-Made Structure, Midden / Scatter, Quarry, Arch Deposit, Water Source	*Registered Knowledge Holder names available from DAA	473111mE 7714101mN Zone 50 [Reliable]	

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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
32590	CEM-10-34	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving, Grinding Patches / Grooves, Quarry, Arch Deposit	*Registered Knowledge Holder names available from DAA	473093mE 7714273mN Zone 50 [Reliable]	
32621	CEM-10-24	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	473426mE 7714646mN Zone 50 [Reliable]	
32659	Maitland River Scatter 11	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	449139mE 7701375mN Zone 50 [Reliable]	
32661	Maitland River Scatter 13	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	448524mE 7700952mN Zone 50 [Reliable]	
32662	Maitland River Scatter 14	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	448842mE 7701268mN Zone 50 [Reliable]	
32666	Maitland River Scatter 06	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	449038mE 7701548mN Zone 50 [Reliable]	
32667	Maitland River Scatter 10	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	448325mE 7700511mN Zone 50 [Reliable]	
32668	Maitland River Scatter 09	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	448318mE 7700744mN Zone 50 [Reliable]	
32670	Maitland River Scatter 07	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DAA	448048mE 7700574mN Zone 50 [Reliable]	
33339	TSF2-01	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Engraving	*Registered Knowledge Holder names available from DAA	418219mE 7672516mN Zone 50 [Reliable]	
33340	TSF2-02	No	No	No Gender Restrictions	Registered Site	Quarry	*Registered Knowledge Holder names available from DAA	418265mE 7672216mN Zone 50 [Reliable]	
33343	TSF2-04	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	418120mE 7673008mN Zone 50 [Reliable]	

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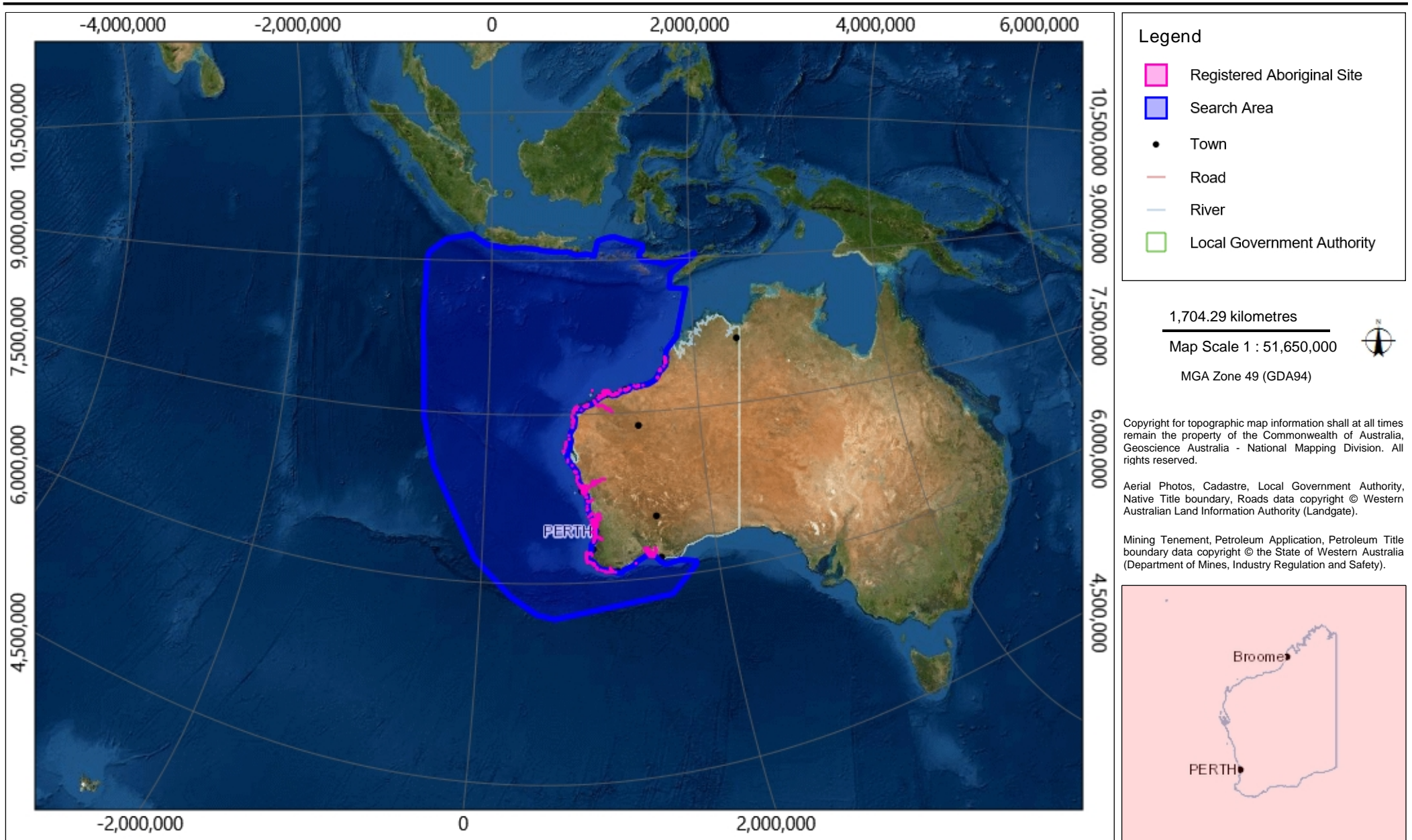
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ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
33344	TSF2-05	No	No	No Gender Restrictions	Registered Site	Engraving, Grinding Patches / Grooves	*Registered Knowledge Holder names available from DAA	418124mE 7672816mN Zone 50 [Reliable]	
33346	TSF2-07	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	418110mE 7672622mN Zone 50 [Reliable]	
33347	TSF2-09	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	418517mE 7674392mN Zone 50 [Reliable]	
33349	TSF2-11	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	418490mE 7673818mN Zone 50 [Reliable]	
33350	TSF2-12	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	418476mE 7672769mN Zone 50 [Reliable]	
33351	TSF2-13	No	No	No Gender Restrictions	Registered Site	Engraving	*Registered Knowledge Holder names available from DAA	418482mE 7672799mN Zone 50 [Reliable]	
33411	WGT15	No	No	No Gender Restrictions	Registered Site	Man-Made Structure	*Registered Knowledge Holder names available from DAA	418428mE 7672486mN Zone 50 [Reliable]	

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For further important information on using this information please see the
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Map of Registered Aboriginal Sites



Appendix F

STAKEHOLDER CONSULTATION – STAKEHOLDER FACT SHEETS

BHP Consultation with Relevant Stakeholders – 22 July 2021

Dear Stakeholder

As part of its Pyrenees Operations, BHP is planning to undertake petroleum activities within Commonwealth waters within Production Licence WA-42-L. The activities are to support ongoing production from the Pyrenees Operations and will involve the drilling of two lateral production wells from an existing production well in the Stickle Field, as well as activities to improve oil recovery from an existing production well in the Crosby Field.

Total duration of the activities is expected to be three to four months, including drill rig mobilisation and positioning at each well centre, and will be contingent on weather conditions. The activity is currently planned to commence in 2022, pending approvals, drill rig and support vessel availability and weather constraints. The earliest start is Q2 2022 calendar year.

The Environment Plan for this activity is being prepared to allow the activity to occur at any time of year as schedules are subject to change and to allow our business maximum flexibility.

A Fact Sheet is attached, which provides information on the proposed activity, including a summary of potential key risks and associated management measures.

Activity Overview

Activity purpose:	To support ongoing production from the Pyrenees Operations	
Activity:	<ul style="list-style-type: none"> • Drilling of two lateral production wells from the Stickle-4H1 well • Plugging of the lower lateral production well at the Crosby-3H1 well 	
Activity locations:	Stickle-4H1 well	Approximately 46 km north of Exmouth, Western Australia
	Crosby-3H1 well	Approximately 43 km north of Exmouth, Western Australia
Well locations:	Stickle-4H1 well	21° 31' 23.679" S, 114° 06' 35.289" E
	Crosby-3H1 well	21° 32' 43.063" S, 114° 05' 42.504" E
Approximate water depth:	Stickle-4H1 well	~199 m
	Crosby-3H1 well	~197 m
Estimate start date:	Earliest start is expected as Q2 2022 calendar year. Latest start is Q4 2022 calendar year.	
Approximate duration:	The drill rig is expected to be on location in WA-42-L for 3-4 months, contingent on weather conditions. Additional time will be needed for drilling rig mobilisation and positioning at each well centre.	

Vessels:	<ul style="list-style-type: none">• Semi-submersible mobile offshore drilling unit (MODU)• Support vessels, including anchor handling vessels, and activity support vessels
Operational area:	A 500 m radius temporary petroleum safety zone (exclusion zone) around each well. A 2 km radius temporary operational area (precautionary) around each well.

Your Feedback

Your feedback on the proposed activity and our response will be provided to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), as is required under the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009.

As a relevant stakeholder you are invited to provide comments. The Environment Plan will contain a summary of all comments received. However, BHP will not use or disclose your personal information in the Environment Plan. Full transcripts of all correspondence will be included in a separate sensitive information part of the Environment Plan provided to NOPSEMA.

Please provide comment as soon as practicable. Comments can be made by email, letter or by phone (refer to attached Fact Sheet for contact details) by close of business on **23 August 2021**.

Regards,

BHP

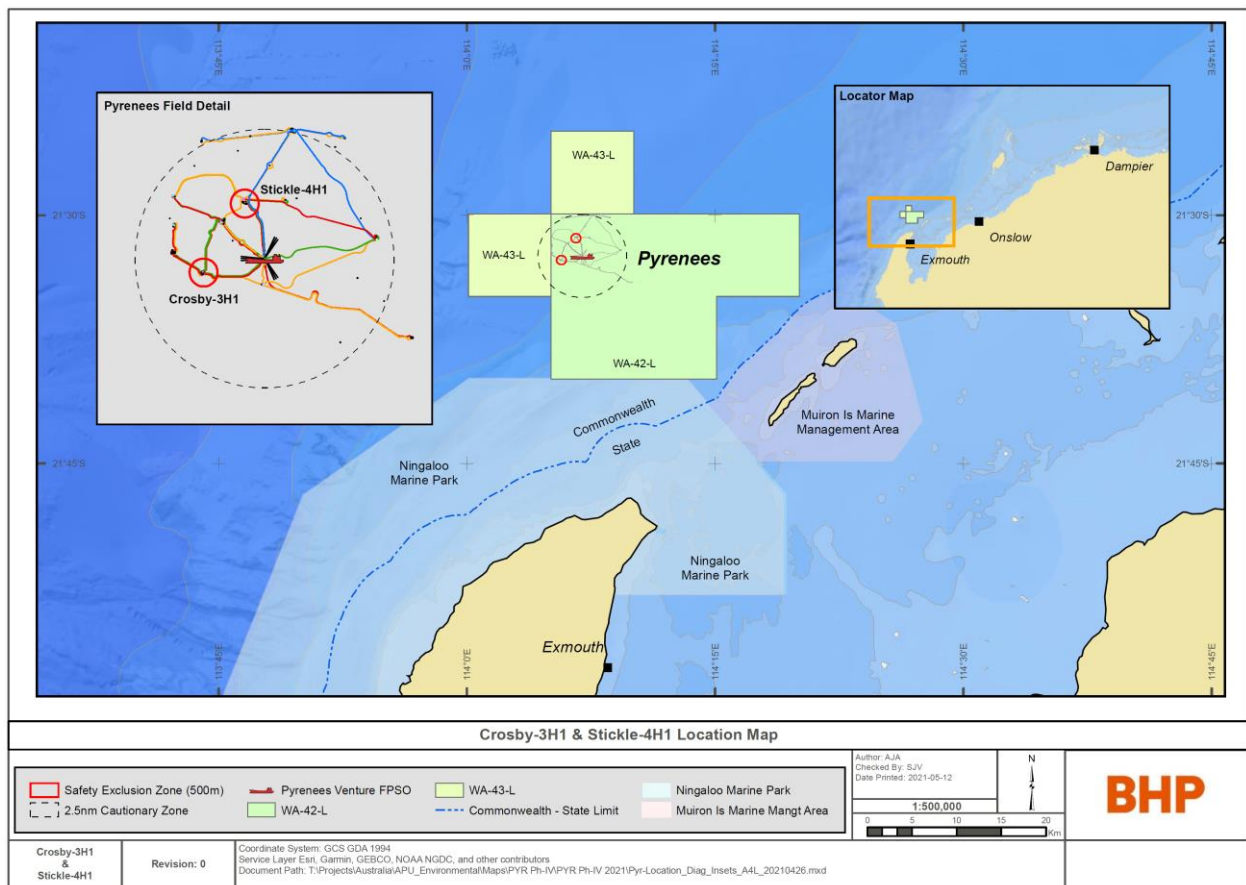
Invitation for Feedback: Stakeholder Information Fact Sheet



Pyrenees Infill Drilling Environment Plan Northern Carnarvon Basin, North West Australia

As part of the Pyrenees Operations, BHP is planning to undertake petroleum activities within Commonwealth waters within Production Licence WA-42-L. The activities are to support ongoing production from the Pyrenees Operations and will involve the drilling of two lateral production wells from an existing production well in the Stickle Field, as well as activities to improve oil recovery from an existing production well in the Crosby Field. Total duration of the activities is expected to be three to four months, including drill rig mobilisation and positioning at each well centre, and will be contingent on weather conditions. The activity is currently planned to commence in 2022, pending approvals, drill rig and support vessel availability and weather constraints. The earliest start is Q2 2022 calendar year. BHP is preparing an Environment Plan (EP) for this activity for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009. The EP is being written to allow the activity to occur at any time of year as schedules are subject to change and to allow our business maximum flexibility.

BHP is the designated operator on behalf of the WA-42-L titleholders, BHP and Santos WA PVG Pty Ltd.



This Stakeholder Fact Sheet relates to the submission of a new Environment Plan for the proposed petroleum activities in WA-42-L, supporting the ongoing crude oil production from the Pyrenees Operations. Production fluids from the Pyrenees fields are produced to the *Pyrenees Venture* Floating Production Storage and Offloading facility (FPSO), a double-hulled stand-alone facility.

Location of Operational Area

The Operational Area defines the spatial boundary within which the proposed activities will take place. The Operational Area is temporary for the duration of activities and will comprise a 2 km radius around the Crosby and Stickle wells to account for the anchor spread from the drill rig. The closest landfall from each well centre is the tip of North West Cape, approximately 30 km to the south of the Stickle well and approximately 27 km to the south of the Crosby well.

Value/ Sensitivity	Approx. Distance from well centre	
	Crosby-3H1 well	Stickle-4H1 well
Ningaloo Coast - World Heritage / National Heritage Area	13 km	16 km
Ningaloo Marine Park (Cmth)	13 km	16 km
Gascoyne Marine Park (Cmth)	17 km	19 km
Ningaloo Marine Park (State)	20 km	22 km
Muiron Islands Management Area	22 km	22 km

Description of Activity

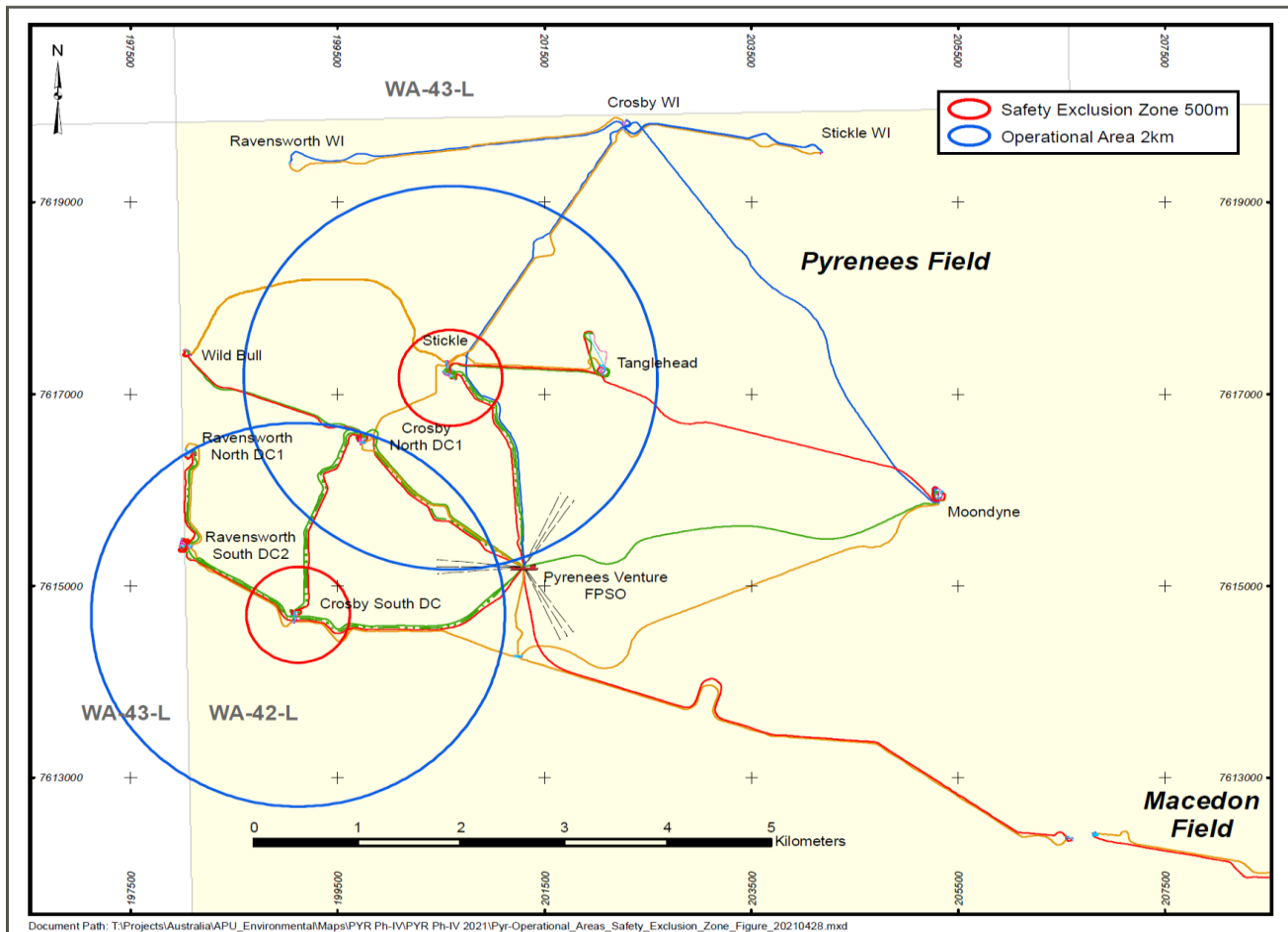
	Crosby-3H1 well	Stickle-4H1 well
Earliest expected commencement date	Earliest start is Q2 2022 calendar year, subject to approvals, rig and vessel availability, and weather constraints. Pre-lay mooring equipment may commence prior.	
Well locations	21° 32' 43.063" S, 114° 05' 42.504" E	21° 31' 23.679" S, 114° 06' 35.289" E
Petroleum licence	WA-42-L	
Approximate duration	30 days depending on weather conditions	90 days depending on weather conditions
Water depth	197 m	199 m
Vessels	<ul style="list-style-type: none"> Semi-submersible mobile offshore drilling unit (MODU) (anchored). Support vessels, including anchor handling vessels and activity support vessels. 	
Operational area	<ul style="list-style-type: none"> A 2 km radius temporary Operational Area (precautionary) around each well. A 500 m radius temporary safety zone (exclusion zone) around each well. 	

Crosby-3H1 well

Crosby-3H1 is a dual-lateral well originally drilled in 2010 with a second lateral drilled in November 2015. In 2020, the well was re-entered using a Light Well Intervention (LWI) vessel and activities were commenced to isolate the lower lateral due to increased water production. BHP is proposing to complete this work scope using a semi-submersible drill rig given its increased capability compared to the LWI vessel.

Stickle-4H1 well

The Stickle-4H1 well was originally drilled in 2004 and completed as a single lateral oil producer. The proposed infill drilling activity includes the re-entry of the Stickle-4H1 well to isolate the existing lateral and then drilling two new horizontal laterals.



Summary of potential risks and associated management measures

Potential Risks	Management and / or Mitigations Measures
Planned Activities	
Emissions: Light	<ul style="list-style-type: none"> Lighting is minimised to that required for safety and navigational purposes.
Emissions: Underwater noise	<ul style="list-style-type: none"> Measures will be in place for interacting with protected marine fauna as per the EPBC Regulations (Part 8).
Physical presence: Interactions with other marine users	<ul style="list-style-type: none"> BHP's existing infrastructure is marked on nautical charts. Establishment of a 500-m rig safety exclusion zone around the drilling rig for the duration of the activity. Consultation with relevant stakeholders (e.g. adjacent petroleum titleholders, commercial fishers and their representative organisations, and government departments and agencies) to inform decision making for the proposed activity and the development of the Environment Plan. BHP will notify relevant fishing industry representative organisations/associations and Government maritime safety agencies of the start and end dates for the activity, and drilling rig location details and any exclusion zones prior to commencement of the activity.
Planned discharges to the marine environment	<ul style="list-style-type: none"> Chemical use will be managed in accordance with BHP and contractor chemical selection and approval procedures. All routine marine discharges will be managed according to legislative and regulatory requirements and BHP's Environment Performance Standards where applicable.
Waste generation	<ul style="list-style-type: none"> Waste generated aboard the drilling rig and support vessels will be managed in accordance with legislative requirements and a Waste Management Plan. Wastes will be managed and disposed of in a safe and environmental responsible manner that prevents accidental loss to the marine environment. Wastes transported onshore will be sent to appropriate recycling or disposal facilities by a licenced waste contractor.

Potential Risks	Management and / or Mitigations Measures
Unplanned Risks	
Invasive marine species	<ul style="list-style-type: none"> BHP contracted vessels comply with Australian biosecurity requirements and guidance, and Australian ballast water requirements. Vessels will be assessed and managed in line with BHP procedures to prevent the introduction of invasive marine species.
Marine fauna interaction	<ul style="list-style-type: none"> Measures will be in place for interacting with protected marine fauna as per the EPBC Regulations (Part 8).
Vessel collision	<ul style="list-style-type: none"> Marine notifications will be made to relevant stakeholders, describing the location of the activity and the 500 m safety exclusion zone to prevent the risk of vessel collisions.
Unplanned releases including hydrocarbons	<ul style="list-style-type: none"> All personnel undertaking activities will undergo relevant inductions and training. Procedures for lifts, equipment maintenance, inspections and bunding. All offshore activities will be managed in accordance with lifting and transfer procedures. Well barrier management shall be implemented, tested and monitored. Recovery of solid wastes lost overboard where safe and practicable to do so. Oil Pollution Emergency Plan (OPEP) and Operational and Scientific Monitoring Plan (OSMP) in place and tested. Appropriate vessel spill response plans, equipment and materials will be in place and maintained.

Protecting Our People and the Environment

Safety of our people and the communities in which we operate always comes first. Identifying, controlling and mitigating safety risks is managed through an overarching, consistent approach guided by BHP's Risk Management governance framework, with supporting processes and performance standards. All activities (routine and non-routine) will be performed in accordance with the industry leading standards established in BHP's Charter, HSEC Framework and Controls, BHP's Wells and Seismic Delivery Management System, Engineering Standards and Procedures, the Environment Plan and the NOPSEMA-accepted Well Operations Management Plan (WOMP) and NOPSEMA-accepted Vessel Safety Case.

Offshore petroleum activities are regulated through a robust and comprehensive environmental protection regime administered by NOPSEMA under the Commonwealth *Offshore Petroleum and Greenhouse Gas Storage Act 2006*. BHP undertakes risk assessments for all environmental aspects of a petroleum activity and stringently adheres to the regulatory regime.

The objective of the Environment Plan is to ensure that potential adverse impacts on the environment associated with activities, during both routine and non-routine activities, are identified, and will be continuously reduced to as low as reasonably practicable (ALARP) and an acceptable level. BHP is committed to understanding the impacts of our activities on stakeholders with an interest in the Pyrenees field and seeks feedback as part of the development of the EP.

Responding to Emergencies

BHP's incident response plans are accepted by the regulator NOPSEMA. The Commonwealth Oil Pollution Emergency Plan (OPEP) is required by law under the Environmental Regulations and forms an appendix to the full EP. The OPEP outline responsibilities, specific procedures and identify resources available in the unlikely event of an oil pollution incident. BHP maintains a constant vigilance and readiness to prevent and/or respond to hydrocarbon loss of containment incidents. The readiness and competency of BHP to respond to incidents is maintained and tested by conducting activity-specific emergency response exercises.

Should you have any questions, concerns or grievances regarding these activities or any other BHP Petroleum activities, please call BHP WA Community Hotline on **1800 421 077** or send an email to bhppetexternalaffairs@bhp.com

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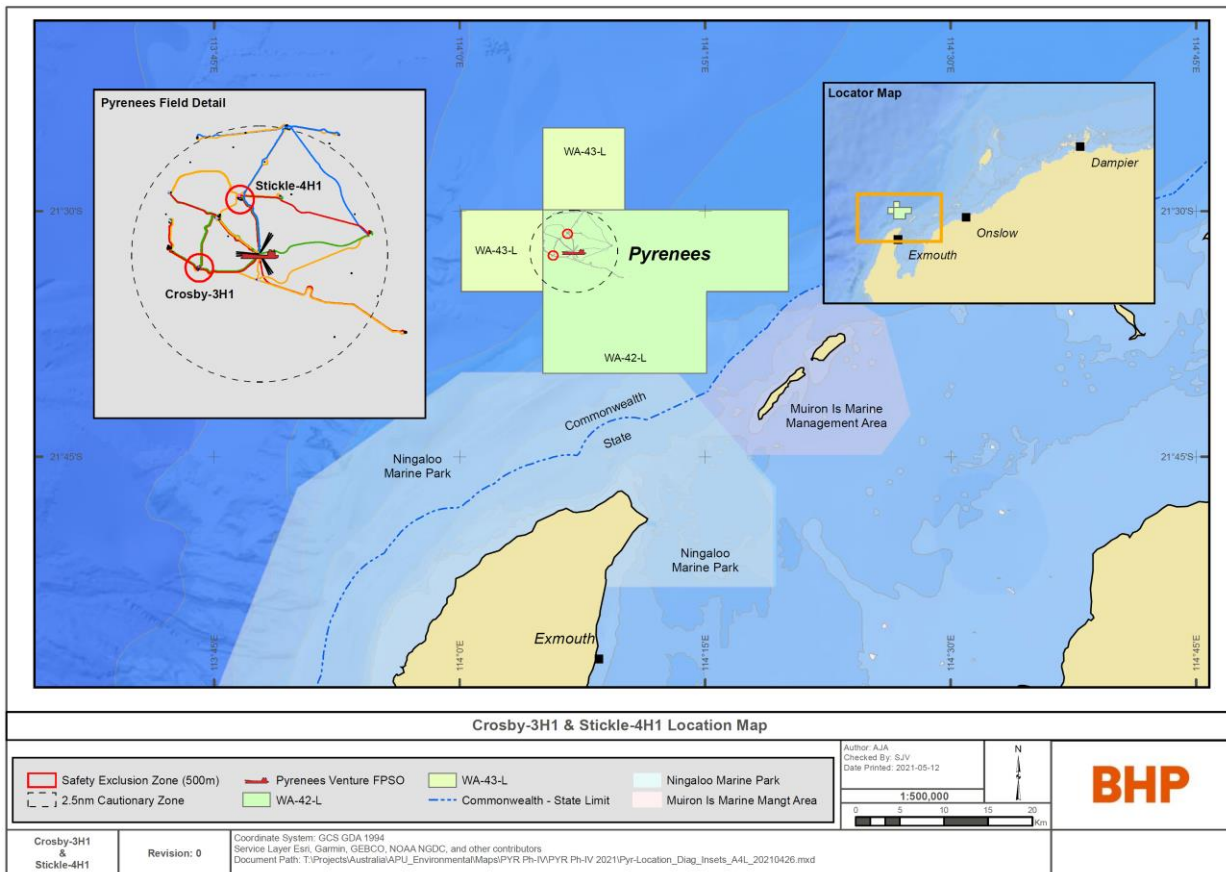
Invitation for Feedback: Commercial Fishing Information Fact Sheet



Pyrenees Infill Drilling Environment Plan Northern Carnarvon Basin, North West Australia

As part of the Pyrenees Operations, BHP is planning to undertake petroleum activities within Commonwealth waters within Production Licence WA-42-L. The activities are to support ongoing production from the Pyrenees Operations and will involve the drilling of two lateral production wells from an existing production well in the Stickle Field, as well as activities to improve oil recovery from an existing production well in the Crosby Field. Total duration of the activities is expected to be three to four months, including drill rig mobilisation and positioning at each well centre, and will be contingent on weather conditions. The activity is currently planned to commence in 2022 pending approvals, drill rig and support vessel availability and weather constraints. The earliest start is Q2 2022 calendar year. BHP is preparing an Environment Plan (EP) for this activity for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009. The EP is being written to allow the activity to occur at any time of year as schedules are subject to change and to allow our business maximum flexibility.

BHP is the designated operator on behalf of the WA-42-L titleholders, BHP and Santos WA PVG Pty Ltd.



This Stakeholder Fact Sheet relates to the submission of a new Environment Plan for the proposed petroleum activities in WA-42-L supporting the ongoing crude oil production from the Pyrenees Development. Production fluids from the Pyrenees fields are produced to the *Pyrenees Venture* Floating Production Storage and Offloading facility (FPSO), a double-hulled stand-alone facility.

Location of Operational Area

The Operational Area defines the spatial boundary within which the proposed activities will take place. The Operational Area is temporary for the duration of activities and will comprise a 2 km radius around the Crosby and Stickle wells to account for the anchor spread from the drill rig. The closest landfall from each well centre is the tip of North West Cape, approximately 30 km to the south of the Stickle well and approximately 27 km to the south of the Crosby well.

Value/ Sensitivity	Approx. Distance from well centre	
	Crosby-3H1 well	Stickle-4H1 well
Ningaloo Coast - World Heritage / National Heritage Area	13 km	16 km
Ningaloo Marine Park (Cmth)	13 km	16 km
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Muiron Islands Management Area	22 km	22 km

Description of Activity

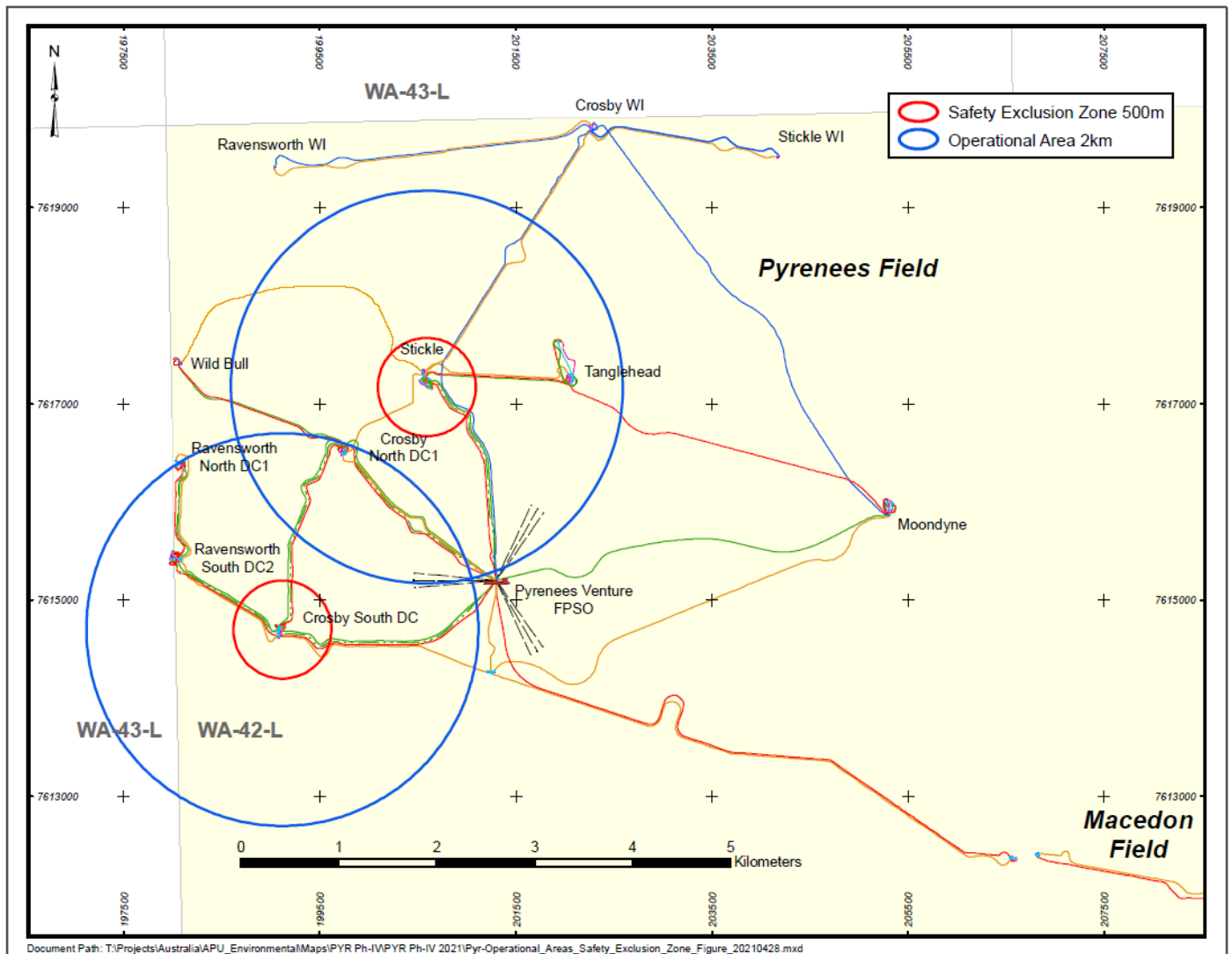
	Crosby-3H1 well	Stickle-4H1 well
Earliest expected commencement date	Earliest start is Q2 2022 calendar year, subject to approvals, rig and vessel availability, and weather constraints. Pre-lay mooring equipment may commence prior.	
Well locations	21° 32' 43.063" S, 114° 05' 42.504" E	21° 31' 23.679" S, 114° 06' 35.289" E
Petroleum licence	WA-42-L	
Approximate duration	30 days depending on weather conditions	90 days depending on weather conditions
Water depth	197 m	197 m
Vessels	<ul style="list-style-type: none"> Semi-submersible mobile offshore drilling unit (MODU) (anchored). Support vessels, including anchor handling vessels and activity support vessels. 	
Operational area	<ul style="list-style-type: none"> A 2 km radius temporary Operational Area (precautionary) around each well. A 500 m radius temporary safety zone (exclusion zone) around each well. 	

Crosby-3H1 well

Crosby-3H1 is a dual-lateral well originally drilled in 2010 with a second lateral drilled in November 2015. In 2020, the well was re-entered using a Light Well Intervention (LWI) vessel and activities were commenced to isolate the lower lateral due to increased water production. BHP is proposing to complete this work scope using a semi-submersible drill rig given its increased capability compared to the LWI vessel.

Stickle-4H1 well

The Stickle-4H1 well was originally drilled in 2004 and completed as a single lateral oil producer. The proposed infill drilling activity includes the re-entry of the Stickle-4H1 well to isolate the existing lateral and then drilling two new horizontal laterals.



Which Fisheries May be Affected

Commercial fisheries have been identified as being relevant on the basis of fishing licence overlap with the proposed Operational (activity) Area, as well as consideration of fishing effort data from recent years, fishing methods and water depth. Individual licence holders in the fisheries listed below, as well as the following representative fishing associations/organisations and government departments are being contacted as part of this consultation:

- Commonwealth Fisheries:
 - Commonwealth fisheries are not expected to be impacted
- State Fisheries:
 - Pilbara Demersal Scale (Line fishery)
 - Mackerel Managed
 - West Coast Deep Sea Crustacean
- Australian of Southern Bluefin Tuna Industry Association (ASBTIA)
- Australian Fisheries Management Authority (AFMA)
- Commonwealth Fisheries Association (CFA)
- Department of Primary Industry and Resources (DPIRD)
- Western Australian Fishing Industry Council (WAFIC)
- Pearl Producers Association (PPA)
- Recfishwest

Summary of potential risks to fishing sector

Potential Risks	Risk Description	Management and / or Mitigations Measures
Planned Activities		
Physical presence	<ul style="list-style-type: none"> The physical presence of the drilling rig during the activities is not considered to affect other marine users. The 500-m safety exclusion zone for the proposed activity lies within a pre-existing cautionary zone (marked on navigational charts) for the Pyrenees Facility and in-field subsea infrastructure. 	<ul style="list-style-type: none"> BHP's existing infrastructure is marked on nautical charts. Establishment of a 500-m safety exclusion zone around the drilling rig for the duration of the activity. BHP will notify relevant fishing industry representative organisations/associations and Government maritime safety agencies of start and end dates for the activity, and drilling rig location details and any exclusion zones prior to commencement of the activity.
Emissions: Underwater noise	<ul style="list-style-type: none"> Underwater noise will be generated by the drilling rig & support vessels. The low acoustic source levels are not predicted to impact fish feeding, spawning or hearing. 	<ul style="list-style-type: none"> Acoustic impacts to marine fauna from the drilling rig & support vessels are considered not significant, with no lasting effects predicted. Acoustic source levels are in a similar range to other commercial vessels in the region.
Planned discharges to the marine environment	<ul style="list-style-type: none"> Discharges from the operation of the drilling rig & support vessels include sewage, grey water, cooling water, desalination brine, deck drainage, ballast and bilge water. Discharges from the operation of the drilling rig and support vessels will result in localised and short-term reduction in water quality. Discharges will be rapidly diluted and dispersed. 	<ul style="list-style-type: none"> Chemical use will be managed in accordance with BHP and contractor chemical selection and approval procedures. All routine marine discharges will be managed according to legislative and regulatory requirements and BHP's Environment Performance Standards where applicable.
Unplanned Risks		
Invasive marine species	<ul style="list-style-type: none"> Introduction or translocation and establishment of invasive marine species via vessel ballast water or biofouling (e.g. hull, submersible equipment). 	<ul style="list-style-type: none"> BHP contracted vessels comply with Australian biosecurity requirements and guidance, and Australian ballast water requirements. Vessel will be assessed and managed in line with BHP procedures to prevent the introduction of invasive marine species.
Unplanned releases including hydrocarbons	<ul style="list-style-type: none"> Loss of solid waste overboard (i.e. dropped objects or wind-blown rubbish, or improper storage). Release of hydrocarbons to the marine environment, such as from: <ul style="list-style-type: none"> A vessel collision resulting in a fuel tank rupture A dropped object on subsea infrastructure (e.g. flowline) A loss of well containment 	<ul style="list-style-type: none"> All personnel undertaking activities will undergo relevant inductions and training. Procedures for lifts, equipment maintenance, inspections and bunding. All offshore activities will be managed in accordance with BHP and Contractor lifting and transfer procedures. Well barrier management shall be implemented, tested and monitored. Recovery of solid wastes lost overboard where safe and practicable to do so. Oil Pollution Emergency Plan (OPEP) and Operational and Scientific Monitoring Plan (OSMP) in place and tested. Appropriate vessel spill response plan, equipment and materials will be in place and maintained.

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STAKEHOLDER CONSULTATION – EXMOUTH COMMUNITY REFERENCE GROUP
MEETING PRESENTATIONS

Exmouth Community Reference Group Meeting

19 August 2021



Disclaimer

Reliance on Third Party Information

The views expressed here contain information that has been derived from publicly available sources that have not been independently verified. No representation or warranty is made as to the accuracy, completeness or reliability of the information. This presentation should not be relied upon as a recommendation or forecast by BHP.

Forward Looking Statements

This presentation may include forward-looking statements within the meaning of the U.S. Securities Litigation Reform Act of 1995 regarding future events and the future financial performance of BHP. These forward-looking statements are not guarantees or predictions of future performance, and involve known and unknown risks, uncertainties and other factors, many of which are beyond our control, and which may cause actual results to differ materially from those expressed in the statements contained in this presentation. BHP's filings with the US Securities and Exchange Commission (the 'SEC') (including in Annual Reports on Form 20-F) which are available on the SEC's website at www.sec.gov.

No Offer of Securities

Nothing in this presentation should be construed as either an offer to sell or a solicitation of an offer to buy or sell BHP securities in any jurisdiction.

Stakeholder feedback

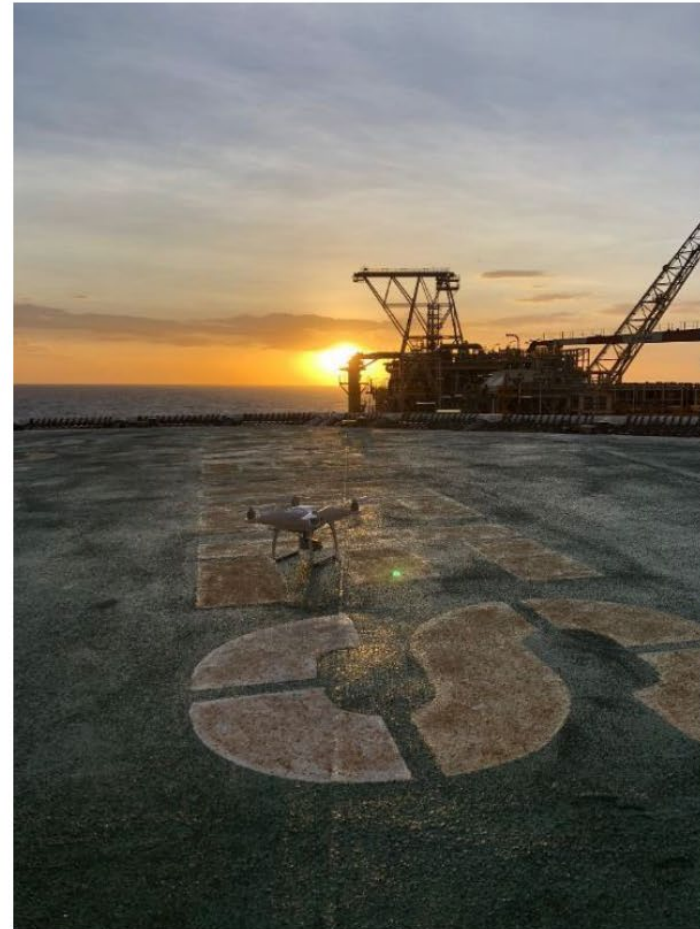
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BHP

Project Update

Exmouth Community Reference Group Meeting
19 August 2021

4



Pyrenees Infill Drilling

- Project sanctioned by the Joint Venture
- Short duration activity (3-4 months) between Q2 2022 and 1Q 2023 subject to drill rig availability and environmental approvals
- Environment Plan to be submitted to NOPSEMA for approval in early September 2021.
- Activity is on 2 existing wells:
 - Crosby-3H1 – enter the well and shut off water production
 - Stickle-4H1 – re-enter well and drill 2 laterals from existing well bore
- Activities are as per previous Pyrenees Phase 3 and Crosby water shut off programs
- Suite of technical and environmental studies completed in support of EP preparation



Have you got a concern?

Enquiries, concerns and / or complaints can be directed to the BHP Corporate Affairs team:

E: bhppetexternalaffairs@bhp.com

Exmouth Community Reference Group Meeting

4 November 2021



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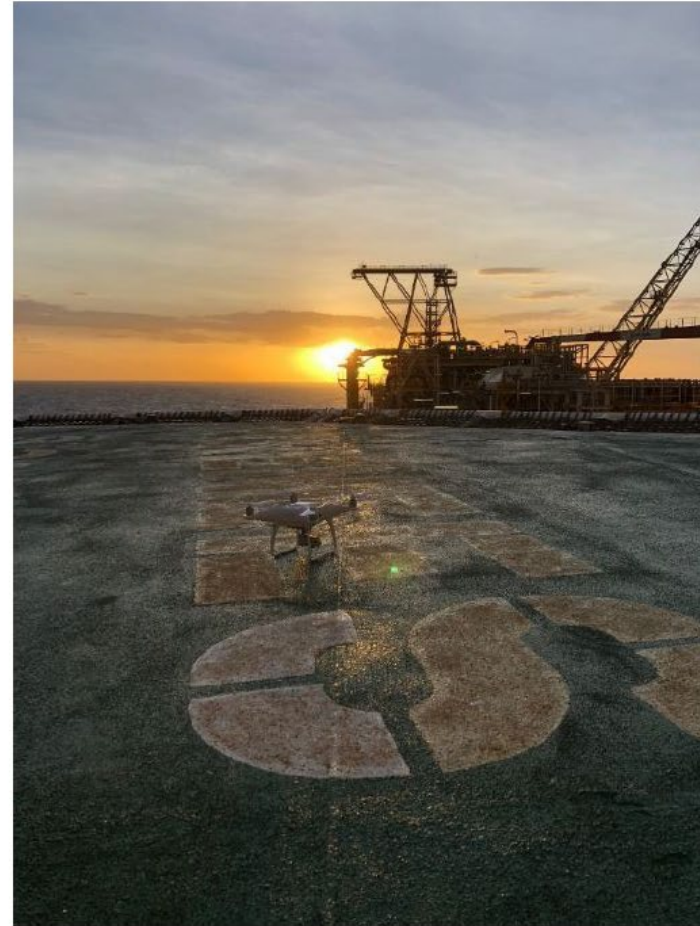
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Project Update

Exmouth Community Reference Group Meeting
4 November 2021

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Appendix G

PYRENEES PHASE 4 INFILL DRILLING PROGRAM OIL POLLUTION EMERGENCY PLAN
(BHPB-04PY-N950-0022)

BHP