WESTERN GAS

WA-474-P, WA-70-R ABANDONED AND SUSPENDED WELLS

ENVIRONMENT PLAN

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ACRONYMS

Abbreviation	Description
"	Inch
µ	Micron
µm	Micrometre
AFMA	Australian Fisheries Management Authority
AHD	Australian heritage database
AHS	Australian Hydrographic Service
AIMS	Australian Institute of Marine Science
AIS	Automatic identification system
ALARP	As low as reasonably practicable
AMBA	Area that may be affected
AMOSC	Australian Marine Oil Spill Centre
AMSA	Australian Maritime Safety Authority
EPA	Environmental Protection Authority (WA)
APPEA	Australian Petroleum Production and Exploration Association
API	American Petroleum Institute
AQIS	Australian Quarantine and Inspection Service
AS/NZS	Australian Standard/ New Zealand Standard
BACI	Before-After-Control-Impact
bbl	Barrel (units of oil)
BTEX	Benzene, toluene, ethyl benzene, xylene
dB	Decibel
g/cc	Grams per cubic centimetre
CFA	Commonwealth Fisheries Association
CHARM	Chemical Hazard and Risk Management
CIN	CHARM Implementation Network
cm	Centimetre
CMP	Commonwealth Marine Park
CO_2	Carbon dioxide
CoC	Chain of Custody
CWA	Centre for Whale Research
DAFF	Department of Agriculture, Fisheries and Forestry
DBCA	Department of Biodiversity, Conservation and Attractions

Abbreviation	Description
DEWHA	Department of the Environment, Water, Heritage and the Arts
DMP	Department of Mines and Petroleum (WA)
DNV	Det Norske Veritas
DoEE	Department of the Environment and Energy (formerly the Department of Environment)
DoF	Department of Fisheries (Western Australia)
DoT	Department of Transport (Western Australia)
DP	Dynamic positioning
DPIRD - Fisheries	Department of Primary Industries and Regional Development – Fisheries (Western Australia) (Previously Department of Fisheries).
EC_{50}	The concentration of a substance that produces a specified response in 50% of the population expose to it for a specified time.
ENVID	Environmental impact identification
EP	Environment Plan, prepared in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
FCP	Forward Command Post
ft	Foot is a unit of length in imperial units
g/m^2	Grams per square metre
GPS	Global positioning system
KEF	Key ecological feature
kg	Kilogram
hr	Hour
HQ	Hazard quotient
HSE	Health Safety & Environment
HSES	Health, Safety & Environment Specialist
Hz	Hertz
IAP	Incident Action Plan
IAPP	International Air Pollution Prevention
IBC	Intermediate bulk container
ICS	Incident command system

Abbreviation	Description
IMO	International Maritime Organisation
IMS	Invasive marine species
IMT	Incident Management Team
IOPP	International Oil Pollution Prevention (Certificate)
ISPP	International Sewage Prevention Pollution
IUCN	International Union for Conservation of Nature
ITOPF	International Tanker Owners Pollution Federation Ltd
JSA	Job safety analysis
kHz	Kilohertz
km	Kilometre
L	Litre
LC_{50}	The concentration of a substance that is lethal to 50% of the population exposed to it for a specified time
LEL	Lower explosive limits
LoR	Limit of reporting
m	Metre
m^2	Square metre
m^3/day	Cubic metres per day
mg/L	Milligrams per litre
m/s and m s^{-1}	Metres per second
MAE	Major accident event
MAH	Mon-aromatic hydrocarbon
MC	Monitoring Coordinator
MDO	Marine diesel oil
mm	Millimetre
MMscf	Million metric standard cubic feet (unit measurement for gases)
MOU	Memorandum of Understanding
MP	Monitoring Personnel
MS	Method statement
MSA	Master service agreement
NRC	National Research Council
NEBA	Net environmental benefit analysis
NEC	No effect concentration
NICNAS	National Industrial Chemicals Notification and Assessment Scheme

Abbreviation	Description
nm	Nautical mile is a unit of distance equal to 1,852 metres
NOAA	National Oceanic and Atmospheric Administration
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Administrator
NWS	North west shelf
OCNS	Offshore Chemical Notification Scheme
ODS	Ozone-depleting substances
OPEP	Oil pollution emergency plan
OPG	International Association of Oil and Gas Producers
OPGGS	Offshore Petroleum and Greenhouse Gas Storage
OSC	Operations Sections Chief
OSMP	Operational and Scientific Monitoring Plan
OSPAR	Oslo and Paris Commission
OSRD	Oil spill risk database
OSTM	Oil spill trajectory modelling
OWR	Oiled wildlife response
pa	Pascal (unit of pressure)
PAH	Polycyclic aromatic hydrocarbon
PEC	Predicted effect concentration
PLNOR	Pose little or no risk to the environment
PMS	Preventative maintenance system
ppb	Parts per billion
PPE	Personal protection equipment
ppm	Parts per million
QA/QC	Quality Assurance / Quality Control
QPAR	Quarantine Pre-Arrival Report
RMA	Resource Management and Administration
ROV	Remotely operated vehicle
RCC	Rescue Coordination Centre
SAG	Scientific Advisory Group
SAP	Sampling and analysis plan
SBM	Synthetic-based mud
SCAT	Shoreline clean-up assessment technique

Abbreviation	Description
SDS	Safety data sheet
SEL	Sound exposure level
sm^3	Standard cubic metre
SMIP	Scientific Monitoring Implementation Plan
SMPEP	Shipboard Marine Pollution Emergency Plan
SOLAS	Safety Of Life At Sea
SOPEP	Shipboard Oil Pollution Emergency Plan
TL	Technical Lead
TVDSS	True vertical depth subsea
VOC	Volatile organic compound
VRASS	Vessel Risk Assessment Score Assessment
WA	Western Australia
WAFIC	Western Australian Fishing Industry Council
WBM	Water-based mud
WDCS	Whale and Dolphin Conservation Society
WOMP	Well Operations Management Plan
wt	Weight

1 INTRODUCTION

Division 2.3 - Contents of an Environment Plan

The environment plan must contain the following:

13(4)a Describe the requirements, including legislative requirements, that apply to the activity and are relevant to the environmental management of the activity; and

13(4)b Demonstrate how those requirements will be met.

15(1) The environment plan must include the following details for the titleholder:

a) Name;
b) Business address;
c) Telephone number (if any);
d) Fax number (if any);
e) Email address (if any);
f) If the titleholder is a body corporate that has an ACN (within the meanings of the *Corporations Act 2001*) - CAN.

15(2) The environment plan must include the following details for the titleholder's nominated liaison person:

a) Name;
b) Business address;
c) Telephone number (if any);
d) Fax number (if any);
e) Email address (if any).

15(3) The environment plan must include arrangements for notifying the Regulator of a change in the titleholder, a change in the titleholder's nominated liaison person or a change in the contact details for either the titleholder or the liaison person.

16(a) A statement of the titleholder's corporate environmental policy.

1.1 PROJECT OVERVIEW

In October 2017, Australian owned Western Gas Corporation Pty Ltd (Western Gas) acquired the WA-474-P and WA-70-R titles from US oil, gas and energy company, Hess Corporation (HESS).

Western Gas is proposing to:

- permanently leave in situ a total of four subsea wellheads associated with four abandoned exploration wells, namely Chester-2, Glencoe-2, Mentorc-2 and Snapshot-1 in Petroleum Permits WA- 70-R and WA-474-P (defined as Permit Areas). Plugging and abandonment of these wells has already occurred, as described in the Government accepted Well Operations Management Plan (WOMP) and Well Abandonment Reports for each well.
- In addition, the Glenloth-1 well is to remain as a suspended well. Western Gas is proposing to undertake annual vessel-based wellhead survey activities on the suspended well, which is located in Petroleum Permit WA-70-R.

Hereafter this is referred to as the Activity.

All wells are located approximately 180 km northwest of Onslow and 150 km north of Exmouth, Western Australia at water depths between 1,116 and 1,131 metres.

1.2 PURPOSE OF THIS ENVIRONMENT PLAN

This revision to the previously accepted WA-474, WA-70-R, Suspended Wells Exploration Drilling Environment Plan (EP) (WG-EHS-PLN-001) is to address the permanent abandonment scenarios as well as the continuing wellhead survey associated with the single suspended wellhead.

This EP has been prepared in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS (Environment) Regulations) for acceptance by NOPSEMA. This EP details the potential environmental impacts and risks associated with the Activity and demonstrates how these will be reduced to as low as reasonably practicable (ALARP) and to an acceptable level through the application of mitigation and control measures. The EP provides an implementation strategy that will be used to measure and report on environmental performance during both routine and non-routine activities to ensure impacts and risks are reduced to ALARP and an acceptable level.

The EP has also been prepared to enable compliance with the Western Gas Health and Safety Policy Statement, Health, Safety and Environment (HSE) Management System and Western Gas' Environment Policy Statement (Appendix A) and all relevant legislation.

This EP documents and considers all relevant stakeholder consultation performed during the planning of the Activity.

1.3 DESCRIPTION OF OPERATOR

Western Gas is a proud Western Australian company that's focused on timely, responsible resource development, to provide local and international customers with secure, reliable and clean energy, and flow-on economic and social contributions for Western Australia. Western Gas is led by a senior management team comprising long-term petroleum professionals, with a strong track record in the delivery of large-scale gas development projects in Australia and internationally.

1.4 TITLEHOLDER AND LIAISON PERSON DETAILS

1.4.1 Titleholder

Permit Area WA-474-P:

Name:	Western Gas (474 P) Pty Ltd
Business address:	680 Murray Street, West Perth, 6005
Telephone no:	+61 8 6323 2311

Email: info@westerngas.com.au

ACN: 126 805 963

Permit Area WA-70-R:

Name: Western Gas (70 R) Pty Ltd

Business address: 680 Murray Street, West Perth, 6005

Telephone no: +61 8 6323 2311

Email: info@westerngas.com.au

ACN: 122 238 699

1.4.2 Nominated Liaison Person

Name: Richard Baker

Business address: Suite 3, 680 Murray Street, West Perth, 6005

Telephone no: +61 8 6323 2311

Email: rbarker@westerngas.com.au

In the event of a change in titleholder, nominated liaison person or contact details, Western Gas will submit the amended details to NOPSEMA referencing the EP document number and NOPSEMA reference.

1.5 LEGISLATIVE REQUIREMENTS

1.5.1 Relevant Environmental Legislation

Environmental aspects of petroleum activities in Commonwealth waters are controlled by two main statutes, these being 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 is described in the following sections. Additionally, there are number of Commonwealth and Western Australian statutes and regulations, International Agreements and Conventions and other applicable standards, guidelines and codes under which the proposed Activity will be planned and carried out.

Before 28 February 2014, some petroleum activities in Commonwealth waters were regulated under two pieces of legislation: the EPBC Act and the OPGGS Act. This created unnecessary duplication of the environmental approval process in Commonwealth waters.

From 28 February 2014, to simplify the content and streamline the environmental regulation of petroleum activities in Commonwealth waters, NOPSEMA became the sole designated regulator that relate to

matters listed as 'protected' under the EPBC Act. The Activity to be conducted in Commonwealth waters will comply with legislative requirements established under relevant Commonwealth legislations.

1.5.2 Commonwealth Legislation

The petroleum activity described in this EP (Section 2) takes place within Commonwealth waters.

All activities conducted under the EP will comply with legislative requirements established under relevant Commonwealth legislation. This legislation is further summarised in Table 1-2.

1.5.2.1 OPGGS Act

Subsection 572(3) of the OPGGS Act requires that a titleholder remove all structures from the title area, and all equipment and other property that is neither used nor to be used in connection with the operations. Subsection 572(7) requires property removal be subject to any other provision of the OPGGS Act, the regulations, directions given by NOPSEMA or the responsible Commonwealth Minister, and any other law. Under subsection 270(3) of the OPGGS Act, before title surrender, all property brought into the surrender area must be removed to the satisfaction of NOPSEMA, or arrangements that are satisfactory to NOPSEMA must be made relating to the property. This EP is seeking consent to permanently abandon the four wellheads (Chester-2, Glencoe-2H, Mentorc-2, Snapshot-1). Western Gas confirms that this EP is not seeking consent to surrender any title under subsection270(3) of the OPGGS Act.

Western Gas activities are aligned with Section 3 of the OPGGS Act, which states 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;
- 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".

1.5.2.2 Well Operations Management Plans

The wells were plugged and abandoned / suspended as part of previous exploration drilling programs in the Permit Areas. All well suspension activities, including surveillance requirements, were undertaken in accordance with a National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) accepted Well Operations Management Plans (WOMP; WGC-WMF-PLN_Permanently Abandoned Wells WOMP_R0_211216).

End of Well Abandonment Reports (EWAR) were also prepared by Western Gas for Chester-2, Glencoe-2H, Mentorc-2 and Snapshot-1 to:

- demonstrate that abandonment well barriers are in line with the approved WOMP;
- describe the procedures, processes and criteria by which Western Gas has permanently abandoned Chester-2, Glencoe-2H, Mentorc-2, Snapshot-1.

These EWAR were accepted by NOPSEMA on the basis that NOPSEMA are reasonably satisfied with the process undertaken in abandoning the well was as described in the in force WOMP, in accordance with regulation 5.17 of the Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011.

The EWAR for each plugged and abandoned well and NOPSEMA's acceptance of well abandonment is recorded in acceptance letters from NOPSEMA, as outlined in Table 1-1.

Table 1-1: NOPSEMA Well Abandonment Letter References

Well	EWAR	NOPSEMA Reference for the Acceptance Letter
Chester-2	CHR2-REG-REP_Permanent Well Abandonment_R0_220707	ID: 7085 A880467
Glencoe-2H	GLN2H-WMF-REP_End of Well Abandonment Report_R0_220707	ID: 7086 A880469
Mentorc-2	MEN2-WMF-REP_End of Well Abandonment Report_R0_220707	ID: 7087 A880399
Snapshot-1	SNP1-WMF-REP_End of Well Abandonment Report_R0_220707	ID: 7084 A859077

Glenloth-1 continues to exist in a suspended state under Glenloth-1 – Ongoing Temporary Suspension WOMP. No intervention work or removal of current well barriers is planned under the existing WOMP or this Environment Plan, therefore there is no risk to the current integrity of the well. The accepted WOMP outlines that through detailed risk assessment, Western Gas have determined that further intervention work is likely to be required on Glenloth-1 to establish the necessary barriers required to permanently abandon the well. The well remains appropriately suspended, with effective barriers in place, until such time as that permanent abandonment activity can be conducted or conversion of the well into a producing well using a suitable vessel or rig. A separate WOMP, and Environment Plan will be prepared for the permanent abandonment of Glenloth-1. In accordance with the accepted Glenloth-1 – Ongoing Temporary Suspension WOMP, annual visual inspections of the Glenoth-1 wellhead will be carried out. These inspections are included as part of the Activity within this Environment Plan.

These inspections are consistent with Section 572 Maintenance and removal of property Policy (N-00500-PL1903), which outlined examples of good industry practice related to well suspension and abandonment timeframes include NORSOK D10 which states that the maximum allowable duration for a well that is 'temporarily abandoned without monitoring' is three years.

The timing of the permanent abandonment of Glenloth-1 is planned to coincide with development activities for the Equus Gas Project. In December 2022, Western Gas signed non-binding agreements with the North West Shelf Project participants and Pluto LNG to process 2-3 Mtpa of gas from its Equus Gas Project for LNG export and the WA market from 2027. In early 2023 Western Gas commenced Joint Development Studies with the Woodside led Pluto and NWS JVs. The Joint Studies provide the technical input to enter Binding LNG Processing Agreement, which is planned to be followed by FEED studies in 2024 to enable a Final Investment Decision in late 2024 / early 2025 and First Gas in late 2027 / early 2028.

During the FEED studies, Western Gas will prepare a Field Development Plan to finalise subsurface well designs, field phasing and subsea infrastructure requirements. Included in the Field Development Plan studies will be assessment of Glenloth-1 and its potential utilisation in field development. Wherever possible Western Gas will endeavour to utilize existing infrastructure to deliver the most efficient and low impact development. If Glenloth-1 is deemed not suitable for use in future production operations, Western Gas will prepare a plan for the plugging and abandonment of the well. The plugging and abandonment operations would then be scheduled to take place alongside the development drilling phase post FID in 2025.

This provides justification for the timeframes for the removal when the property is either used, or to be used in connection with the operations, as required by the Section 572 Maintenance and removal of property Policy (N-00500-PL1903).

Table 1-2: Relevant Commonwealth Legislation

Commonwealth Legislation	Summary	Relevant to the Activity	Administering Authority	Relevant Aspects to the Activity
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	This Act provides for the preservation and protection from injury or desecration areas and objects that are of significance to Aboriginal people, under which the Minister may make a declaration to protect such areas and objects. The Act also requires the discovery of Aboriginal remains to be reported to the Minister.	No	Commonwealth – Department of Climate Change, Energy the Environment and Water (DCCEEW)	No activity being undertaken on land or near shore. No known sites of Aboriginal Heritage Significance within the operational area or EMBA.
Australian Ballast Water Management Requirements, Version 8	Australian Ballast Water Management Requirements outline the mandatory ballast water management requirements to reduce the risk of introducing harmful aquatic organisms into Australia's marine environment through ballast water from international vessels. These requirements are enforceable under the *Biosecurity Act 2015*.	Yes	Commonwealth – Department of Agriculture, Fisheries and Forestry (DAFF)	Potential internationally sourced vessel operating in Australian Waters which could have the potential for introduction of introduced marine species (IMS) and potential ballast water exchange.
Australian Heritage Council Act 2003	This Act identifies areas of heritage value listed on the Register of the National Estate and sets up the Australian Heritage Council and its functions.	No	Australian Heritage Council	There are no heritage places found on the National Heritage List, within the EMBA that could potentially be impacted by unplanned events.
Australian Maritime Safety Authority Act 1990 (AMSA Act)	This Act specifies that the Australian Maritime Safety Authority's (AMSA) role includes protection of the marine environment from pollution from ships and other environmental damage caused by shipping. AMSA is responsible for administering the Marine Order in Commonwealth waters. This Act facilitates international cooperation and mutual assistance in preparing and responding to a major oil spill incident and encourages countries to develop and maintain an adequate capability to deal with oil pollution emergencies. Requirements are given effect through AMSA. AMSA is the lead agency for responding to oil spills in the marine environment and is responsible for the Australian National Plan for Maritime Environmental Emergencies.	Yes	AMSA	This Act applies to the use of any vessel associated with operations and is relevant to the activity in regard to the unplanned pollution from ships.

Commonwealth Legislation	Summary	Relevant to the Activity	Administering Authority	Relevant Aspects to the Activity
Aquatic Resources Management Act 2016	This Act will be the primary legislation used to manage fishing, aquaculture, pearling and aquatic resources in Western Australia. The Act was scheduled for commencement on 1 January 2019; however, this has been deferred while an amendment to the Act is progressed.	Yes	Department of Primary Industries and Regional Development (DPIRD)	Vessel movements have the potential to introduce IMS.
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.	Yes	AMSA	Vessel movements, safety, discharges and emissions.
Maritime Powers Act 2013	Protects the heritage values of shipwrecks and relics for shipwrecks over 75 years. It is an offence to interfere with a shipwreck covered by this Act. Available historic shipwreck locations covered by international conventions enacted by this legislation have been identified and assessed (as applicable) within this EP.	No	Department of Immigration and Border Protection	No planned interaction or interference. Potential impact could be due to a hydrocarbon spill, but the credible spill is to surface, and therefore shipwrecks are highly unlikely to be impacted.
Biosecurity Act 2015 Biosecurity Regulations 2016	This Act provides the Commonwealth with powers to take measures of quarantine, and implement related programs as are necessary, to prevent the introduction of any plant, animal, organism or matter that could contain anything that could threaten Australia's native flora and fauna or natural environment. The Commonwealth's powers include powers of entry, seizure, detention and disposal. This Act includes mandatory controls on the use of seawater as ballast in ships and the declaration of sea vessels voyaging out of and into Commonwealth waters. The Regulations stipulate that all information regarding the voyage of the vessel and the ballast water is declared correctly to the quarantine officers.	Yes	DAFF	This Act applies to all internationally sourced vessels operating in Australian Waters which could have the potential for the introduction of IMS and potential ballast water exchange.

Commonwealth Legislation	Summary	Relevant to the Activity	Administering Authority	Relevant Aspects to the Activity
Corporations Act 2001	This Act is the principal legislation regulating matters of Australian companies, such as the formation and operation of companies, duties of officers, takeovers and fundraising.	Yes	Australian Securities and Investments Commission	The titleholder has provided ACN details within the meaning of the Act.
EPBC Act Environment Protection and Biodiversity Conservation Amendment Regulations 2006	The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) is the sole assessor for offshore petroleum activities in Commonwealth water (as of 28 February 2014). Under the new arrangements, environmental protection will be met through NOPSEMA's decision-making processes. This Act is the Australian Government's key piece of environmental legislation and aims to: • Protect MNES • Provide for Commonwealth Environmental assessment and approval processes • Provide an integrated system for biodiversity conservation and management of protected areas	Yes	Department of Climate Change, Energy, Environment and Water (DCCEEW)	This Act applies to all aspects of the activity that have the potential to impact MNES. Appropriate environmental approvals will be sought from NOPSEMA for all operations (this EP) which outlines compliance with the relevant regulations and plans under the Act. Where activities have existing approvals under the Act, these will continue to apply.
Underwater Cultural Heritage Act 2018 *Underwater Cultural Heritage (Consequential and Transitional Provisions) Act 2018*	This Act replaces the *Historic Shipwrecks Act 1976* and extends protection to other wrecks such as submerged aircraft and human remains. It also increases penalties applicable to damaged sites. The Act came into effect on 1 July 2019.	Yes	DCCEEW	This Act applies to the shipwrecks (more than 75 years old) within the EMBA. There is no planned interaction or interference with shipwrecks, and any unplanned impacts is only expected to affect the surface waters.
Environment Protection (Sea Dumping) Act 1981 (Sea Dumping Act)	Regulates the loading and dumping of waste at sea and fulfils Australia's international obligations under the London Protocol to prevent marine pollution by controlling dumping of wastes and other matter. The Sea Dumping Act applies to all vessels, aircraft and platforms in Australian waters and to all Australian vessels and aircrafts in any part of the sea.	Yes	DCCEEW	The Act regulates the loading and dumping of waste at sea. A Sea Dumping Permit is required to leave infrastructure in situ.

Commonwealth Legislation	Summary	Relevant to the Activity	Administering Authority	Relevant Aspects to the Activity
	This Act does not apply in relation to the disposal or storage of controlled material (other than a vessel, aircraft or platform) directly arising from, or related to, the exploration, exploitation and associated offshore processing, of seabed mineral resources.			
National Biofouling Management Guidance for the Petroleum Production and Exploration Industry 2009	The guidance document provides recommendations for the management of biofouling hazards by the petroleum industry.	Yes	DAFF	Applying the recommendations within this document and implementing effective biofouling controls can reduce the risk of the introduction of an introduced marine species.
National Greenhouse and Energy Reporting Act 2007	Introduces a single national reporting framework for the reporting and dissemination of information about greenhouse gas emissions, greenhouse gas projects and energy use and production of corporations.	Yes	DCCEEW Clean Energy Regulator Climate Change Authority	This Act applies to the atmospheric emissions through combustion engine use to operate the vessels associated with the activity. Implementation of the Act will reduce the impact of GHG emissions associated with vessel use for the installation and commissioning activity, through compliance with MARPOL Annex VI (Marine Order Part 97: Marine Pollution Prevention – Air Pollution) and require the use of low sulphur fuel.
Maritime Legislation Amendment (Prevention of Air Pollution from Ships) Act 2007	This Act implements the requirements of MARPOL 73/78 Annex VI for shipping in Commonwealth waters.	Yes	Department of Infrastructure and Regional Development.	Implementation of this Act reduces the impact of GHG emissions associated with vessel use for the installation and commissioning activity, through compliance with MARPOL Annex VI (Marine Order Part 97: Marine Pollution Prevention – Air Pollution) and require the use of low sulphur fuel.
Navigation Act 2012	An act regulating navigation and shipping including Safety of Life at Sea (SOLAS). A number of Marine Orders enacted under this Act apply directly to offshore petroleum exploration and production activities: • Marine Order 21 Safety and Emergency Arrangements	Yes	AMSA (operational) Department of Infrastructure and Regional Development	All vessel movements associated with the activity will be governed by marine safety regulations and Marine Orders under the Act.

Commonwealth Legislation	Summary	Relevant to the Activity	Administering Authority	Relevant Aspects to the Activity
	• Marine Order 27: Safety of Navigation and Radio Equipment • Marine Order 30: Prevention of Collisions • Marine Order 58: Safe Management of Vessels • Marine Order 70: Seafarer Certifications		Minister for Infrastructure and Regional Development	
OPGGS Act Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009	Petroleum exploration and development activities in Australia's offshore areas are subject to the environmental requirements specified in the OPGGS Act and associated Regulations. The OPGGS Act contains a broad requirement for titleholders to operate in accordance with "good oil-field practice". Specific environmental provisions relating to work practices essentially require operators to control and prevent the escape of wastes and petroleum. The Act also requires that activities are carried out in a manner that does not unduly interfere with other rights or interests, including the conservation of the resources of the sea and seabed, such as fishing or shipping. In some cases, where there are particular environmental sensitivities or multiple use issues it may be necessary to apply special conditions to an exploration Permit Area. The holder of a petroleum title must maintain adequate insurance against expenses or liabilities arising from activities in the title, including expenses relating to clean-up or other remedying of the effects of the escape of petroleum. The OPGGS Environment Regulations provide an objective based regime for the management of environmental performance for Australian offshore petroleum exploration and production activities in areas of Commonwealth jurisdiction. Key objectives of the Environment Regulations include: • to ensure operations are carried out in a way that is consistent with the principles of ecologically sustainable development	Yes	NOPSEMA	Environmental impacts and environment risks of the activity due to: • Noise emissions • Artificial light • Atmospheric emissions • Seabed and benthic habitat disturbance • Interaction with other marine users • Vessel discharges • Spill response operations • Dropped objects • Introduction of invasive marine species • Marine fauna interaction • Release of hydrocarbons • Interaction with other marine users (wellhead in-situ)

Commonwealth Legislation	Summary	Relevant to the Activity	Administering Authority	Relevant Aspects to the Activity
	• to adopt best practice to achieve agreed environment protection standards in industry operations • to encourage industry to continuously improve its environmental performance.			
Ozone Protection and Synthetic Greenhouse Gas Management Act 1989 (and associated regulations)	Regulates the manufacture, importation and use of ozone depleting substances (ODS) (typically used in fire-fighting equipment and refrigerants). Applicable to the handling of any ODS.	Yes	DCCEEW	The activity does not include import, export or manufacture activities of ODS. This Act applies where ODS is found on vessel refrigeration systems, however, this is a rare occurrence
Protection of the Sea (Prevention of Pollution from Ships) Act 1983 Protection of the Sea (Prevention of Pollution from Ships) (Orders) Regulations 1994	This Act relates to the protection of the sea from pollution by oil and other harmful substances discharged from ships. This Act disallows any harmful discharge of sewage, oil and noxious substances into the sea and sets the requirements for a shipboard waste management plan. The following Marine Orders relating to marine pollution prevention have been put in place to give effect to relevant regulations of Annexes I, II, III, IV, V and VI of MARPOL 73/78: • Marine Order 91: Marine Pollution Prevention – Oil • Marine Order 93: Marine Pollution Prevention – Noxious Liquid Substances • Marine Order 94: Marine Pollution Prevention – Packaged Harmful Substances • Marine Order 95: Marine Pollution Prevention – Garbage • Marine Order 96: Marine Pollution Prevention – Sewage • Marine Order 97: Marine Pollution Prevention – Air Pollution	Yes	Department of Infrastructure and Regional Development	This Act applies to vessel discharges and movements associated with the activity. The Act is relevant to the extent that Western Gas will comply with MARPOL through the following relevant Marine Orders relating to marine pollution prevention have been put in place to give effect to relevant regulations of Annexes I, II, III, IV, V and VI of MARPOL 73/78: • Marine Order 91: Marine Pollution Prevention – Oil • Marine Order 93: Marine Pollution Prevention – Noxious Liquid Substances • Marine Order 94: Marine Pollution Prevention – Packaged Harmful Substances • Marine Order 95: Marine Pollution Prevention – Garbage • Marine Order 96: Marine Pollution Prevention – Sewage

Commonwealth Legislation	Summary	Relevant to the Activity	Administering Authority	Relevant Aspects to the Activity
Protection of the Sea (Civil Liability of Bunker Oil Pollution Damage) Act 2008	This Act implements the requirements for the International Convention on Civil Liability for Bunker Oil Pollution Damage.	No	AMSA	This Act applies to diesel refuelling which will not be required during this activity.
Sea Installations Act 1987	The Sea Installations Act regulates the placement, use and maintenance of seabed installations in Australian waters. A sea installation refers to any manmade structure that is in contact with the seabed and used for an environment-related activity, for example: • Tourism and recreation • Carrying on of a business • Exploring, exploiting or using the living resources of the sea, seabed or sub-soil of the seabed whether by way of fishing, pearling, oyster farming, fish farming or otherwise • Marine archaeology • Other activities including scientific activity or transport activity	No		Yes – the London Protocol is implemented through Section 5 of the Sea Dumping Act; Article 1.4.1.4 of the London Protocol covers the abandonment of manmade structures.
Protection of the Sea (Harmful Antifouling Systems) Act 2006	This Act relates to the protection of the sea from the effects of harmful anti-fouling systems. It prohibits the use of harmful organotins in ant-fouling paints used on ships	Yes	Department of Infrastructure and Regional Development and AMSA	This Act applies to vessel movements in Australian Waters associated with the activity. Vessels are required to have biofouling systems in place to prevent introduction of IMS / harmful impact on Australian biodiversity.

1.5.3 International Agreements and Conventions

Australia is signatory to numerous international conventions and agreements that obligate the Commonwealth government to prevent pollution and protect specified habitats, flora and fauna. These agreements and conventions are described in Table 1-3.

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Table 1-3: Relevant International Agreements and Conventions

International Agreements and Conventions	Summary	Relevant to the Activity	Relevant Aspects to the Activity
Agreement Between the Government of Australia and the Government of Japan for the Protection of Migratory Birds in Danger of Extinction and Their Environment 1974 (commonly referred to as the Japan Australia Migratory Bird Agreement or JAMBA)	This agreement recognises the special international concern for the protection of migratory birds and birds in danger of extinction that migrate between Australia and Japan. Implemented in EPBC Act 1999.	Yes	Only relevant in so far as the credible spill scenario may result in impact to migratory seabirds foraging or nesting in area.
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 1986 (commonly referred to as the China Australia Migratory Bird Agreement or CAMBA)	This agreement recognises the special international concern for the protection of migratory birds and birds in danger of extinction that migrate between Australia and China. Implemented in EPBC Act.	Yes	Only relevant in so far as the credible spill scenario may result in impact to migratory seabirds foraging or nesting in area.
Convention for the Control of Transboundary Movements of Hazardous Wastes and Their Disposal 1989 (Basel Convention)	This convention deals with the transboundary movement of hazardous wastes, particularly by sea. Implemented in *Hazardous Waste (Regulation of Exports and Imports) Act 1989.*	No	Activity does not involve transboundary movement of hazardous wastes.
United Nations Convention on Biological Diversity – 1992	An international treaty to sustain life on earth.	Yes	Relevant only insofar as the activity may interact with MNES (threatened and migratory species) protected under the EPBC Act.
Convention on Oil Pollution Preparedness, Response and Co-operation 1990 (OPRC 90)	This convention comprises national arrangements for responding to oil pollution incidents from ships, offshore oil facilities, seaports and oil handling. The convention recognises that in the event of pollution incident, prompt and effective action is essential.	Yes	In the event that worse-case credible spill scenarios may enact a national arrangement for response.
Convention on the Conservation of Migratory Species of Wild Animals 1979 (Bonn Convention)	The Bonn Convention aims to improve the status of all threatened migratory species through national action and international agreements between range states of particular groups of species.	Yes	Only relevant in so far as the credible spill scenario may result in impact to MNES protected migratory species.

International Agreements and Conventions	Summary	Relevant to the Activity	Relevant Aspects to the Activity
International Convention for the Establishment of an International Fund for Compensation for Oil Pollution Damage (Fund 92)	This convention ensures compensation is provided for damage caused by oil pollution.	No	Relevant to oil tankers, not supply or support vessels.
International Convention for the Prevention of Pollution from Ships 1973/1978 (MARPOL 73/78)	This Convention and Protocol (together known as MARPOL 73/78) build on earlier conventions in the same area. MARPOL is concerned with operational discharges of pollutants from ships. It contains six Annexes, dealing respectively with oil, noxious liquid substances, harmful packaged substances, sewage, garbage and air pollution. Detailed rules are laid out as to the extent to which (if at all) such substances can be released in different sea areas. The legislation giving effect to MARPOL in Australia is the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*, the Navigation Act 2012 and several Parts of Marine Orders made under this legislation.	Yes	Already dealt with through the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* – refer to legislation table above
International Convention on Civil Liability for oil pollution damage (1969)	This convention provides a mechanism for ensuring the payment of compensation for oil pollution damage.	No	Relevant to oil tankers
International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Convention) 2004	The International Maritime Organisation (IMO) as been addressing the problem of invasive marine species in ship's ballast water since the 1980s. Ballast water and sediments guidelines were adopted in 1991 and the ballast water convention was adopted in 2004. Recent accession by Finland has triggered the final entry into force of these international requirements. As a result, the International Convention for the Control and Management of Ships Ballast Water and Sediment will enter into force on 8th September 2017 (IMO Briefing 22 2016). It aims to prevent the spread of harmful aquatic organisms from one region to another, by establishing standards and procedures for the management and control of ships' ballast water and sediments. Ballast Water Management systems must be approved by the Administration in accordance with this IMO Guidelines.	Yes	Potential internationally sourced vessel operating in Australian Waters which could have the potential for introduction of Invasive Marine Species and potential ballast water exchange.

International Agreements and Conventions	Summary	Relevant to the Activity	Relevant Aspects to the Activity
United Nations Convention on the Law of the Sea (UNCLOS) (1982)	Part XII of the convention sets up a general legal framework for marine environment protection. The convention imposes obligations on State Parties to prevent, reduce and control marine pollution from the various major pollution sources, including pollution from land, from the atmosphere, from vessels and from dumping (Articles 207 to 212). Subsequent articles provide a regime for the enforcement of national marine pollution laws in the many different situations that can arise. Australia signed the agreement relating to the implementation of Part XI of the Convention in 1982, and UNCLOS in 1994.	Yes	This Act applies to vessel discharges and movements associated with the activity. The Act is relevant to the extent that Western Gas will comply with MARPOL through the following relevant Marine Orders relating to marine pollution prevention have been put in place to give effect to relevant regulations of Annexes I, II, III, IV, V and VI of MARPOL 73/78: • Marine Order 91: Marine Pollution Prevention – Oil • Marine Order 93: Marine Pollution Prevention – Noxious Liquid Substances • Marine Order 94: Marine Pollution Prevention – Packaged Harmful Substances • Marine Order 95: Marine Pollution Prevention – Garbage • Marine Order 96: Marine Pollution Prevention – Sewage • Marine Order 97: Marine Pollution Prevention – Air Pollution
United Nations Framework Convention on Climate Change (1992)	The objective of the convention is to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous interference with the climate system. Australia ratified the convention in December 1992 and it came into force on 21 December 1993. Relevant GHG frameworks such as: • Paris Agreement • Kyoto Protocol (Doha Amendment)	Yes	Only relevant to the extent that to reduce impact of GHG emissions associated with vessel use, Western Gas will comply with MARPOL Annex VI (Marine Orders Part 97: Marine Pollution Prevention – Air Pollution) and require the use of low sulphur fuel. The MODU and support vessels will use diesel, which is a low sulphur fuel.

1.5.4 State Legislation

The petroleum activity described in this EP (Section 2) takes place within Commonwealth waters. It is noted that nearshore environments within Western Australia are not predicted to be impacted by an unplanned event, however an overview of Western Australian legislation is provided in Table 1-4 for completeness.

Table 1-4: Relevant State (WA) Legislation

Legislation or Regulation	Description
Conservation and Land Management Act 1984	Department of Environment and Conservation (DEC) 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.
Dangerous Goods Safety Act 2004	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.
Emergency Management Act 2005	WestPlan-MTE 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.

Legislation or Regulation	Description
Environmental Protection Act 1986	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.
Fish Resources Management Act 1994	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).
Marine and Harbours Act 1981	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.
Marine and Harbours (Fuelling) Regulations 1985	Refuelling businesses in ports to be licensed.
Maritime Archaeology Act 1973	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.
Pollution of Waters by Oil and Noxious Substances Act 1987	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.
Pollution of Waters By Oil and Noxious Substances Regulations 1993	
Port Authorities Act 1999	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.

Legislation or Regulation	Description
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.
Shipping and Pilotage Act 1967	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.
Western Australian Marine (Sea Dumping) Act 1981	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.
Western Australian Marine Act 1982	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.
W.A. 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.
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.
Wildlife Conservation Act 1950	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 of is likely to become extinct. List includes over 199 species, itemising scientific and common name.

2 DESCRIPTION OF THE ACTIVITY

Division 2.3 - Description of the activity
The environment plan must contain a comprehensive description of the activity including the following:

13(1)a: the location or locations of the activity;

13(1)b: general details of the construction and layout of any facility or other structure;

13(1)c: an outline of the operational details of the activity (for example, seismic surveys, exploration drilling or production) and proposed timetables;

13(1)d: any additional information relevant to the consideration of environmental impacts and risks of the activity.

2.1 OVERVIEW

Western Gas is planning to permanently leave in situ a total of four subsea wellheads associated with four permanently abandoned exploration wells, namely Chester-2, Glencoe-2, Mentorc-2 and Snapshot-1 in Petroleum Permits WA-70-R and WA-474-P. Plugging and abandonment of these wells has already occurred, as described in the Government accepted Well Operations Management Plan (WOMP) and End of Well Abandonment Reports (EWAR) for each well (Section 1.5.2.2).

In addition, the Glenloth-1 well is to remain as a temporarily suspended well within Petroleum Permit WA-70-R. Western Gas is proposing to undertake annual vessel-based wellhead survey activities on the suspended well. The activity summary can be found in Table 2-1.

All wells are located in Commonwealth waters approximately 180 km northwest of Onslow and 150 km north of Exmouth, Western Australia (Figure 2-1) at water depths between 1,116 and 1,131 metres.

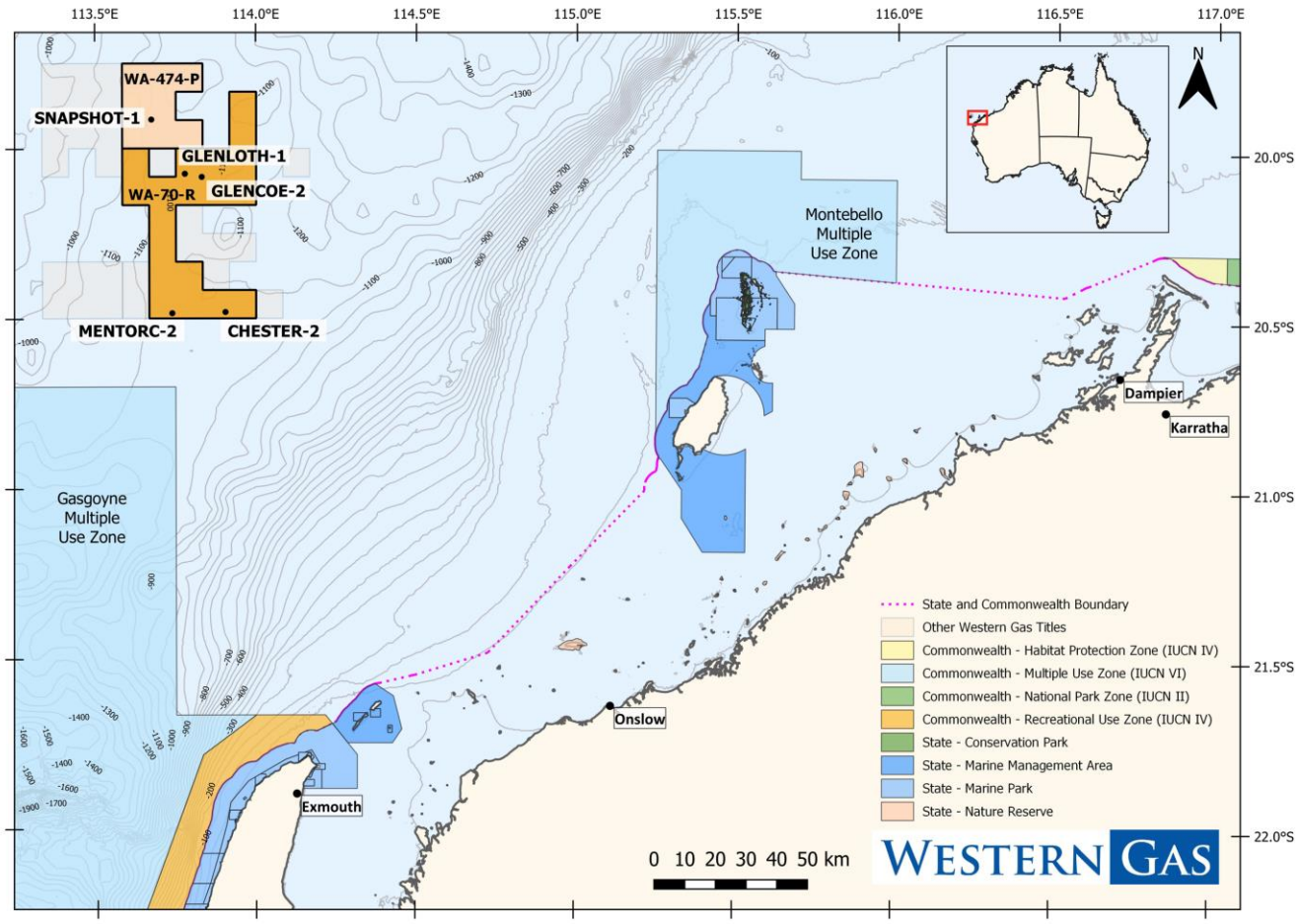

Figure 2-1: Location of Activity - Permit Areas WA-474-P and WA-70-R

Table 2-1: Activity Summary

Items	Data
Well Type	Suspended
Number of suspended wells	1 well
Number of P&A'd wells (out of survey scope)	4 wells
Water depth	1,100 m
Vessel type	Subsea Support Vessel or similar
Active ROV time to inspect wellhead	~ 6 hours
Estimated total survey duration	7 days (including contingency)
Number of vessels	1

2.1.1 Project Location

All wellheads covered by this EP are located within Permit Areas WA-474-P and WA-70-R (Figure 2-1).

There are no islands or emergent land masses within the Permit Areas and the nearest landfall is the North West Cape located approximately 145 km towards the south of the Permit Areas.

2.1.2 Operational Area

The surveys on Glenloth-1 will be conducted within the Operational Area assessed in this EP. The Operational Area will be a 500-metre zone from the wellhead.

The area that the wellhead occupies and an area around the wellhead where environmental impacts have the potential to occur has been included in the EMBA.

2.1.3 Timing

The proposed Activity involves leaving the four abandoned wellheads in-situ whilst the one wellhead associated with the suspended well will be surveyed by vessel once every year.

2.2 PERMANENTLY ABANDONED WELLHEAD DETAILS

2.2.1 Well Completion

After the target depths were reached, and the wells had been evaluated, the wells were suspended. The wellhead system (including suspension cap) remains above the mudline and a mud-mat (attached to the 0.9 m [36”] conductor) is in place on the seabed measuring approximately 3 m x 3 m (10ft x 10 ft). Verified barriers are in place to ensure well integrity as per the NOPSEMA-accepted WOMPs.

Since the integrity of the wells is assured, no further well completion will be required as part of the activity. No barriers identified as part of the WOMP will be modified during the activity.

2.2.2 Chester-2

The Chester-2 exploration well was drilled by HESS Australia as previous titleholder of WA-70-R in accordance with the Regulations in effect at that time and best industry practices.

In November 2017, Western Gas completed a transaction with HESS to acquire the interests in the Equus area permits including WA-518-P, WA-519-P, WA-474-P, WA-390-P and WA-70-R and assumed operatorship of Chester-2.

The well summary of Chester-2 can be found in Table 2-2 below.

Table 2-2: Chester-2 Wellhead Summary

Well Name and Permit	Chester-2	WA-70-R
Location	20° 28' 48.528" S	113° 54' 20.136" E
Titleholder	Western Gas (70 R) Pty Ltd	
Water Depth and Total Well Depth	1,125 m MDSS	3,726.1 m MDSS
Identified Zones with Potential to Flow	LBG HC Sands / Norian 590 and 595 Sands / Norian 500 Sand LBG Water Sands	
Year Suspended and Last Observed	2012	2012
Planned Future Use	Considered permanently abandoned	

Chester-2 was spudded on the 5th June 2011 with the Jack Bates semi-submersible Mobile Offshore Drilling Unit (MODU) and reached a total depth of 3,726m TVDSS on the 3rd August 2011. Following the acquisition of wireline logs across the Triassic targets and installation of a combination 10-3/4" x 9-5/8" casing string, the well was displaced to inhibited brine before setting two cement plug barriers over the intervals 3,223m – 3,076m TVDSS and 1,923m – 1,763m TVDSS. The rig was released from location on the 16 August 2011.

2.2.3 Glencoe-2H

Glencoe-2H (originally Glencoe-2) was constructed by HESS Australia as previous title holder of WA-70-R in accordance with the Regulations in effect at that time and best industry practices. The Glencoe-2H well summary can be seen in Table 2-3.

Table 2-3: Glencoe-2H Wellhead Summary

Well Name and Permit	Glencoe-2H	WA-70-R
Location	20° 4' 57.23" S	113° 49' 55.4" E
Titleholder	Western Gas (70 R) Pty Ltd	
Water Depth and Total Well Depth	1,116.6 m MDSS	3,923 m MDSS
Identified Zones with Potential to Flow	W. spectabilis Sand / LBG HC Sand	
Year Suspended and Last Observed	2012	2012
Planned Future Use	Considered permanently abandoned	

Glencoe-2 was spudded on the 19th August 2011 with the Transocean Legend semi-submersible drilling rig. After significant downtime was incurred, the well was halted at 1,518m (referenced to Transocean Legend RT) and the rig was withdrawn from service. The Jack Bates re-commenced operations from 1,525.1m (referenced to Jack Bates RT) on the 7th April 2012 and the well was drilled

to a total depth of 2,946m reaching TD on the 15th April. Following the acquisition of wireline logs the well was plugged back to 2,453.8m MDRT.

On 21st April 2012 Glencoe-2H was established as a side-track to Glencoe-2, kicking off at 2,480m in 12-1/4" hole. After progressively building angle to 89° and setting 9-5/8" production casing, an 800m long 8-1/2" horizontal section was drilled entirely within the W. spectabilis sandstone. The final total depth of 3,952m MDRT was reached on 1 May 2012. Following the running and cementing of a 7" liner to 3,797.5m the well was perforated, and flow tested. After the installation of two cement isolation plugs the rig was released from location on the 3 June 2012.

2.2.4 Mentorc-2

Mentorc-2 was constructed by HESS Australia as previous title holder of WA-70-R in accordance with the Regulations in effect at that time and best industry practices. The Mentorc-2 well summary can be found in Table 2-4.

Table 2-4: Mentorc-2 Wellhead Summary

Well Name and Permit	Mentorc-2	WA-70-R
Location	20° 29' 0.344" S	113° 44' 22.35" E
Titleholder	Western Gas (70 R) Pty Ltd	
Water Depth and Total Well Depth	1,131 m MDSS	2,526 m MDSS
Identified Zones with Potential to Flow	LBG HC Sands / LBG Water Sands	
Year Suspended and Last Observed	2011	2011
Planned Future Use	Considered permanently abandoned	

Mentorc-2 was spudded on the 12th March 2011 with the Jack Bates semi-submersible and reached a total depth of 2,526m TVDSS on the 10th April 2011. Following the acquisition of wireline logs across the Lower Barrow Group (LBG) sands a 9-5/8" liner was installed and the well displaced to inhibited brine. The well was secured with a combination cement barrier within the 13-3/8" casing, across the interval 1,986m – 2,115m TVDSS with no intent to re-enter in the future. The rig was released from location on the 19th April 2011.

2.2.5 Snapshot-1

Snapshot-1 was constructed by HESS Australia as previous title holder of WA-474-P in accordance with the Regulations in effect at that time and best industry practices. The Snapshot-1 well summary can be found in Table 2-5.

Table 2-5: Snapshot-1 Wellhead Summary

Well Name and Permit	Snapshot-1	WA-474-P
Location	19° 54' 49.451" S	113° 40' 31.074" E
Titleholder	Western Gas (474 P) Pty Ltd	
Water Depth and Total Well Depth	1,121.2 m MDSS	4,924.9 m MDSS
Identified Zones with Potential to Flow	Carnian 400 Water Sand / Norian 100 HC Sand / Norian 200 Water Sand / Norian 300 Water Sand / Norian 700 HC Sand	
Year Suspended and Last Observed	2016	2016
Planned Future Use	Considered permanently abandoned	

Snapshot-1 was spudded on the 19th March 2016 with the Ocean Monarch semi-submersible and reached a total depth of 4,951m MDRT (4,632.8m TVDSS) on the 30th April 2016. Following the acquisition of wireline logs across the target intervals the well was plugged with multiple cement plugs. The rig was released from location on the 20th May 2016.

2.3 SUSPENDED WELL WELLHEAD DETAILS

2.3.1 Glenloth-1

Glenloth-1 remains suspended in permit title WA-70-R. NOPSEMA has accepted the WOMP associated with Glenloth-1 in relation to ongoing temporary suspension of the well subject to Western Gas commencing detailed design on the permanent abandonment of Glenloth-1 within three (3) years. The well status summary of Glenloth-1 can be found below in Table 2-6.

Table 2-6: Glenloth-1 Wellhead Summary

Well Name and Permit	Glenloth-1	WA-70-R
Location	20° 04' 23.9" S	113° 46' 46.258" E
Titleholder	Western Gas (70 R) Pty Ltd	
Water Depth and Total Well Depth	1,116.53 m MDSS	4,989 m MDSS
Identified Zones with Potential to Flow	Carnian 400 Sand / Norian 100 Sand / Norian 300 Sand / Norian 400 Sand / Norian 500 Sand / Norian 600 Sand / LBG HC Sand	
Year Suspended and Last Observed	2010	2010
Planned Future Use	Currently suspended. Requires further Petroleum Activity intervention to permanently abandon.	

2.4 WELL INSPECTION SURVEY

The primary commitment made by HESS in the 2016 WOMP approved by NOPSEMA, was to conduct a five-year surveillance survey of suspended wells to determine whether there is any evidence of barrier

deterioration and to determine whether on-going well integrity is maintained by the absence of visible hydrocarbon discharge from within the wellbore.

Under the WOMP accepted in 2022 for Glenloth-1, a seabed well inspection survey will be undertaken at least once per year to confirm the integrity of the Glenloth-1 wellhead.

An ROV will be deployed from a small utility vessel to locate and inspect the wellhead.

The survey may take up to 7 days, including time for contingencies. The ROV inspection of the wellhead itself is expected to take approximately 6 hours.

2.4.1 Vessel Operations

Vessels will be fuelled by marine diesel oil (MDO), and there is no planned vessel refuelling to take place in the Operational Area. All vessel fuelling is proposed to take place at a suitable harbour prior to mobilisation for the Activity.

At this time, the small utility vessel that will be used to undertake inspection survey activity has not been identified, however would typically be less than 30 m in length and support a crew of approximately 15 persons.

The vessel transiting to and from the operational area is not included in the scope of this EP; and will operate under the Commonwealth *Navigation Act 2012* and are subject to existing Australian Maritime Law.

2.4.2 ROV Operations

A suitable ROV capable of operating in the water dept at the Operational Area will be installed on the vessel with pre-survey tests conducted prior to mobilisation and once installed.

To assist in locating the wellhead, an ROV may use various geophysical and hydrographic survey techniques such as Multibeam echo-sounder (MBES), Side-scan Sonar (SSS), Ultra-short Baseline System (USBL) and General Video Inspection (GVI).

Once the wellhead has been located, the ROV will record imagery of the wellhead and the surrounding seabed enabling an assessment of the state of the wellhead and surrounds.

If an ROV is unavailable, an AUV has been deemed suitable to conduct survey work.

2.5 CURRENT STATUS OF INFRASTRUCTURE

As required by the Section 572 Maintenance and removal of property Policy (N-00500-PL1903), this section describes an inventory for all property in the title area.

A schematic of the wellheads from the original equipment manufacturer, Baker Hughes, is included as Figure 2-2. All wellheads are of the same type and design.

A General Visual Inspection (GVI) of the Glenloth-1 wellhead was conducted in December 2022. The GVI concluded:

- There was no indication of any form of leakage from the wellhead or adjacent seabed. This provides verification that temporary suspension barriers remain fully intact.
- There was no evidence of damage to or deterioration of the Glenloth-1 wellhead.
- There was no evidence of marine growth or marine life in the vicinity of the Glenloth-1 wellhead.

Refer to Figure 2-3, Figure 2-4, Figure 2-5 and Figure 2-6 for photographs of the structures present at Glenloth-1.

Given the wellhead structures are the same between all wellheads included in this EP and the similar depth and environments the wellheads are located in, Glentloth-1 is an appropriate analogue for the status and condition of the other wellheads included in this EP.

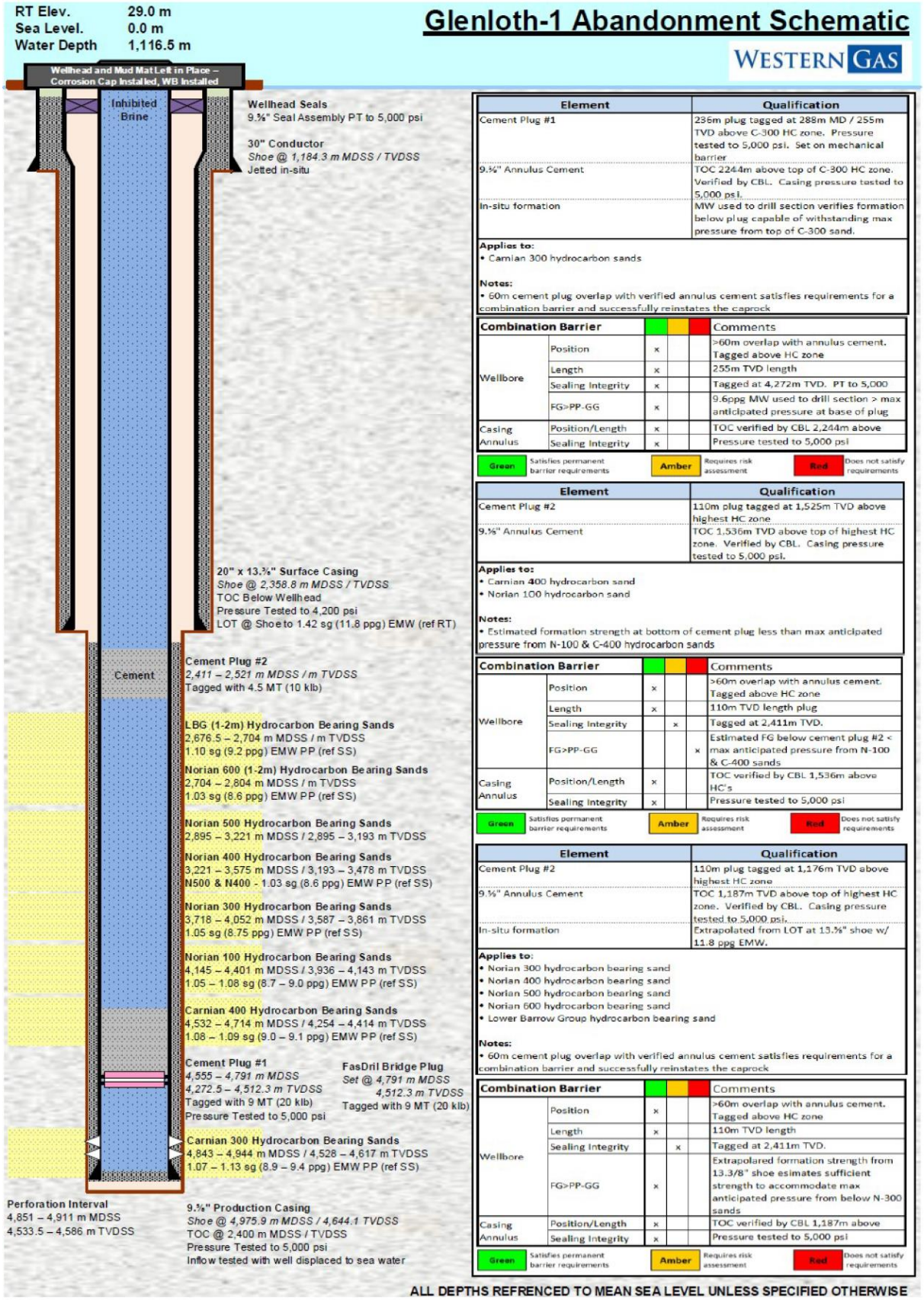

Figure 2-2: Schematic of the wellhead

Figure 2-3: Photograph of the Glenloth-1 well conductor debris cap

Figure 2-4: Photograph of the Glenloth-1 well conductor

Figure 2-5: Photograph of the Glenloth-1 guide base connection to wellhead

Figure 2-6: Photograph of the Glenloth-1 guide base

3 DECOMMISSIONING OPTIONS ASSESSMENT

3.1.1 Overview

Section 572(3) of the OPGGS Act states that “a titleholder must remove from the title area all structures that are, and all equipment and other property that is, neither used nor to be used in connection with the operations in which the titleholder is or will be engaged and that are authorised by the permit, lease, licence or authority.”

The Offshore Petroleum Decommissioning Guideline (DISER, 2020) clarifies that the Base Case is complete removal of all equipment and property. Options other than complete removal may be considered if the titleholder can demonstrate that the alternative decommissioning approach delivers equal or better environmental outcomes compared to complete removal, and that the approach complies with all other requirements (DISER, 2020).

To inform the scope of the petroleum activity for this EP, Western Gas conducted an options assessment to evaluate decommissioning options relative to the Base Case. Consistent with the Decommissioning Guidelines, the options assessment considered environmental, and social criteria to evaluate each decommissioning option, however it was the environmental criteria alone that were used to determine the decommissioning option. In accordance with the Section 572 Maintenance and Removal of Property Policy (NOPSEMA, 2020), the EP must evaluate the feasibility of all options, therefore technical feasibility criteria are also considered in the options assessment. NOPSEMA released an updated guidance on Section 572 Maintenance and Removal of Property in December 2022 (NOPSEMA, 2022)

Stakeholders were consulted on the selected option as described in Section 10.

3.1.2 Process

The process used to conduct the decommissioning options assessment for Chester-2, Glencoe-2H, Mentorc-2 and Snapshot-1, compromised of:

1. Identification the potentially feasible decommissioning options for the wellheads and the activities associated with the decommissioning options
2. Evaluation options based on compliance alongside relevant legislation and guidelines associated with decommissioning
3. Assessment of the practicability of each option from a technical perspective
4. Assessment of the environmental impacts and risks associated with the activities required to implement each decommissioning option

3.1.2.1 Relevant Decommissioning Legislation and Guidelines

Table 3-1 provides an assessment of the decommissioning options against identified relevant legislation and guidelines.

Table 3-1: Relevant Decommissioning Guidelines and Legislation

Legislation/Guideline	Relevant Clause/Requirement	*Option 1*	*Option 2*
		Removal	**Leave in-situ**
OPGGS Act 2006	Section 572 requires titleholders to remove structures, equipment and property that are no longer being used in connection with operations authorised by the title Section 270 requires titleholders to remove all infrastructure before the title can be surrendered or to make alternative arrangements that are satisfactory to NOPSEMA in relation to that infrastructure.	Removal meets requirements under the Act for removal from the title areas.	The case for leaving the infrastructure in-situ needs to be to the satisfaction of NOPSEMA and approved through the acceptance of an EP.
NOPSEMA Policy on s572 (NOPSEMA, 2022)	NOPSEMA's policy on s572 (NOPSEMA, 2022) proposes that a deviation from the base case of full removal can be sought via an EP where the titleholder demonstrates that the arrangements for the alternative approach are acceptable. Arrangements other than removal of property will only be accepted where they are appropriate having regard to applicable legislation, relevant Australian Government guidelines and policy. Specifically, the titleholder must demonstrate that the alternative decommissioning approach meets all applicable requirements under the OPGGS Act and regulations, any other legislative requirement, and relevant international obligations.	Removal meets 'base case' requirements for decommissioning under the Policy for removal from the title area.	Leaving infrastructure in-situ is an alternative decommissioning option and therefore, in order to fall within NOPSEMA's Policy on s572, it needs to be demonstrated in an EP that arrangements for leaving infrastructure in-situ are acceptable and meets all applicable requirements under the OPGGS Act and regulations, any other legislative requirement, and relevant international obligations. An EP must demonstrate that the alternative arrangement proposed delivers environmental performance outcomes that ensure that environmental impacts and risks will be reduced to ALARP, be of an acceptable level and are carried out in a manner consistent with the principles of ecologically sustainable development.
Environment Protection (Sea Dumping) Act 1981	Section 10A of the *Environment Protection (Sea Dumping) Act 1981* requires a permit to be obtained for dumping controlled material into Australian waters. 'Controlled material' is defined in the *Environment Protection (Sea Dumping) Act 1981* as 'waste or other	Removal of infrastructure does not trigger any requirements under the *Environment Protection (Sea Dumping) Act 1981,* considering infrastructure will be removed from the marine environment.	A permit may be required under the *Environment Protection (Sea Dumping) Act 1981* to leave infrastructure in situ.

Legislation/Guideline	Relevant Clause/Requirement	*Option 1* Removal	*Option 2* Leave in-situ
	material (within the meaning of the Protocol [meaning the London Protocol])' The London Protocol states that sea dumping does not include 'the abandonment in the sea of matter (such as cables, pipelines and marine research devices) placed for a purpose other than the mere disposal thereof'.		
International Maritime Organisation (IMO) Resolution A.672(16) -Guidelines and standards for the removal of offshore installations and structures on the continental shelf and the exclusive economic zone adopted 1989	Relevant paragraphs of IMO Resolution A.672(16) contain the following requirements: • Infrastructure within specified water depths (above 75 and 100 m) should be completely removed (paragraphs 3.1 and 3.2) • Infrastructure left in-situ should not cause unjustifiable interference with other uses of the sea (paragraph 3.4.2). • Structures left in-situ should be marked on navigational charts (paragraph 3.8). • Structures left in-situ should be monitored, as necessary, for compliance against these guidelines (paragraph 3.10). • Responsibility for maintenance and liability for future damages from structures left in-situ should be clearly established (paragraph 3.11).	Meets requirements for removal of abandoned or disused installations and structures.	Leaving the Chester-2, Glencoe-2H, Mentorc-2 and Snapshot-1 wellhead meets all the requirements of IMO Resolution A.672(16), as follows: • The depth of water where these wellheads are located is 1,125 m and therefore far deeper than the depths paragraphs 3.1 and 3.2 recommend for removal. • Interferences with other marine users as been assessed as 'low'. • Through this EP, Western Gas commits to marking Chester-2, Glencoe-2H, Mentorc-2 and Snapshot-1 on navigation charts (paragraph 3.8). • Chester-2, Glencoe-2H, Mentorc-2 and Snapshot-1 are located in fixed positions and will not move from their location (paragraph 3.9). • Periodic monitoring is not required to ensure ongoing compliance against IMO Resolution A.672(16) (paragraph 3.10). This is on the basis that the wellhead will be marked on navigational charts and the degradation of the wellhead is not expected to result in release of material that will result in a risk to navigation. • No ongoing maintenance is required of the Chester-2, Glencoe-2H, Mentorc-2 and Snapshot-

Legislation/Guideline	Relevant Clause/Requirement	*Option 1*	*Option 2*
		Removal	**Leave in-situ**
			1 wellheads. Furthermore, upon acceptance of this EP, Section 270 of the OPGGS Act provides for the title to be relinquished, at which point Western Gas' responsibility for liability would cease. Section 6 provides an assessment of the residual risks that are expected to remain at the time the title is relinquished (paragraph 3.11).

3.1.2.2 Decommissioning Options

A screening assessment was undertaken to identify potential credible decommissioning options of the wellheads for the permanently abandoned well. These options are discussed in Table 3-2.

Table 3-2: Assessment of Decommissioning Assessment Criteria

Decommissioning Option	Description	Credible
Option A – Remove below mudline (2 m):	Internal cutting utilises cutting tools deployed from the inside of the wellhead (below the mudline to sever the wellhead and internal casing string from the inside of the casing stump. The severed wellhead and casing/conductor stumps (and any surrounding cement attached) are then pulled and recovered using the same tooling used to make the cut. This method should leave nothing protruding from the seafloor.	✓
Option B -- Remove at the mudline:	External cutting: utilises cutting tools deployed from the outside of the wellhead (above the mudline where there is access) to sever the wellhead, conductor and internal casing strings from the casing stump by cutting from the outside. This method will usually leave a stump (100 mm) protruding from the seafloor. Both conventional diamond wire saw (DWS) methods and tooling and a newly designed DWS tool were considered. Conventional DWS methods have significant technical issues likely to prevent it from being a suitable option. DWS require mounting to the conductor, requiring removal of the Guide Base (GB) or dredging below to allow access to the conductor below the GB.	✓
Option C – Leave wellheads in-situ	The wellheads have been in place since 2011, 2012 and 2016 since their plug and abandonment. No removal campaign/s or additional activities would be required.	✓
Option C.1 -- Wellhead covering/capping:	The installation of a wellhead cover or cap on top of the wellhead is intended to reduce the potential for snagging risks to commercial trawl fishers. As there are currently no active fisheries occurring within this area, this is a credible decommissioning scenario. If fisheries become active again in this area, the wellhead will be found on navigational charts and can be avoided.	✓

3.1.3 Assessment Criteria and Rating Details

The criteria and sub-criteria used for the options assessment are detailed and the rating details are described in Table 3-3.

Table 3-3: Options Assessment Criteria and Sub-criteria

Criteria	Sub-criteria	Description
Environment	Water quality and sediment quality	Assessment of water and sediment quality
	Ecological services	Assessment of biodiversity and habitat changes due to the physical presence of property, and seabed disturbance because of the petroleum activity
	Emissions	Emissions such as light, noise, air and marine discharges.
	Waste	Volume and type of waste associated with offshore operations (e.g., landfill, recyclables)
Technical Feasibility	Engineering and execution complexity	The extent to which the option requires the use of proven technology. The ability to recover from unplanned excursions and complete the planned option.
Social	Effect on current and future commercial fisheries	Displacing commercial fisheries or affecting their catch. Consideration given to current and potential future commercial fisheries
	Other socio-economic effects	Effects on local communities, recreational users, commercial activities, etc.
Economic	Financial cost	Operational / capital costs to Western Gas

3.1.4 Options Evaluation

A workshop was held to evaluate the decommissioning options for the Chester-2, Glencoe-2H, Mentorc-2 and Snapshot-1 wellheads. Table 3-4 provides a summary of the assessment with a colour rating used to represent the criteria.

The detailed output from this workshop is provided in Appendix B.

Table 3-4: Decommissioning Options Assessment Workshop Outcomes

Criteria	Sub-criteria	Decommissioning Options			
		Option A - Remove below mudline (2 m)	**Option B - Remove at the mudline**	**Option C – Leave in-situ**	**Option C.1 – Wellhead covering/capping**
Environment	Water quality and sediment quality	If cutting 2 m below the mudline an internal cutting tool requires access to latch onto the wellhead. This will require dredging to access the wellhead through ROV use.	Cutting at the mudline would require dredging if using DWS – less associated than full removal below the mudline	Leaving in-situ does not require any disturbance to the water or sediment quality	Wellhead capping/covering increases the wellhead footprint minimally. Does not require dredging but does influence the footprint associated.
	Ecological services (Marine growth/substrate)	At these depths, there will be minimal marine growth associated. Seabed disturbance will occur as a result of cutting below the mudline and lifting the infrastructure to remove from the ground.	At these depths, there will be minimal marine growth associated. A portion of infrastructure will remain above the seabed (any marine growth on this piece will remain / re-grow). Over time the remaining infrastructure will deteriorate.	Leaving in-situ does not require any change to the current status of the wellhead and surrounding area. Deterioration of the infrastructure will occur over time, however analogous data from Glenloth-1 shows this is slow / unlikely.	At these depths, there will be minimal marine growth associated. Deterioration of the infrastructure will occur over time, however analogous data from Glenloth-1 shows this is slow / unlikely.
	Emissions (light, noise, atmospheric)	Vessels associated	Vessels associated	No vessels associated	Vessels associated
	Waste	Vessels associated and removal/recycling onshore	Vessels associated and removal/recycling onshore	No vessels or waste associated	Vessels associated with installation (food waste, brine, cooling water, grey water)
Technical Feasibility	Engineering and execution complexity	Internal cutting is the most complex option associated with the removal of the wellheads, dependant on the Geotech/seabed	DWS is the most complex option associated with the removal of the wellheads.	No engineering or execution associated	Not complex, fairly straightforward operation – design is required to ensure stability and associated impacts

Criteria	Sub-criteria	Decommissioning Options			
		Option A - Remove below mudline (2 m)	**Option B - Remove at the mudline**	**Option C – Leave in-situ**	**Option C.1 – Wellhead covering/capping**
Social	Effect on current and future commercial fisheries	Eliminates snag risk to commercial fisheries if they operate in the region in the future.	Snag risk remains to trawl fishing operations; however, commercial fishing is not expected to occur in the operational area. Possible risk to future fisheries, however water depth and location suggests low risk to future fishing activities. Vessel activity and associated impacts and risks for no additional benefit.	Snag risk remains to trawl fishing operations; however, commercial fishing is not known to occur in this area. Possible risk to future fisheries, however water depth and location suggests low risk to future fishing activities.	The presence of a cover/cap may pose a potential snag risk for trawl fishing due to the extended height added over the wellhead. However, commercial fishing is not known to occur in this area. Possible risk to future fisheries, however water depth and location suggests low risk to future fishing activities. Vessel activity and associated impacts and risks for no extra benefit.
	Other socio-economic effects (local users, KEFs/Marine Parks, cultural heritage, commonwealth activities)	Full removal of the wellheads provide work onshore and offshore – good reputation	Removal of the wellheads provide work onshore and offshore – good reputation	Leaving in-situ with no marine growth due to water depth – Least preferred reputation	Potential reputational benefits as a responsible petroleum operator
Economic	Financial Impact	Costs associated with vessel use, personnel, removal of wellhead, disposal of wellhead	Costs associated with vessel use, personnel, removal of wellhead, disposal of wellhead	No cost associated as no operations would occur	Costs associated with vessel use, personnel, design and implementation of the well cap

3.1.5 Recommendations

The options assessment against environmental criteria alone shows that Option C (leave in-situ) is the preferred option.

Option C was ranked 'most preferred' for all environment related sub-criteria, which are:

- Water and sediment quality
- Ecological services
- Emissions
- Waste.

This is in part due to Option C not requiring any vessel campaigns associated, whereas the other three options do. The other options also have some kind of interaction on the seabed at the locations of the wellheads which influence the environmental criteria assessment.

Option C therefore does not have any associated impacts or risks from vessel use – i.e. emissions, operational discharges (cooling water, brine, bilge), unplanned releases (diesel fuel, hydrocarbons and chemicals) and the introduction of IMS.

Option C may present potential risk to future commercial fisheries, due to snag risk, however given the water depth and location the potential for trawl fishing to extend into this region in the future is considered very low. When considering standard controls to avoid snagging risks by commercial trawl fishers, the risk is mitigated further (Section 7.5.1.1).

Option C therefore is determined to provide a net positive environmental benefit compared to the other options. For an ALARP demonstration and acceptability assessment of Option C please refer to Section 6.3.

Option B (removal by DWS and cutting at the mudline) has the additional environmental impact due to the requirement to dredge up of sediment in order to remove the wellhead if external obstructions are in place. Both Option A and B would result in disturbance of the seabed and any original drill cuttings, resulting in a localised impact to water and sediment quality. Option A does, however, remove any risk associated with future trawl fisheries as the snag risk will be completely eliminated.

Option C.1 (install cap/cover) was considered to reduce snag risk to fisheries, but consultation and feedback from fisheries stakeholders regarding this issue determined this option would still present as a snag risk if current or future commercial fishers are active in the area.

On this basis, Option C (leave in-situ, no additional cap/covering) was selected as it was the preferred option overall and when environmental criteria alone are considered. The options assessment demonstrated that Option C (leave in-situ) provides a better environmental outcome in either wellhead

scenario compared to the other three options. The wellhead is expected to have a low profile (approximately 3 m above the seabed), and the area around the wellheads is currently not actively trawled.

Western Gas is therefore proposing a deviation from the removal requirements of subsection 572(3) of the OPGGS Act and Option C (leave in-situ) has been defined as the preferred decommissioning activity for the purposes of this EP.

4 EXISTING ENVIRONMENT DESCRIPTION

Division 2.3 - Description of the environment
The environment plan must:

13(2) a) describe the existing environment that may be affected by the activity; and
b) include details of the particular relevant values and sensitivities (if any) of that environment.

13(3): Without limiting paragraph (2)(b), particular relevant values and sensitivities may include any of the following:

a) the world heritage values of a declared World Heritage property within the meaning of the EPBC Act;
b) the national heritage values of a National Heritage place within the meaning of that Act;
c) the ecological character of a declared Ramsar wetland within the meaning of that Act;
d) the presence of a listed threatened species or listed threatened ecological community with the meaning of that Act;
e) the presence of a listed migratory species within the meaning of that Act;
f) any values and sensitivities that exist in, or in relation to, part or all of:
   i. a Commonwealth marine area within the meaning of that Act; or
   ii. Commonwealth land within the meaning of that Act.

4.1 SECTION OVERVIEW

This Section provides a description of the existing marine environment in which the Activity proposes to operate and the marine environment that could potentially be affected by an unplanned event (e.g. a hydrocarbon release from a vessel into the marine environment).

In order to identify the environmental features relevant to the Activity, a project footprint is defined that is referred to as the Environment that May Be Affected (EMBA) by the Activity. The EMBA is determined by the predicted spatial extent of all identified planned (i.e. impact) and unplanned (i.e. risk) events arising from the Activity.

Seven planned (i.e. impacts) and five unplanned (i.e. risks) environmental events from the Activity were identified during the ENVID (refer to Section 5 for methodology). Planned and unplanned events are discussed in detail in Section 6 and Section 7, respectively.

4.2 PROJECT AREAS

The spatial boundary of the environmental assessment is defined using project areas. These are the areas within which the impacts or risks resulting from environmental aspects are expected to occur.

For this EP the following project areas have been defined (Figure 4-1):

- Operational Area – the area within which impacts from planned activities will occur. Defined as 500 m from the well location.

- Hydrocarbon Exposure Area (HEA) – the largest area within which hydrocarbon exposure will be moderate (based on moderate exposure values) may result in impacts to fauna.

As there is no risk for loss of well control, the HEA has been determined by the potential risk of a vessel-based collision occurring within the EMBA or Operational Area.

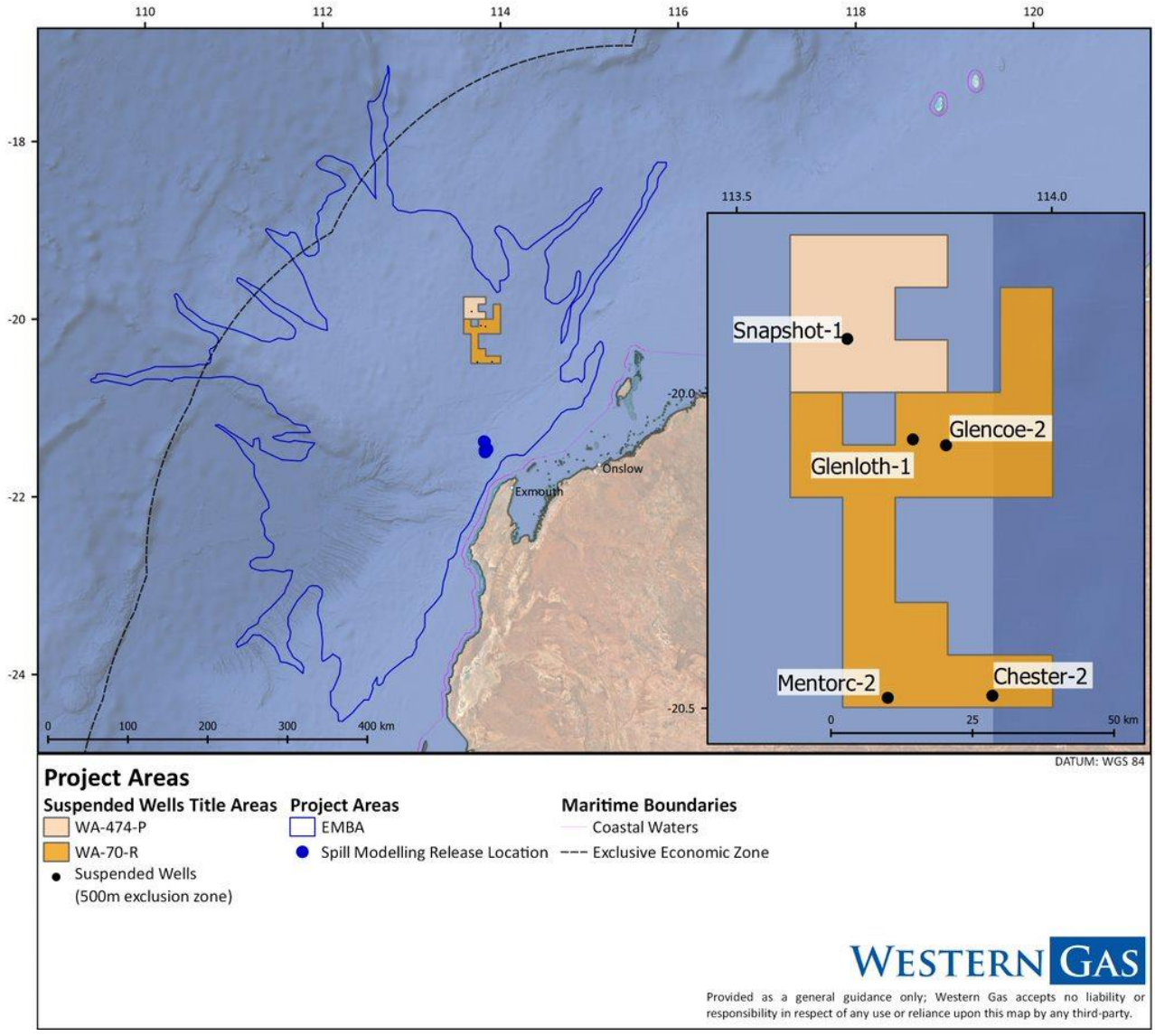

Figure 4-1: Project Areas and associated EMBA

4.2.1 Hydrocarbon Spill from Ruptured Fuel Tank

The MDO spill scenario has no shoreline accumulation predicted for any season at or above the low threshold (10 g/m^2) (RPS, 2022). The maximum distance of surface oil from the release location at the low (≥1 g/ m^2), moderate (≥10 g/ m^2) and high (≥50 g/ m^2) thresholds were 164 km (north-northeast), 91 km (southwest) and 79 km (northeast), all occurring during transitional conditions, respectively (RPS,

2022). MDO is characterised by a high percentage of volatile components (95%), which will evaporate when on the sea surface (generally about 6% over the first 12 hours, a further 34.6% should evaporate in the first 24 hours, and an additional 54.4% should evaporate over several days). It also contains 5% persistent hydrocarbons, which will not evaporate, though will decay over time. Some heavy components contained in MDO have a strong tendency to physically entrain into the upper water column in the presence of moderate winds (i.e., >12 knots) and breaking waves but can re-float to the surface if these energies abate (RPS, 2022).

4.3 REGIONAL GEOGRAPHICAL SETTING

Permit Areas WA-474-P and WA-70-R are located in a deep-water region north of the Exmouth coastline, adjacent to the Exmouth Plateau on the North West Shelf (Figure 2-1). The Permit Areas are located on the Continental Slope of Commonwealth waters in water depths of 900 to 1,200 m.

The proposed Activity will be undertaken within the Northern Carnarvon Basin. This basin is dominated by a southwest trending set of troughs, these being the Exmouth, Barrow, Dampier, and Beagle Sub-basins. These are the major Mesozoic depocentres of the southern North West Shelf, containing up to 15 km (9 nm) of Mesozoic sedimentary rock (GeoScience Australia, 2014[1]).

4.4 RELEVANT VALUES AND SENSITIVITIES OF THE ENVIRONMENT

4.4.1 Habitats

Although targeted benthic assessment of the full Operational Area has not been undertaken, previous box coring, pre-drilling ROV surveys, sediment grab sampling and seismic and sonar surveys have been undertaken by HESS and Western Gas throughout the WA-70-R (then WA-390-P) Permit Area. Given the proximity of WA-70-R and WA-474-P, the similarity of water depths and absence of any hard substrate, it is assumed that WA-70-R and WA-474-P would exhibit similar benthic attributes.

Therefore, the Operational Area is likely to be comprised of deep, soft sediments with typical infauna and epifaunal macro-invertebrates of this type of habitat within the North West Province and on a larger scale, the North West Shelf region (Ward and Rainer, 1988[2]). In this region, benthic communities in depths greater than 200 m primarily are comprised of scavengers, detrital feeders and filter feeding

1 GeoScience Australia (2014) Carnarvon Basin- Basin Details and Geological Overview accessed via http://www.ga.gov.au/scientific-topics/energy/province-sedimentary-basin-geology/petroleum/offshore-northwest-australia/canarvon.

2 Ward, T.J. and Rainer, S.F. (1988). Decapod crustaceans of the North West Shelf, a tropical continental shelf of North-Western Australia. Australian Journal of Marine and Freshwater Research, 39: 751-765.

organisms (DEWHA, 2007[3]) with percentage cover of epibenthic communities typically less than shallower regions (Fulton *et al*., 2006).

As the EMBA lies in waters that reach a nearshore environment, different values are being impacted by the unplanned risk associated with vessel-based activities. More detailed information on the impacted receptors within the EMBA can be found throughout this section.

4.4.2 Australian Marine Parks

Australian Marine Parks (AMPs) occur within Commonwealth waters and have been proclaimed as Commonwealth reserves under the EPBC Act in 2007 and 2013.

There are no AMPs located within the Operational Area. The closest AMP to the Operational Area is the Gascoyne Marine Park, which is approximately 22 km away. The EMBA overlaps a total of six AMPS; five are located within the North-west Marine Region (NWMR) and one within the South-west Marine Region (SWMR). These details are described in Table 4-1 and associated

Figure 4-2.

[3] Department of Water, Environment, Heritage and the Arts (DEWHA). (2007). A Characterisation of the Marine Environment of the North-west Marine Region. A summary of an expert workshop convened in Perth, Western Australia, 5-6 September 2007. Prepared by the North-west Marine Bioregional Planning Section, Marine and Biodiversity Division. DEWHA, Canberra, ACT.

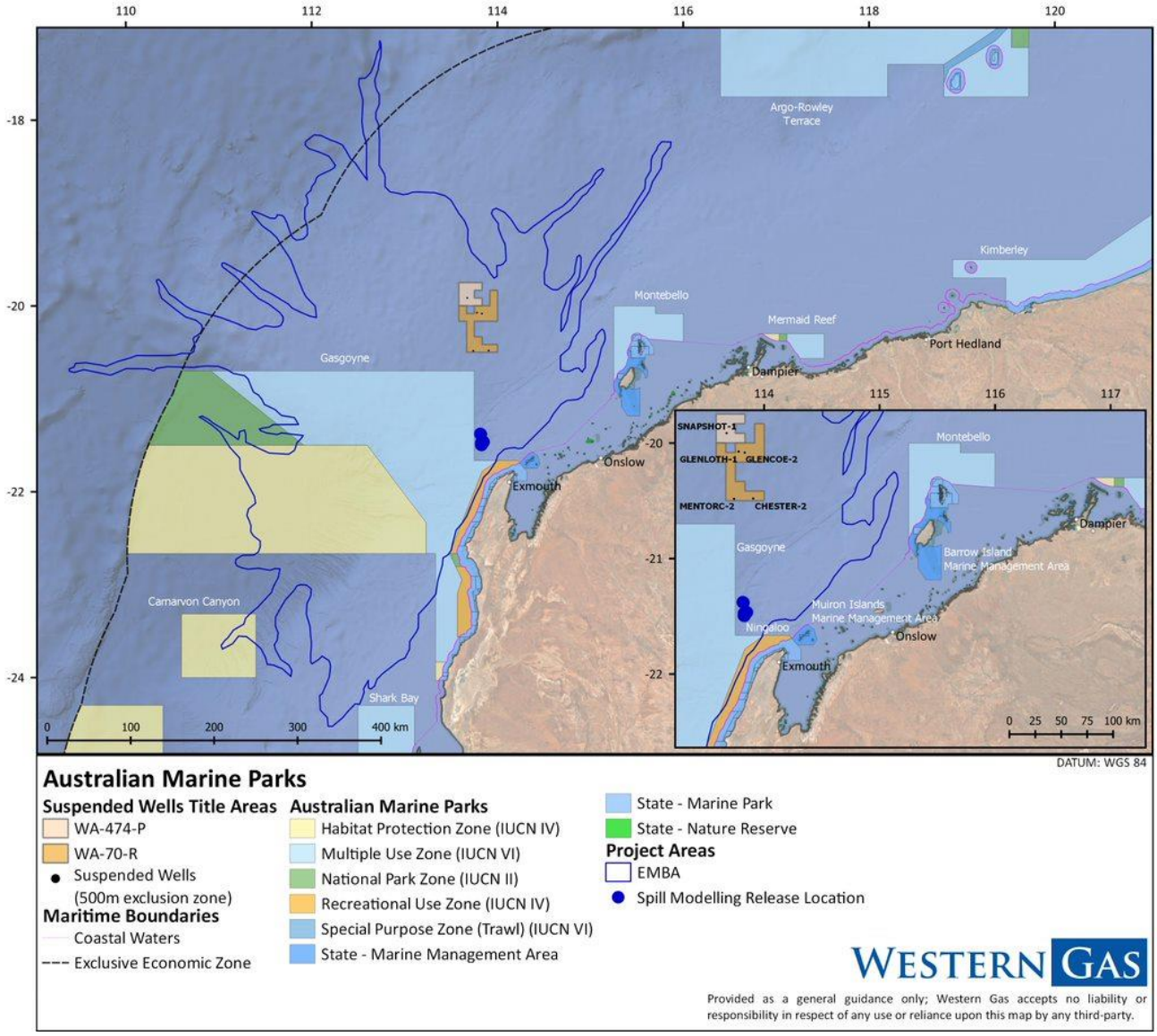

Figure 4-2: Australian Marine Parks within the EMBA

Table 4-1: Australian Marine Parks relevant to the Project Area

Protected Area	Operational Area	Diesel Spill EMBA
Commonwealth Marine Parks		
Gascoyne Marine Park	-	✓
Carnarvon Canyon Marine Park	-	✓
Ningaloo Marine Park	-	✓

4.4.3 Key Ecological Features

One Key Ecological Feature (KEF) occurs within the Operational Area and spill EMBA (Table 4-2 , Figure 4-3). Detailed description of this KEF is provided in Appendix C.

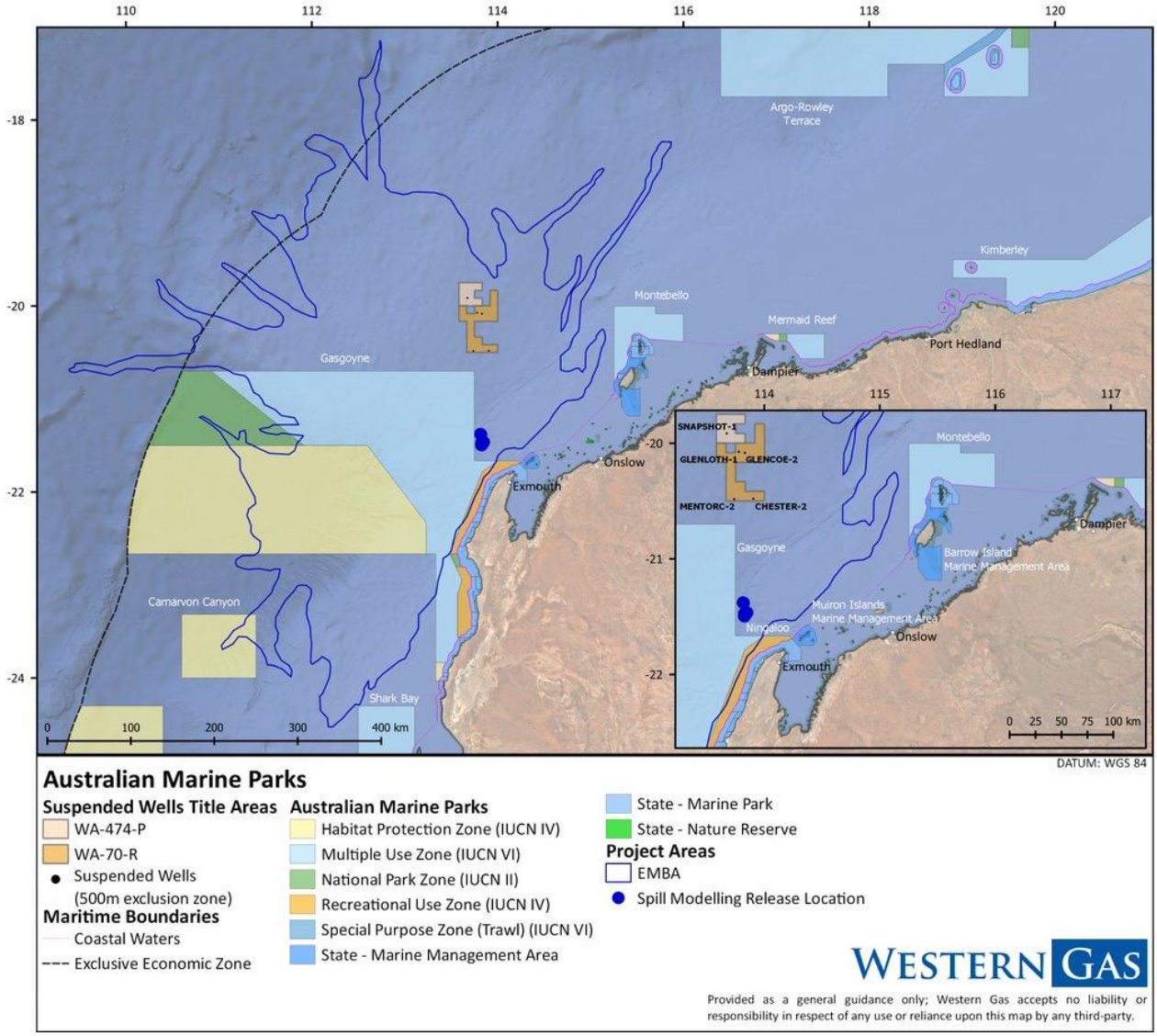

Figure 4-3: Key Ecological Features (KEFs) within the EMBA

Table 4-2: Key Ecological Features present within the operational area and spill EMBA

Value/ Sensitivity	EMBA	
	Operational Area	Diesel Spill EMBA
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		✓
Exmouth Plateau	✓	✓

4.4.4 Fisheries

The Commonwealth and State managed fisheries that occur within the Operational Area and the spill EMBA are listed in Table 4-3. Detailed information regarding these fisheries is provided in Appendix C.

Table 4-3: Commonwealth and State fisheries within the operational area and spill EMBA

Value/Sensitivity	EMBA	
	Operational Area	Diesel Spill
Commonwealth Managed Fisheries		
Southern Bluefin Tuna	✓	✓
Western Deepwater Trawl Fishery	✓	✓
Western Tuna and Billfish Fishery	✓	✓
North West Slope Trawl Fishery	✓	✓
State Managed Fisheries (North Coast Bioregion)		
Beche-De-Mer (Sea Cucumber) Fishery	-	✓
Pearl Oyster Fishery	-	✓
Pilbara Fish Trawl (Interim) Managed Fishery	-	✓
Onslow Prawn Managed Fishery (OPMF)	-	✓
Nickol Bay Prawn Managed Fishery (NBPMF)	-	✓
Pilbara Trap Managed Fishery	-	✓
Gascoyne Coast Bioregion		
Gascoyne Demersal Scalefish Fishery		✓
West Coast Bioregion		
Roe's Abalone Fishery		✓
West Coast Rock Lobster Fishery		✓
West Coast Deep Sea Crustacean Fishery		✓
State-wide Bioregion		
Marine Aquarium Fish Managed Fishery		✓
Specimen Shell Managed Fishery		✓
Hermit Crab Fishery		✓
Pearling and Aquaculture		
Aquaculture Leases		✓

4.4.5 Tourism

Tourism activities have not been identified to occur within the Operational Area. The EMBA does have activities such as: charter fishing, diving, snorkelling, whale, marine turtle and dolphin waters and cruising.

With the exception of offshore charter fishing, most marine tourism activities occur in state waters. Charter fishing is a popular tourist activity in the Pilbara region with most tours operate out of Exmouth. Whale watching is a popular tourist activity, particularly in the Exmouth Gulf during the southward migration of Humpback Whales from September to late November (DEWHA 2008). The area also offers encounters with whale sharks which is an important source of tourism income within the area. The majority of tourism occurs around the Ningaloo Reef and Cape Range National Park are concentrated in the vicinity of the population centres such as Exmouth, Dampier and Onslow.

Tourism and recreation activities are not expected to occur within the Operational Area due to the water depths and distance offshore. Some tourism and recreation activities may occur in areas of the Hydrocarbon Exposure Area and EMBA that occur nearshore but is expected to be limited to passing vessels and the occasional offshore charter fishing.

Aquatic recreational activities such as boating, diving and fishing occur near the coast and islands off the Ningaloo, Pilbara and Kimberly coasts, as does the nature-based tourism which has become more popular in the North West coastal region, with seasonal attractions including humpback whale watching, whale shark encounters and tours of turtle hatchings.

4.4.6 Oil and Gas Industry

The nearest subsea infrastructure is over 50 km away and associated with Chevron's Jansz Io and Gorgon Developments. There are also platforms and FPSOs at John Brooks, Macedon and Vincent. The closest onshore facilities to the Operational Area are at Barrow and Varanus Islands. Neighbouring Petroleum Industry can be seen in Figure 4-4.

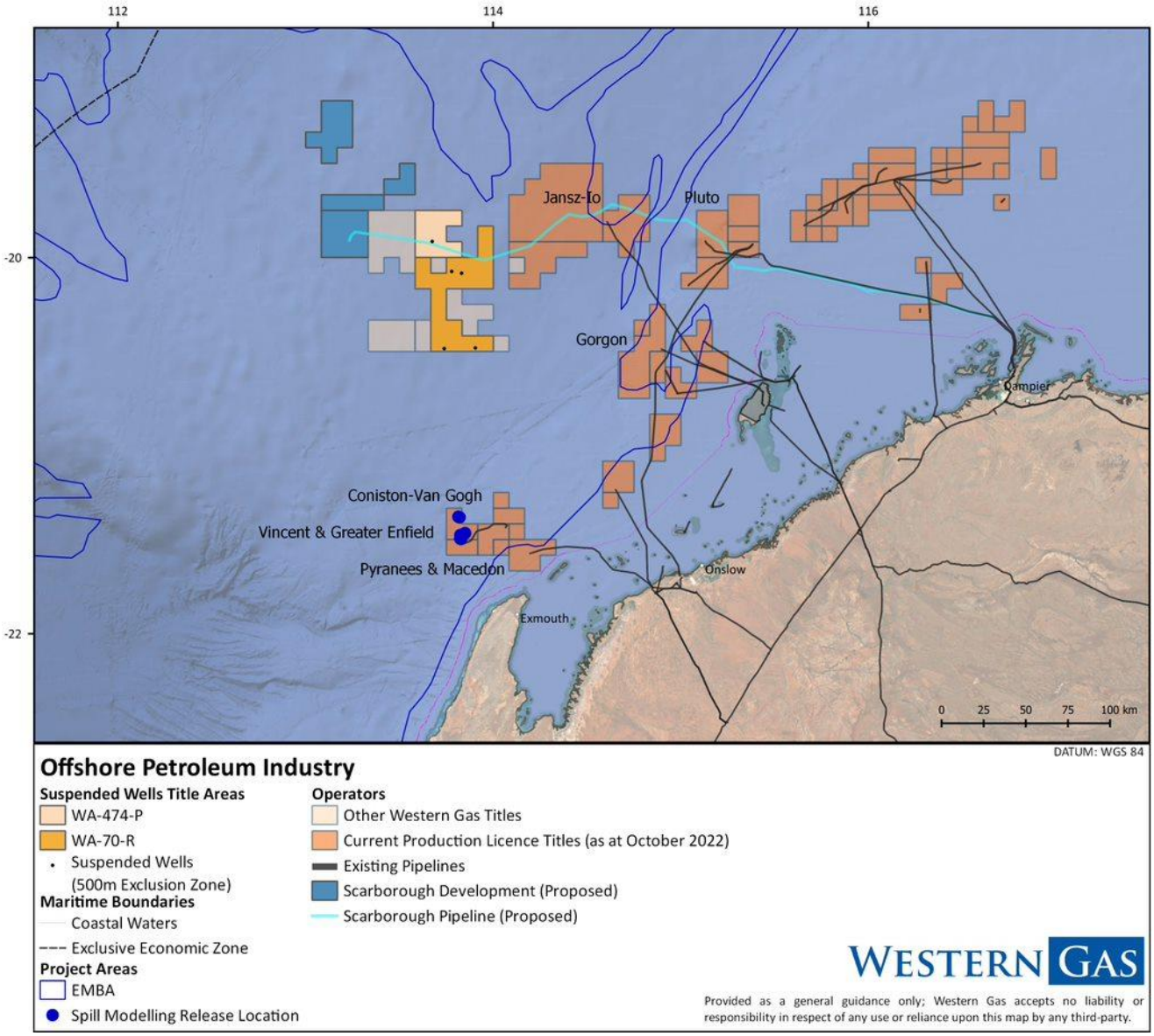

Figure 4-4: Neighbouring Petroleum Industry within the EMBA

4.4.7 Commercial Shipping

A recognised shipping fairway traverses the Permit Areas (Figure 4-5). Commercial shipping fairways are established by the Australian Maritime Safety Authority (AMSA) and any alerts to changes or hazards within these fairways are managed by 'Notice to Mariners'.

Control measures to manage potential risks in relation to commercial shipping, through consultation with AMSA (refer to Stakeholder Consultation in Section 10), are provided in Section 6.3.

Vessel traffic within the EMBA can be seen in Figure 4-5.

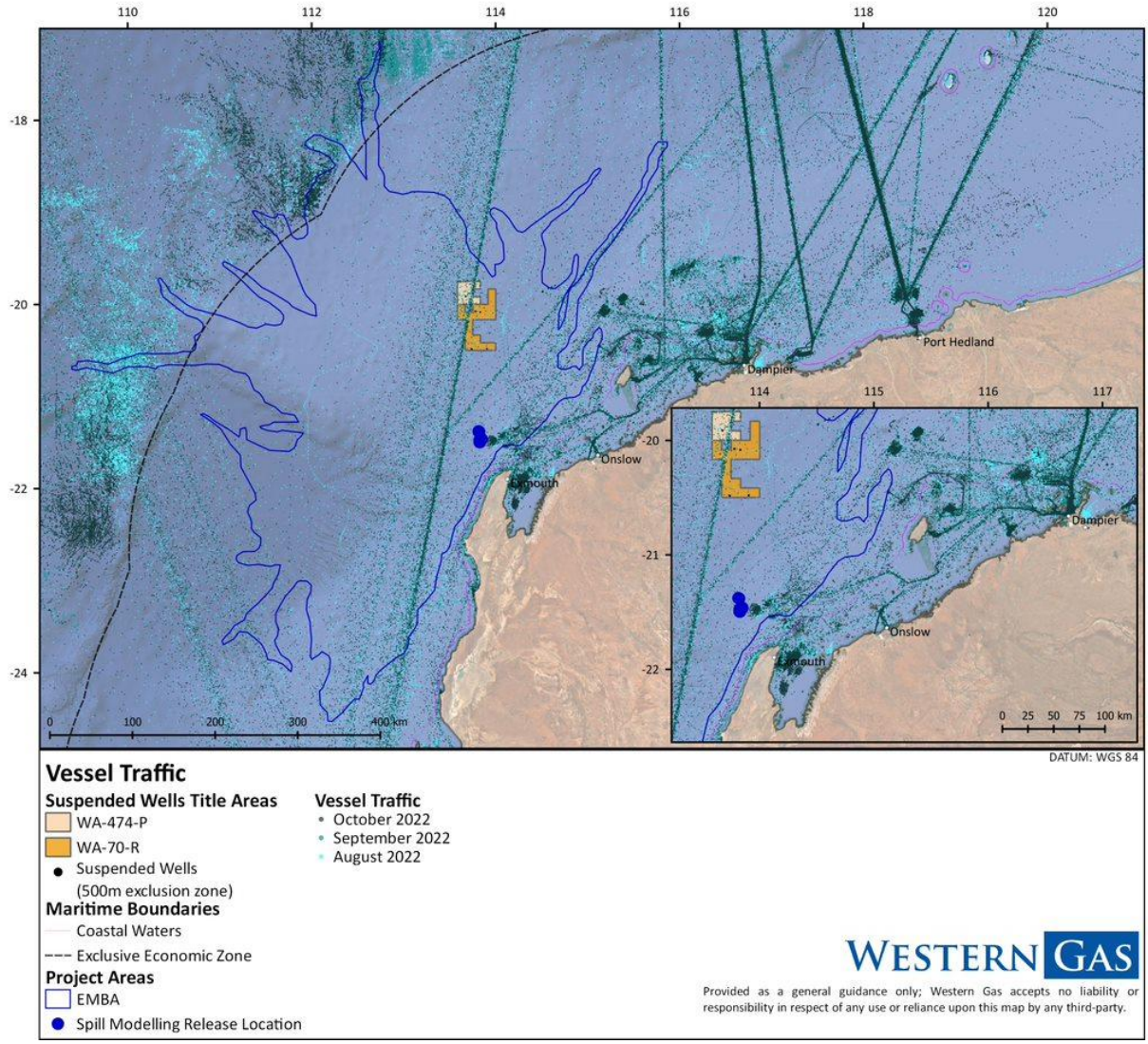

Figure 4-5: Vessel Traffic within the EMBA

4.4.8 Defence

The Permit Areas overlap the Learmonth military restricted airspace area. The Defence Department has previously advised that this is not a currently active range but will be further consulted prior to the inspection survey to ascertain the current level of military activity. The defence areas found within the EMBA can be seen in Figure 4-6.

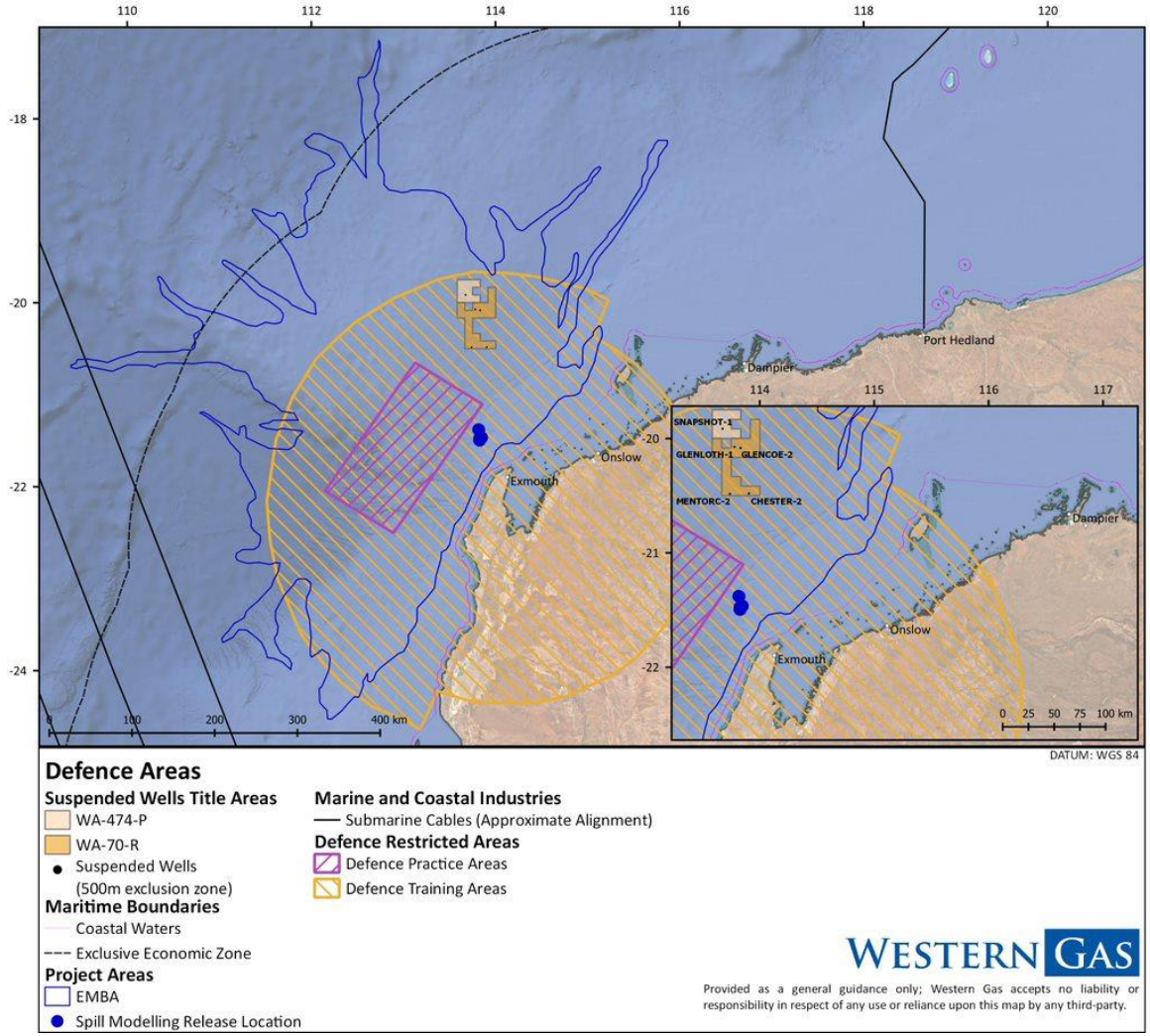

Figure 4-6: Defence Areas intersecting the EMBA

4.4.8.1 Submarine Telecommunications Cables

The SEA-ME-WE3, Australia-Singapore and Indigo-West cables are three submarine telecommunications cables of international significance currently in service in the region. The previous JASURAUS cable was decommissioned in 2012. The EMBA intersects these submarine telecommunication cables, however there are no submarine telecommunication cables located in the Operational Area.

Under the Telecommunications and Other Legislation Amendment Act 2005 protection zones can be declared to cover the cables to prohibit and/or restrict activities that may damage them. The protection zones are generally the area within 1.8 km (1 nm) either side of the cable and include both the waters and seabed within the area. The Perth Protection Zone extends approximately 112 km (60 nm) offshore from City Beach to water depths of 2,000 m, and 1 nm each side of the SEA-ME-WE3 cable.

4.4.9 Cultural Heritage

Aboriginal sites are of immense cultural, scientific, educational and historic interest and provide Aboriginal people with an important link to their present and past culture. Within Western Australia, sites of significance are included within the list of Registered Sites under the Aboriginal Heritage Act 1972. Indigenous Protected Areas are a component of Australia's National Reserve System (i.e. the network of formally recognised parks, reserves and protected areas across Australia). As well as protecting biodiversity, Indigenous Protected Areas deliver environmental, cultural, social, health and wellbeing and economic benefits to Indigenous communities. Cultural Heritage sites that may be present nearby the EMBA are seen in Figure 4-7.

A search of the Australian Heritage Database (AHD) was undertaken for the Operational Area and spill EMBA to identify any heritage values that could potentially be impacted by the Activity. The AHD contains listings from the following:

- World Heritage List: lists internationally significant World Heritage locations listed under the Convention Concerning the Protection of the World Cultural and Natural Heritage (the World Heritage Convention);
- Commonwealth Heritage List: contains natural, Indigenous and historic heritage places within the Commonwealth area; these places are protected under the EPBC Act;
- National Heritage List: contains natural, historic and Indigenous places that are of outstanding national heritage value to the Australian nation; these places are protected under the EPBC Act.

4.4.10 World Heritage Property

Within the EMBA there is one World Heritage place and one National heritage place. Both of these heritage properties are The Ningaloo Coast. These Heritage sites within the EMBA are seen in Figure 4-7.

There are several known shipwreck and historic (>75 years old) shipwreck sites within the EMBA.

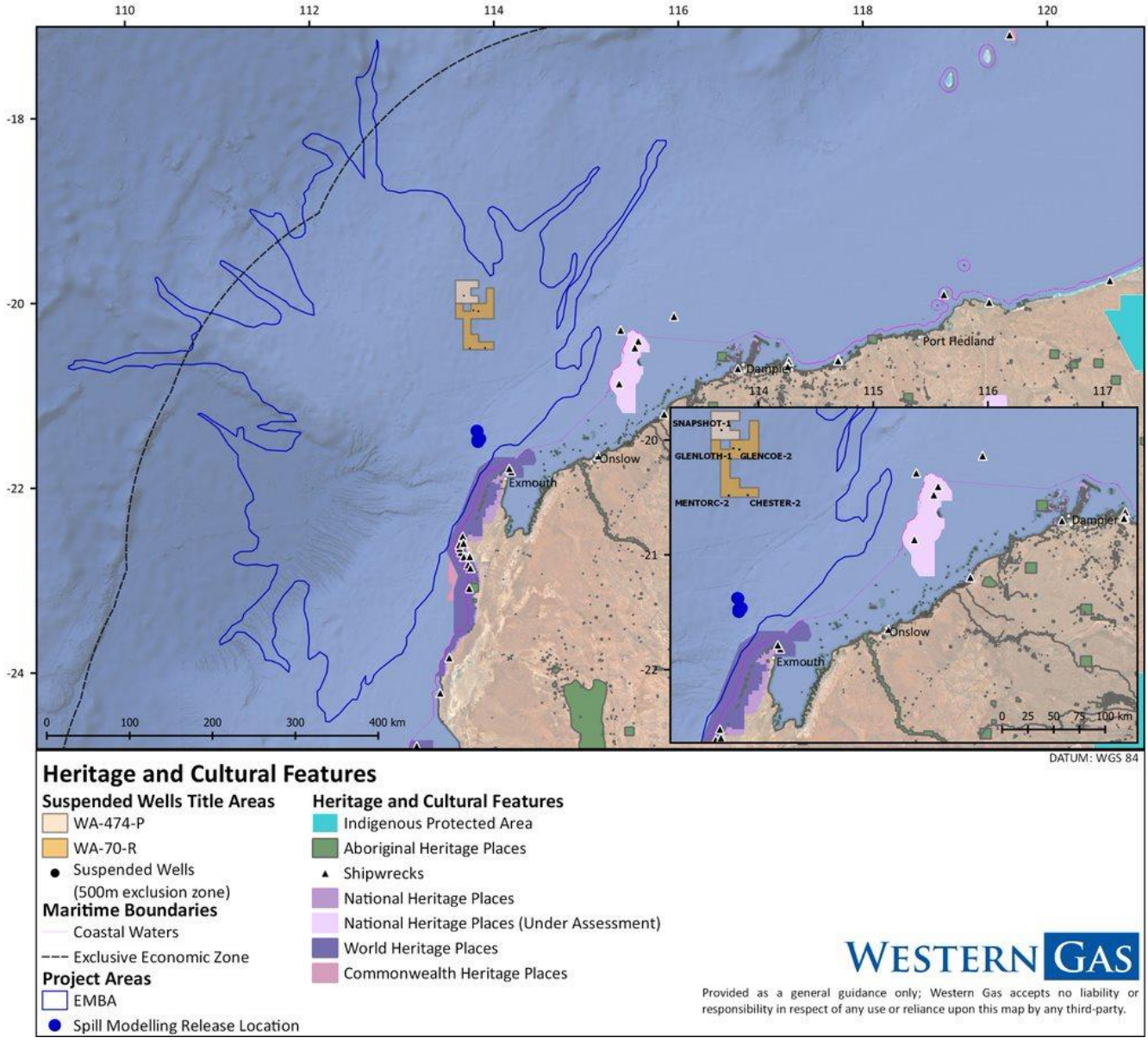

Figure 4-7: Cultural, National and World Heritage Sites within the EMBA

Table 4-4: World and National Heritage Properties

Value/Sensitivity	EMBA	
	Operational Area	Diesel Spill
World Heritage Properties		
The Ningaloo Coast	-	✓
National Heritage Properties		
The Ningaloo Coast	-	✓
Commonwealth Heritage Places		
Ningaloo Marine Area (Commonwealth waters)		✓
Underwater Cultural Heritage		
Historic shipwrecks (>75 years)		✓
Shipwrecks		✓

4.4.10.1 Ningaloo Coast

The Ningaloo Coast is recognised as both a World Heritage Area (WHA) and included on both the National and Commonwealth Heritage lists. The Ningaloo Coast includes both land within State and Commonwealth waters. The coastal waters host a major nearshore reef system and a directly adjacent limestone karst system with associated habitats and species along an arid coastline (DEE 2019). The area has a high level of terrestrial species endemism and high marine species diversity and abundance. An estimated 300 to 500 whale sharks aggregate annually coinciding with mass coral spawning events and seasonal localised increases in productivity (DEE 2019). The marine portion of the nomination contains a high diversity of habitats that includes lagoon, reef, open ocean, the continental slope and the continental shelf. Intertidal systems such as rocky shores, sandy beaches, estuaries and mangroves are found within the WHA. The most dominant marine habitat is the Ningaloo reef, which sustains both tropical and temperate marine fauna and flora, including marine reptiles and mammals (UNESCO, 2019).

4.4.11 National Heritage Properties

There is one National Heritage Properties occurring within the spill EMBA (Figure 4-7).

4.4.12 Ramsar Wetlands

There are no Ramsar wetlands occurring within the Operational Area or spill EMBA.

4.4.13 Listed Threatened Species or Ecological Communities and BIAs Present

The listed threatened species that may occur within the Operational Area or spill EMBA were identified from the EPBC Act Protected Matters Reports (Appendix D). The species are listed in Table 4-5 and detailed descriptions of these species are presented in Appendix C. There were no listed threatened ecological communities identified within the Operational Area or spill EMBA.

Some biologically important areas (BIAs) overlap the operational area and spill EMBA. These are listed in Table 4-5.

Appendix C catalogues Recovery Plans, Conservation Management Plans, Threat Abatement Plans or approved Conservation Advice in place (or in draft) for those EPBC Act listed threatened and migratory species that may occur within the Operational Area and spill EMBA (Table 4-5).

Table 4-5: Threatened and migratory species and BIAs occurring in the Operational Area and spill EMBA

Common Name	Scientific Name	EPBC Listing			BIA Present		Presence	
		Listed Threatened	Listed Migratory	Other matters	Operational Area	Diesel Spill EMBA	Operational Area	Diesel Spill EMBA
Fish and Sharks								
Great white shark	*Carcharodon carcharias*	✓	✓	-	-	-	M	M
Shortfin mako	*Isurus oxyrinchus*	-	✓	-	-	-	L	L
Longfin mako	*Isurus paucus*	-	✓	-	-	-	L	L
Giant manta ray	*Manta birostris*	-	✓	-	-	-	M	M
Whale Shark	*Rhincodon typus*	-	✓	-	-	✓	M	F
Humpback Whale	*Megaptera novaeangliae*	✓	✓	-	-	✓	-	Mi
Pygmy Blue Whale	*Balaenoptera musculus brevicauda*	✓	✓	-	✓	✓	-	Mi F
Narrow Sawfish, Knifetooth Sawfish	*Anoxypristis cuspidate*	✓	-	-	-	-	-	L
Oceanic Whitetip Shark	*Carcharhinus longimanu*	-	✓	-	-	-	-	L
Grey Nurse Shark (west coast population)	*Carcharias taurus (west coast population)*	✓	-	-	-	-	--	L
Southern Dogfish, Endeavour Dogfish, Little Gulper Shark	*Centrophorus zeehaani*	✓	-	-	-	-	-	L
Porbeagle, Mackerel Shark	*Lamna nasus*	-	✓	-	-	-	-	M

Common Name	Scientific Name	EPBC Listing			BIA Present		Presence	
		Listed Threatened	Listed Migratory	Other matters	Operational Area	Diesel Spill EMBA	Operational Area	Diesel Spill EMBA
Reef Manta Ray, Coastal Manta Ray	*Mobula alfredi*	-	✓	-	-	-	-	K
Dwarf Sawfish, Queensland Sawfish	*Pristis clavata*	-	✓	-	-	-	-	K
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichardt's Sawfish, Northern Sawfish	*Pristis pristis*		✓					K
Green Sawfish, Dindagubba, Narrowsnout Sawfish	*Pristis zijsron*	-	✓	-	-	-	-	K
Scalloped Hammerhead	*Sphyma lewini*	✓	-	-	-	-	-	K
Southern Bluefin Tuna	*Thunnus maccoyi*	✓	-	-	-	-	-	BK
	Marine Mammals – Whales							
Sei whale	*Balaenoptera borealis*	✓	✓	✓	-	-	L	L
Pygmy Blue Whale	*Balaenoptera musculus*	✓	✓	✓	✓	✓	Mi	Mi, F
Blue whale	*Balaenoptera musculus*	✓	✓	✓	✓	✓	Mi	Mi
Fin whale	*Balaenoptera physalus*	✓	✓	✓	-	-	L	L
Humpback whale	*Megaptera novaeangliae*	✓	✓	✓	-	✓	M	M
Bryde's whale	*Balaenoptera edeni*	-	✓	✓	-	-	M	M
Antarctic minke whale	*Balaenoptera bonaerensis*	-	✓	✓	-	-	M	M
Sperm whale	*Physeter macrocephalus*	-	✓	✓	-	-	M	M
Killer whale	*Orcinus orca*	-	✓	✓	-	-	M	M
Dugong	*Dugong dugon*	✓	✓	✓	-	✓	BK, F	BK, F
9 other species of whale		--	-	✓	-	-	M	M
	Marine Mammals - Dolphins							
8 dolphin species		-	-	✓	-	-	M	M
	Marine Reptiles							
Loggerhead turtle	*Caretta caretta*	✓	✓	✓	-	✓	L	L

Common Name	Scientific Name	EPBC Listing			BIA Present		Presence	
		Listed Threatened	Listed Migratory	Other matters	Operational Area	Diesel Spill EMBA	Operational Area	Diesel Spill EMBA
Green turtle	*Chelonia mydas*	✓	✓	✓	-	✓	L	L
Leatherback turtle	*Dermochelys coriacea*	✓	✓	✓	-	-	L	L
Flatback turtle	*Natator depressus*	✓	✓	✓	-	✓	L	L
Hawksbill turtle	*Eretmochelys imbricata*	✓	✓	✓	-	✓	L	L
7 seasnake species		-	-	✓	-	-	M	M
	Marine Birds							
Red knot	*Calidris canutus*	✓	✓	✓	-	-	M	M
Southern giant-petrel	*Macronectes giganteus*	✓	✓	✓	-	-	M	M
Common noddy	*Anous stodidus*		✓		-	-	M	M
Lesser frigatebird	*Fregata ariel*		✓		-	-	M	M
Wedge-tailed Shearwater	Ardenna pacifica	-	✓	-	-	✓	M	BL
Roseate Tern	*Sterna dougallii*	-	✓	-	-	✓	M	BL
Sooty Tern	*Sterna fuscata*	-	✓	-	-	✓	M	F
Fairy Tern	*Sterna nereis*	-	✓	-	-	✓	M	BL
Lesser Crested Tern	*Thalasseus bengalensis*	-	✓	-	-	✓	M	BL
Common Sandpiper	*Actitis hypoleucos*	-	✓	-	-	-	-	M
Fork-tailed Swift	*Apus pacificus*	-	✓	-	-	-	-	M
Flesh-footed Shearwater, Fleshy-footed Shearwater	*Ardenna carneipes*	-	✓	-		-	-	M
Sharp-tailed Sandpiper	*Calidris acuminata*	-	✓	-	-	-	-	M
Curlew Sandpiper	*Calidris ferruginea*	✓	✓	-	-	-	-	M
Pectoral Sandpiper	*Calidris melantos*	-	✓	-	-	-	-	M
Streaked Shearwater	*Calonectris leucomelas*	-	✓	-	-	-	-	M
Great Frigatebird, Greater Frigatebird	*Fregata minor*	-	✓	-	-	-	-	M
Eastern Curlew, Far eastern Curlew	*Numenius madagascariensis*	✓	✓	-	-	-	-	M
Osprey	*Pandion haliaetus*	-	✓	-	-	-	-	K
Abbott's Booby	*Papasula abbotti*	✓	-	-	-	-	-	M

Common Name	Scientific Name	EPBC Listing			BIA Present		Presence	
		Listed Threatened	Listed Migratory	Other matters	Operational Area	Diesel Spill EMBA	Operational Area	Diesel Spill EMBA
White-tailed Tropicbird	*Phaethon lepturus*	-	✓	-	-	-	-	K
Christmas Island White-tailed Tropicbird, Golden Bosunbird	*Phaethon lepturus fulvus*	✓	-	-	-	-	-	M
Soft-plumaged Petrel	*Pterodroma mollis*	✓	-	-	-	-	-	F
Indian Yellow-nosed Albatross	*Thalassarche carteri*	✓	✓	-	-	-	-	M
Shy Albatross	*Thalassarche cauta*	✓	✓	-	-	-	-	M
Campbell Albatross, Campbell Black-browed Albatross	*Thalassarche impavida*	✓	✓	-	-	-	-	M
Black-browed Albatross	*Thalassarche melanophris*	✓	✓	-	-	-	-	M
White-capped Albatross	*Thalassarche steadi*	✓	✓	-	-	-	-	M

Note: '**M**': Species or species habitat may occur within area. '**F**': Foraging, feeding or related behaviour likely to occur within area. '**L**': Species or species habitat likely to occur within area. '**BK**': Breeding known to occur within area. '**BL**': Breeding likely to occur within area. '**K**': Species or species habitat known to occur within area '**C**': Congregation or aggregation known to occur within the area. Note: '**Mi**': Migration route known to occur within area.

4.4.13.1 Benthic Habitat BIAs

Within the EMBA there are a few benthic habitat BIAs such as corals, invertebrates, macrophytes and microbes. These BIAs can be seen in Figure 4-8.

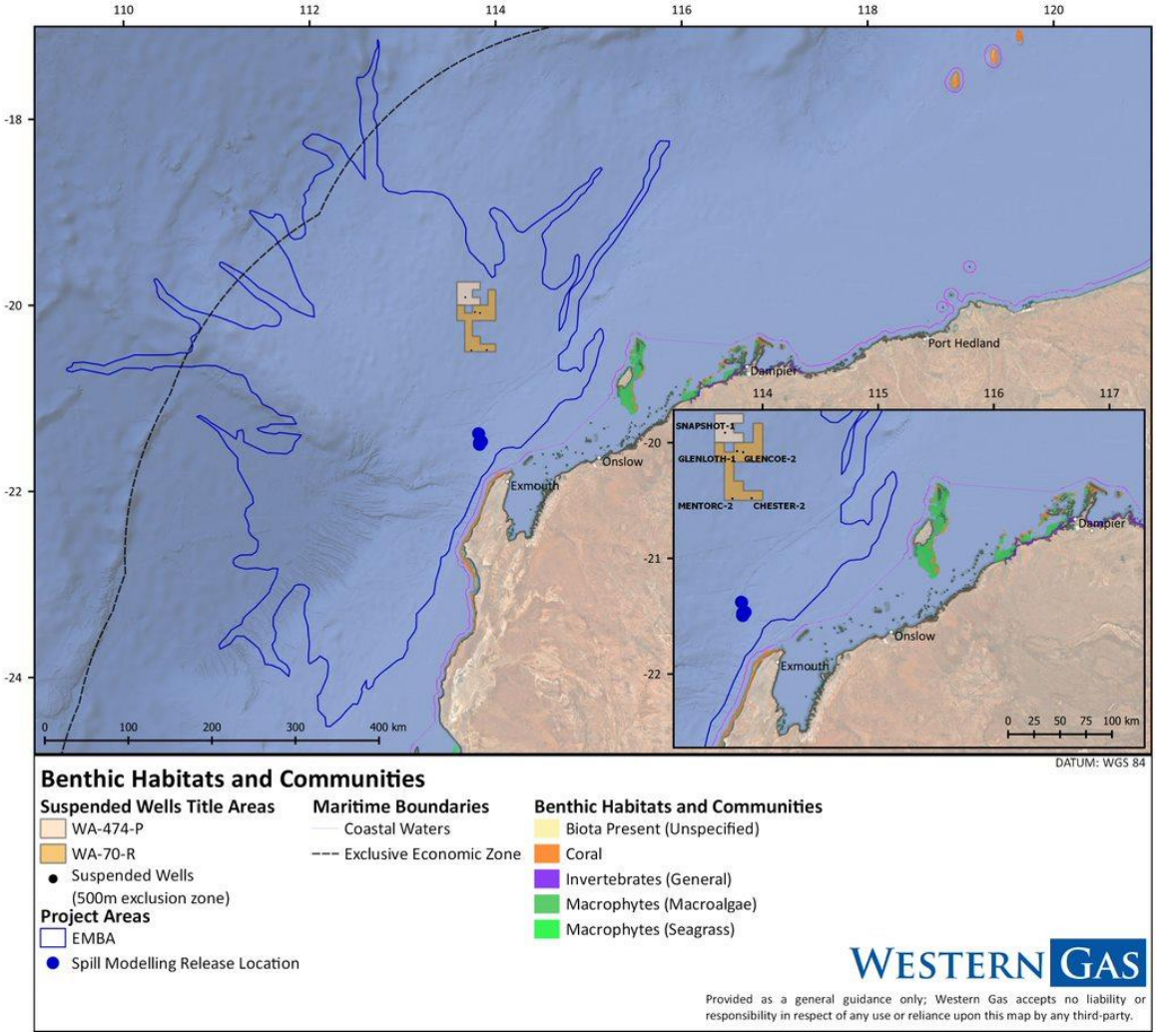

Figure 4-8: Benthic Habitats and Communities within the EMBA

4.4.13.2 Bird BIAs

Several bird species traverse within the EMBA for various needs (foraging, breeding, aggregation and resting). These BIAs can be seen in Figure 4-9, Figure 4-10, Figure 4-11 and Figure 4-12.

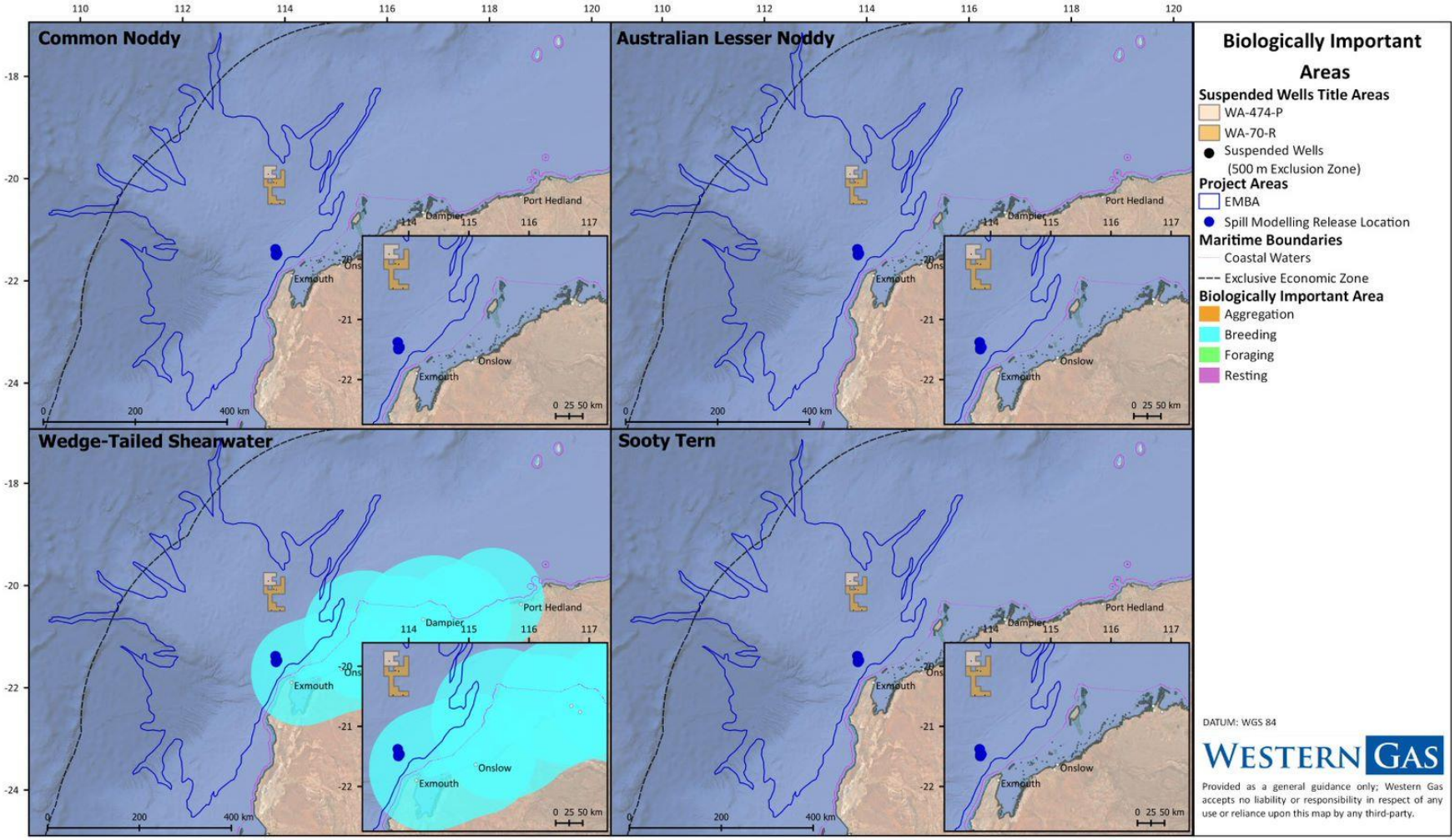

Figure 4-9: Bird Species BIAs (Common Noddy, Australian Lesser Noddy, Wedge-tailed Shearwater and Lesser Frigatebird)

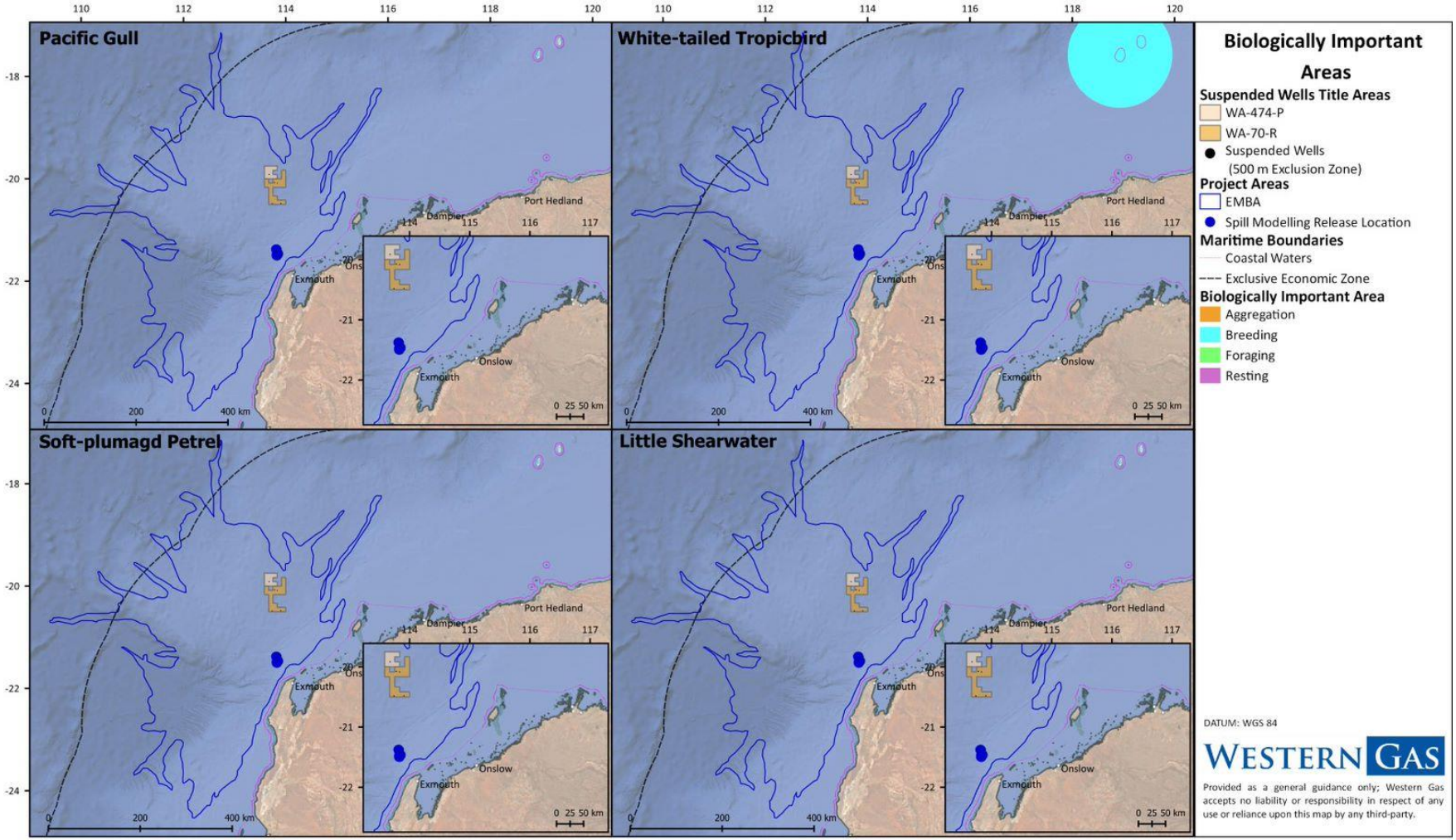

Figure 4-10: Bird Species BIAs (Pacific Gull, White-tailed tropicbird, Soft-plumaged Petrel and Little Shearwater)

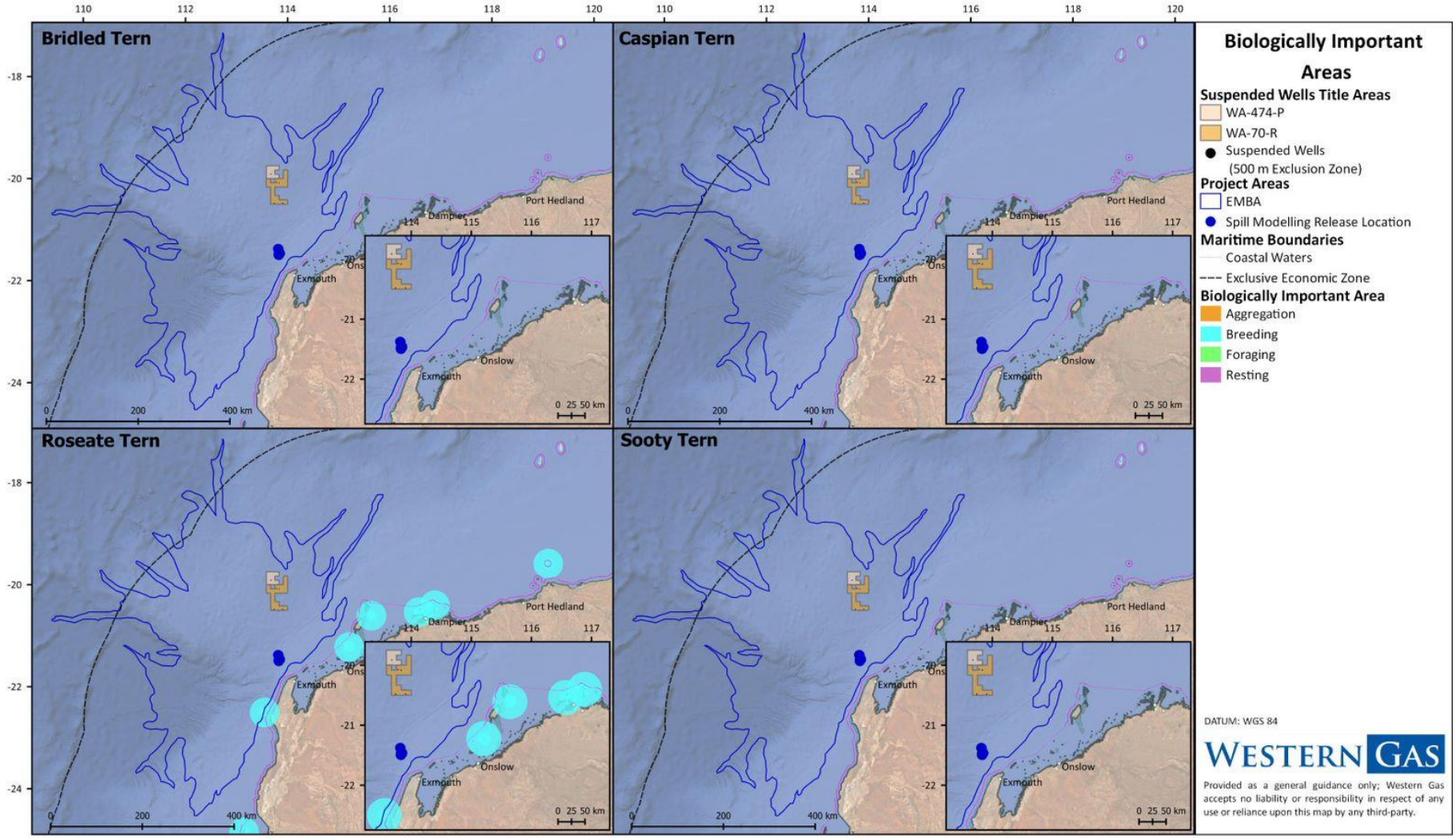

Figure 4-11: Bird Species BIAs (Bridled Tern, Caspian Tern, Roseate Tern and Sooty Tern)

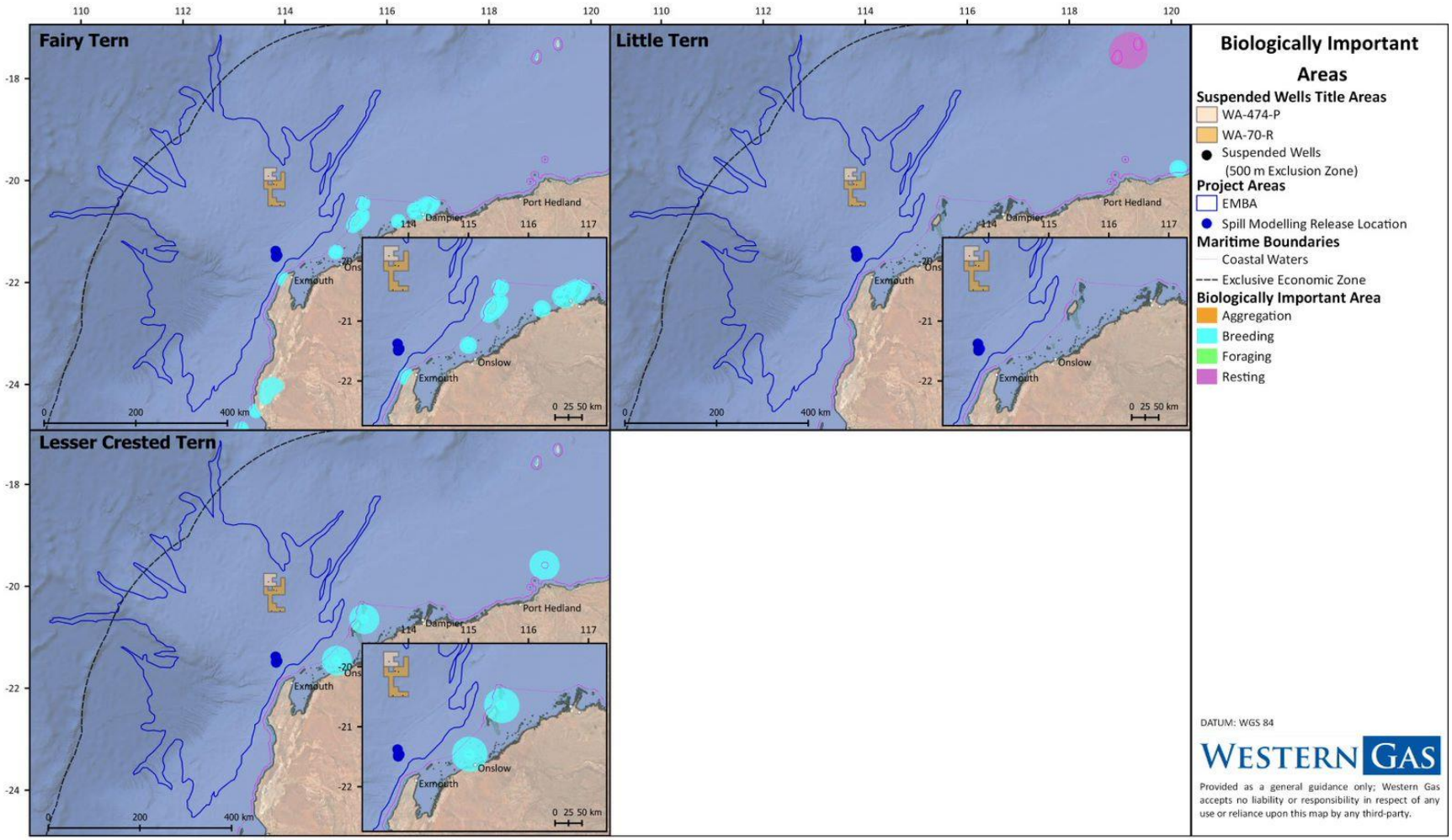

Figure 4-12: Bird Species BIAs (Fairy Tern, Little Tern and Lesser Crested Tern)

4.4.13.3 Marine Mammal BIAs

Marine mammals traverse the EMBA. Dugongs and the Australian Sea Lion BIAs can be seen in Figure 4-13 where different whale species that can be found within the EMBA is detailed in Figure 4-14.

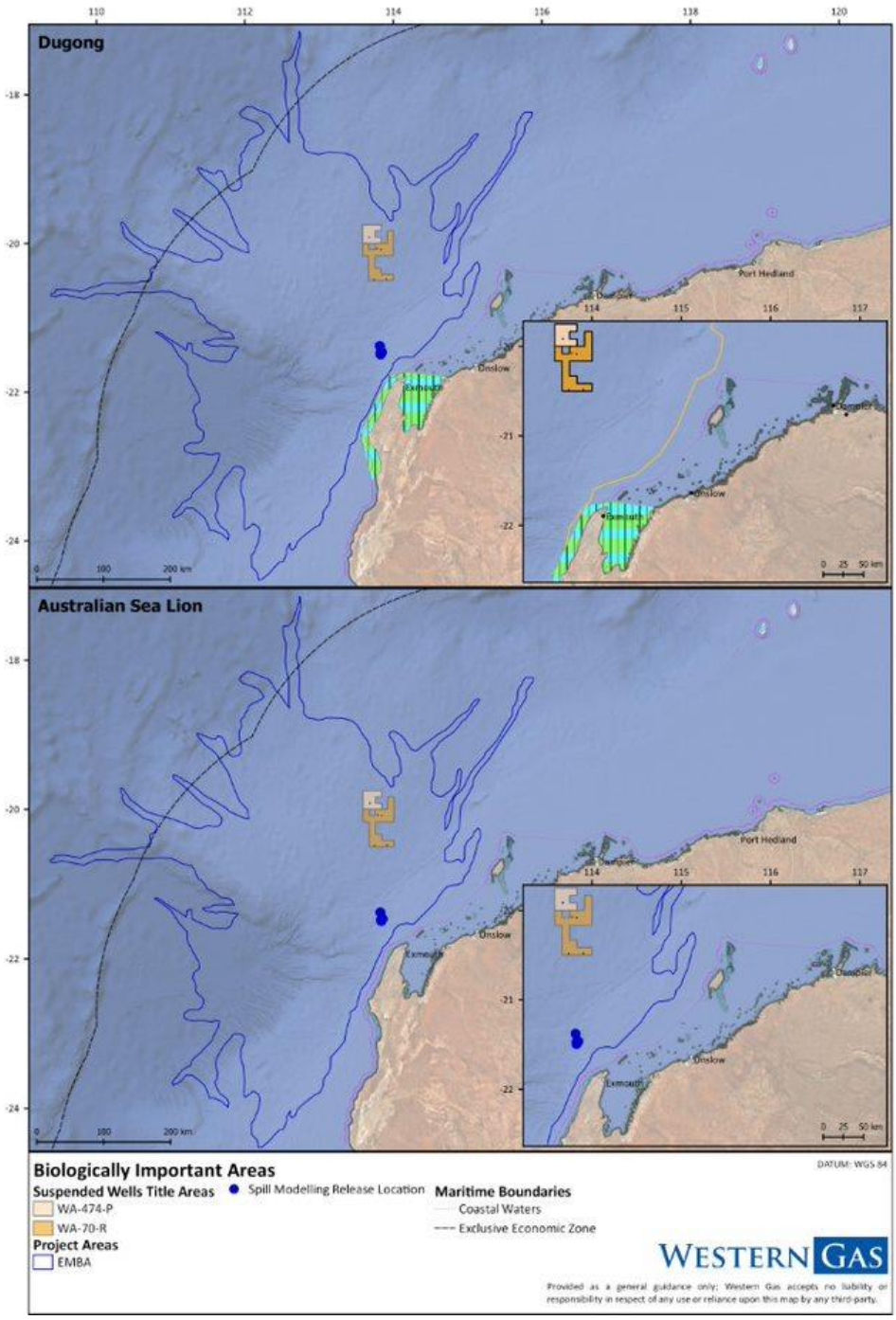

Figure 4-13: Marine Mammal BIAs (Dugong and Australian Sea Lion)

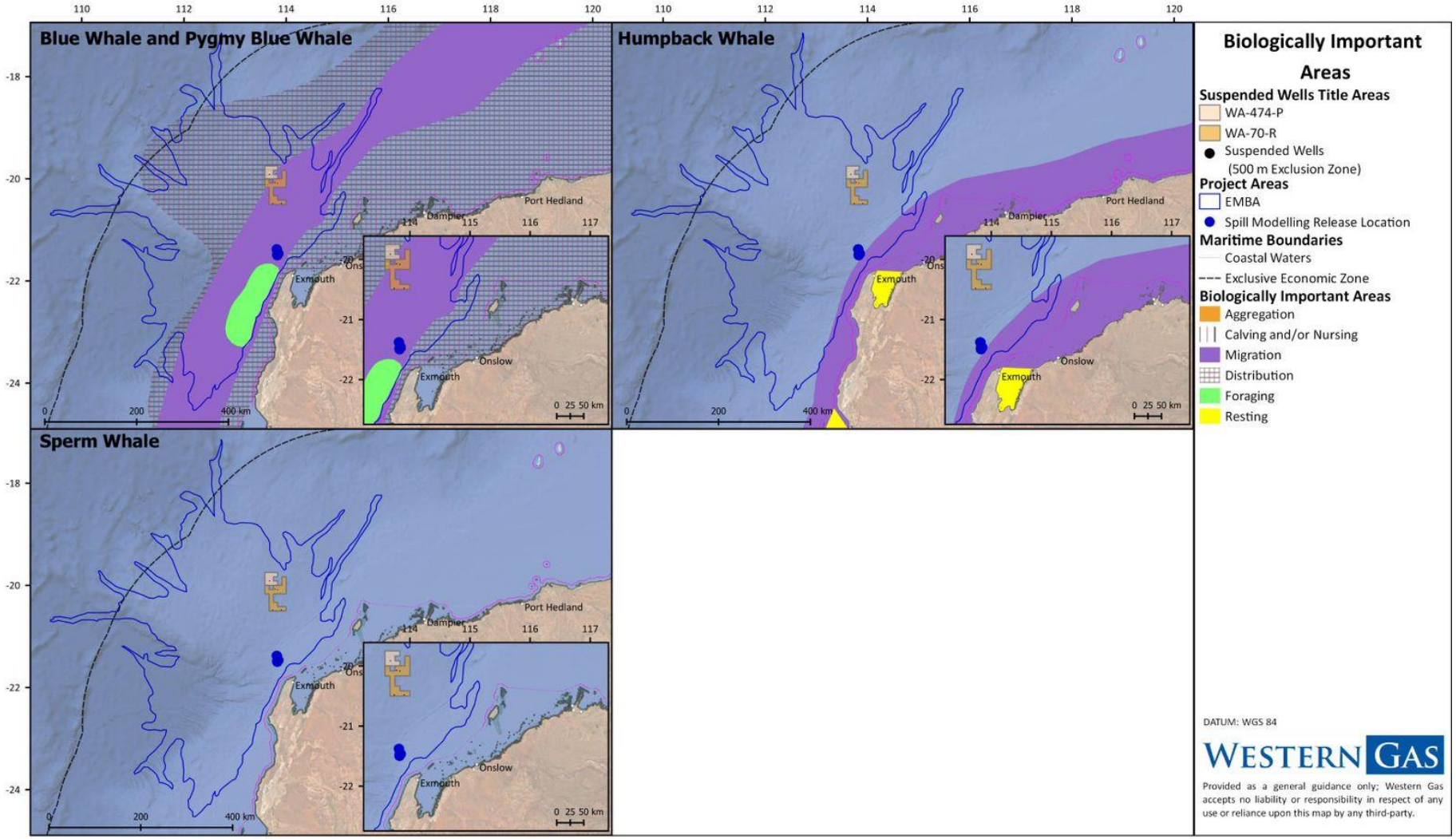

Figure 4-14: Marine Mammal BIAs (Whales)

4.4.13.4 Whale and Shark BIAs

The Whale Shark and White Shark intersect the EMBA with their BIAs, seen in Figure 4-15.

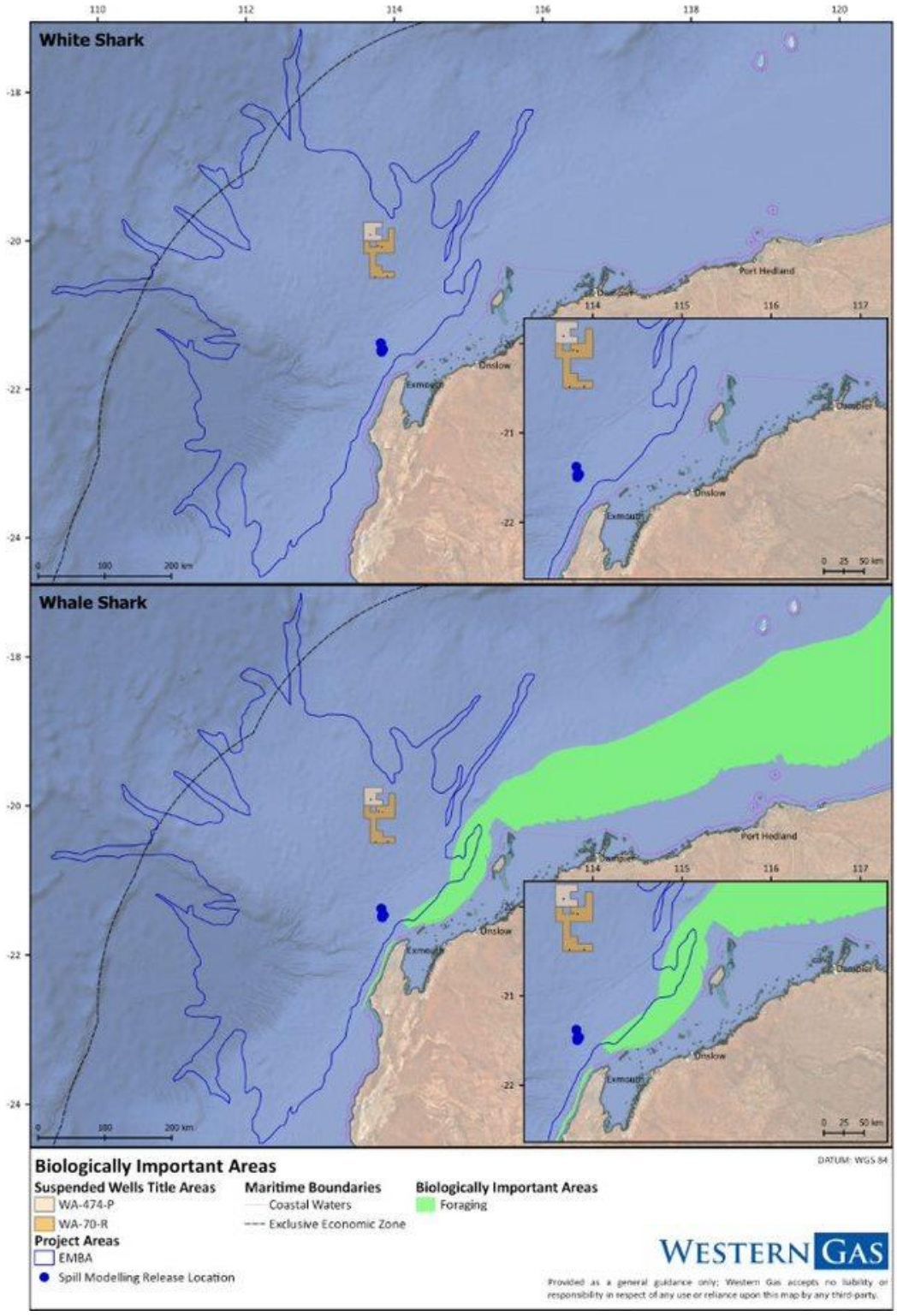

Figure 4-15: Whale and Shark BIAs

4.4.13.5 Marine Reptile BIAs

Marine reptiles can be found within the EMBA, and the BIAs associated can be seen in Figure 4-16.

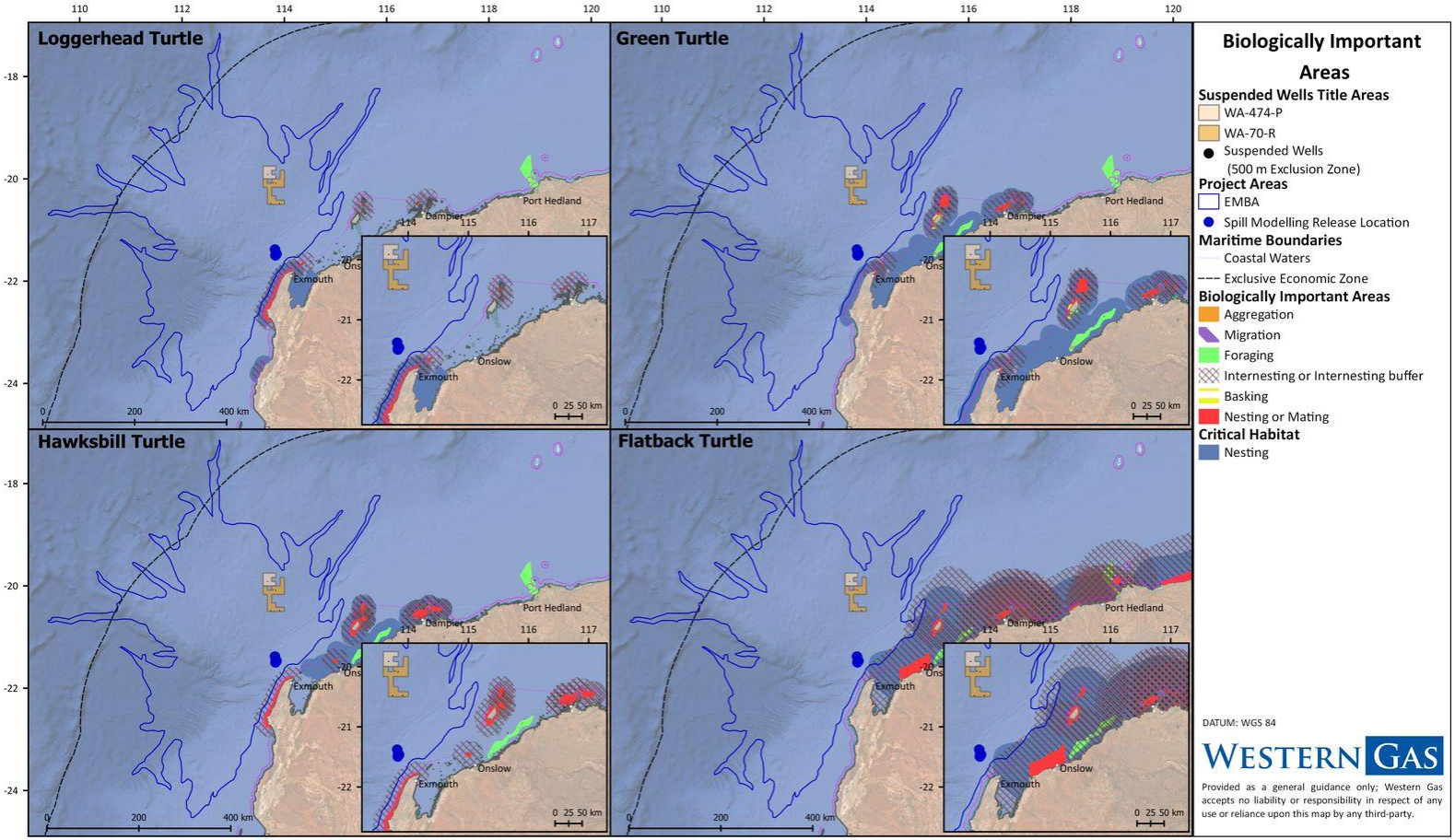

Figure 4-16: Marine Reptile BIAs

4.4.13.6 Coastal Habitat and Communities

Some coastal habitats and communities can be seen close to the EMBA on the Western Australian Coastline. This can be seen in Figure 4-17.

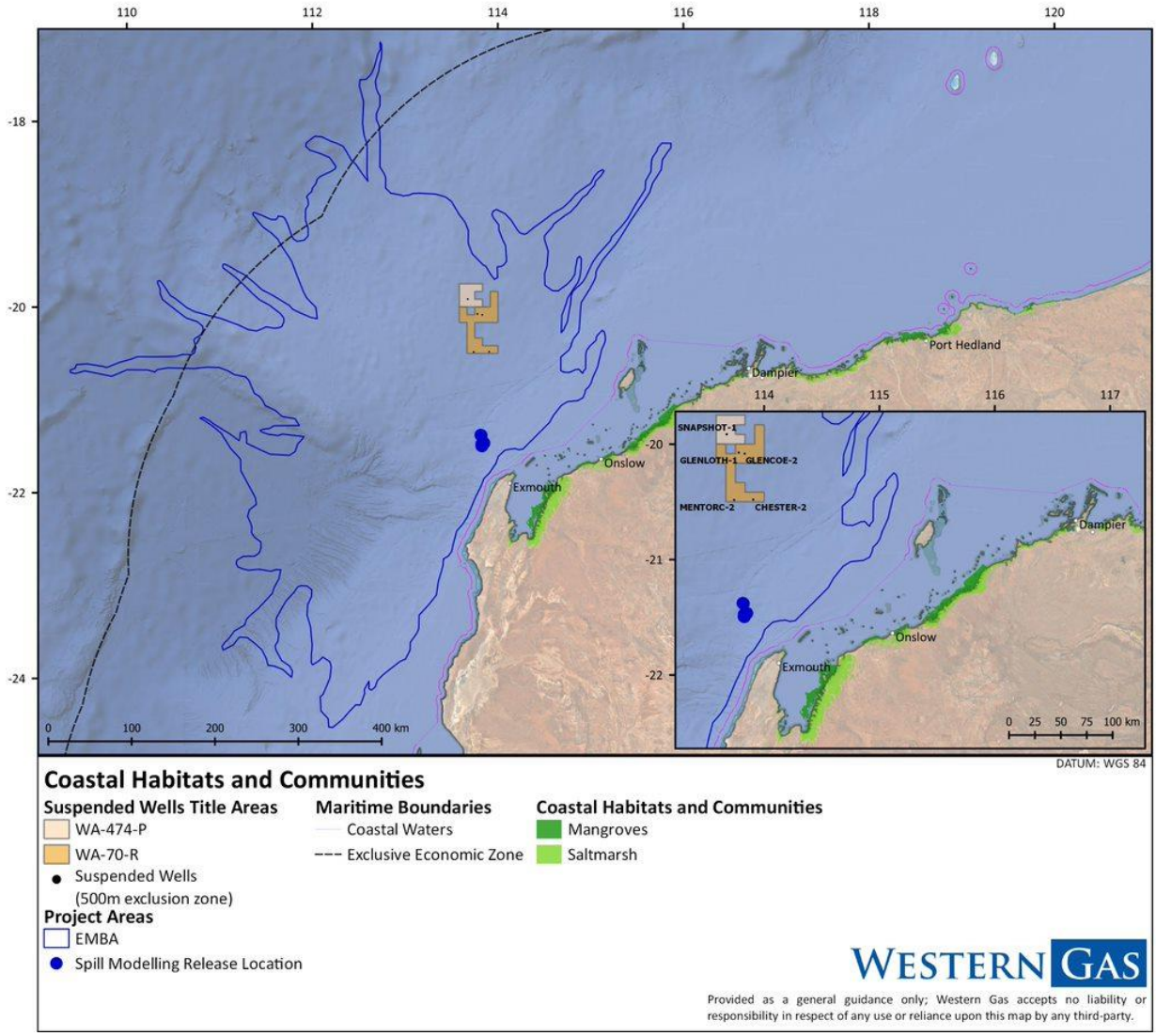

Figure 4-17: Coastal Habitat and Community BIAs

4.4.14 Environmentally Sensitive Windows

Sensitive time windows for key (including threatened) ecological and socio-economic sensitive receptors within the hydrocarbon spill EMBA that exhibit seasonality are summarised in Table 4-6. Some species have not been included due to lack of conclusive life cycle or migratory information.

Table 4-6: Summary of activity windows for ecological and socio-economic sensitivities

Receptor	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Ecological												
Humpback whale							From S to N		From N to S			
Blue whale				From S to N						From N to S		
Sharks and rays												
Sea snakes												
Loggerhead turtle [1]												Nesting
Leatherback turtle [2]												
Green turtle [1]												Nesting
Flatback turtle [1]												Nesting
Seabirds												
Fish spawning												
Socio-economic												
Commercial Fisheries (Commonwealth)	- Southern Bluefin Tuna - North West Slope Trawl Fishery						- Western Deepwater Trawl Fishery - Western Tuna and Billfish Fishery					
Commercial Fisheries (State)	- Mackerel managed fishery											
Oil and gas activity												
Shipping activity												
Tourism/ recreational fishing												

Colour code

Colour	Activity
	Peak activity, presence reliable and predictable
	Lower level of abundance/activity/presence
	Activity/sensitivity can occur throughout the year
	Activity/sensitivity not occurring
1	Turtle hatchlings emerge ~ 60 days after nesting
2	No breeding/nesting activity recorded in WA

5 IMPACT AND RISK ASSESSMENT APPROACH

Division 2.3 - Evaluation of environmental impacts and risks

The environment plan must include:

13(5)a: details of the environmental impacts and risks for the activity; and

13 (5)b: an evaluation of all the impacts and risks, appropriate to the nature and scale of each impact or risk; and

13(5)c: details of the control measures that will be used to reduce the impacts and risks of the activity to as low as reasonably practicable and an acceptable level.

To avoid doubt, the evaluation mentioned in paragraph (5)(b) must evaluate all the environmental impacts and risks arising directly or indirectly from:

13(6)a: all operations of the activity; and

13(6)b: potential emergency conditions, whether resulting from accident or any other reason.

13(7)a set environmental performance standards for the control measures identified under paragraph (5)(c); and

13(7)b set out the environmental performance outcomes against which the performance of the titleholder in protecting the environment is to be measured; and

13(7)c include measurement criteria that the titleholder will use to determine whether each environmental performance outcome and environmental performance standard is being met.

5.1 RISK ASSESSMENT AND MANAGEMENT SYSTEM FRAMEWORK

Western Gas has an established strategy to manage risks that may impact health, safety and the environment. The Western Gas Health, Safety and Environment Management System (HSEMS) framework provides a risk-based methodology to manage Health Safety and Environment (HSE) through their operations and activities. This involves:

- Identification of HSE hazards and aspects;
- Assessment and ranking risks associated with operations and activities;
- Selection, implementation and maintenance of a structured system of preventative and mitigating controls; and
- Monitoring the effectiveness of the process and identifying areas for improvement.

5.2 ENVIRONMENTAL RISK ASSESSMENT METHODOLOGY

An environmental risk assessment (ENVID) was undertaken for all the planned and unplanned events covered within this EP. The impacts and risks assessment methodologies employed are consistent with the approach outlined in the following standards. The Western Gas Environmental Risk Assessment Methodology considers impacts resulting from planned activities, and risks resulting from unplanned events, and assessed the potential impacts to receptors. The methodology evaluates the consequence

of impacts associated with unplanned activities on receptors (Section 5.2.2), and the likelihood and consequence of risks associated with planned events on receptors (Section 5.2.3).

- Australian Standard/New Zealand Standard (AS/NZS) ISO 31000:2009 Risk Management – Principles and Guidelines (Standards Australia / Standards New Zealand 2009).
- AS/NZS Handbook 203:2012 Environmental Risk Management – Principles and Process (Standards Australia / Standards New Zealand 2012).

5.2.1 Terminology

Throughout the impact and risk assessment process, the following terminology is used in accordance with the OPGGS (Environment) Regulations and standard industry practice (Table 5-1).

Table 5-1: Risk management and environmental performance terminology

Terminology	Definition
Acceptability	Determined from a demonstration of the ALARP principle, consistency with internal context (e.g. corporate requirements), applicable state, national and international legislations; other requirements (national, international standards and best practice); and external context (e.g. consideration of relevant stakeholder consultation when determining control measures).
ALARP	As Low As Reasonably Practicable The ALARP principle is that the residual impacts and risks shall be 'as low as reasonably practicable'.
Severity (Consequence)	The severity of the impact being realised (i.e. an impact in terms of adverse effects on the people, environment, assets or reputation).
Control Measure	A system, an item of equipment, a person or a procedure, that is used as a basis for managing environmental impacts and risks.
Environmental Impact	Any change to the environment, whether adverse or beneficial, that wholly or partially results from an activity.
Environmental Performance Outcome	An outcome that demonstrates that the environmental performance will meet or better the acceptable level of impacts and risks of the activity.
Environmental Performance Standard	A statement of the performance required of a control measure.
Environmental Measurement Criteria	Verification to demonstrate that the Environmental Performance Outcome and Environmental Performance Standard are being met.
Environmental Risk	A function of the likelihood of an event occurring and the consequence of the environmental impact.
Hazard	A situation with the potential for causing harm to people, assets, the environment or reputation.
Planned Event	An activity that is intended to occur.
Likelihood	The probability or frequency of an event occurring.
Unplanned Event	An event that is not intended to occur despite control measures in place.

5.2.2 Environmental Risk Assessment Methodology (Unplanned Events)

This risk assessment methodology used for unplanned events that may result from the proposed Activity is illustrated schematically in Figure 5-1.

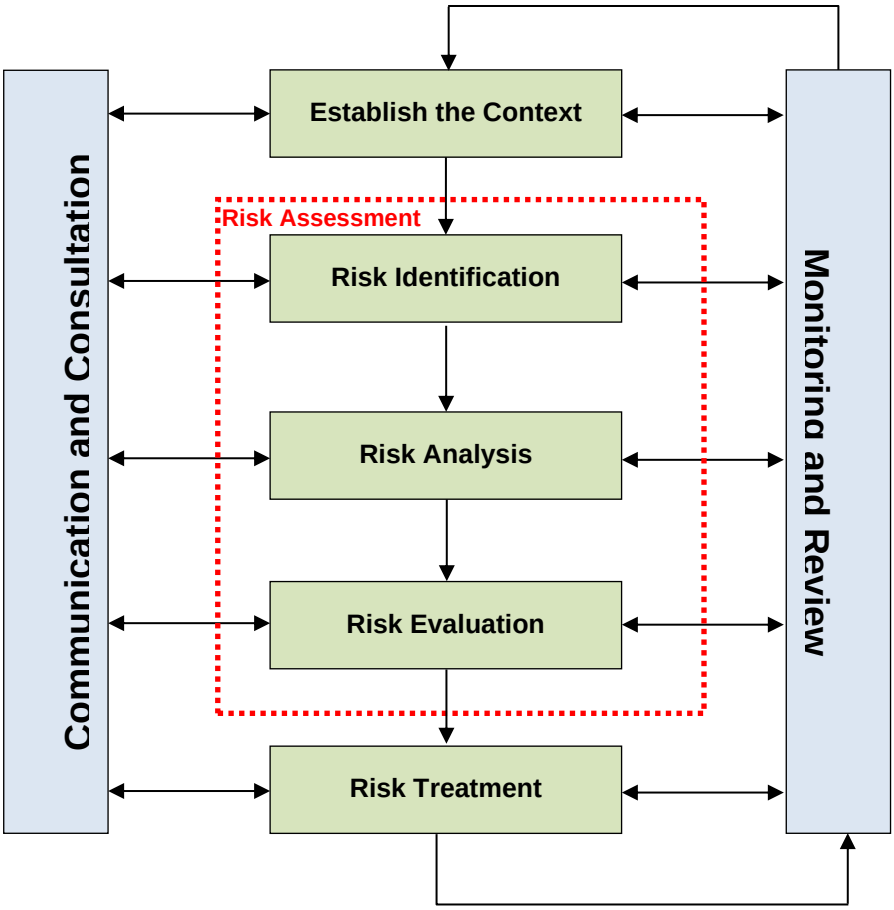

Figure 5-1: Schematic of risk assessment methodology[4]

The main components of the risk assessment methodology include:

- Identify the activities and the events / aspects associated with them that could cause a potential impact to the values (receptors) at risk within and adjacent to the Project Areas.
- Determine the likelihood and severity (i.e. consequence) of the events with standard control measures. Where practicable, quantification of the magnitude of the stressor, the concentration of the contaminant and/or level of disturbance was made. Further, timing, duration and other factors affecting the impact and risk were considered.

[4] Modified from AZ/NZS ISO 31000:2009 Risk Management.

- The environmental risk rating of an unplanned event is determined from the combination of the likelihood and the expected severity (i.e. consequence). Risks are rated with the Western Gas HSE Qualitative Risk Matrix (Figure 5-2) with a 'severity' ranking of 1 (slight) to 5 (catastrophic) and a 'likelihood' ranking of A (rare) to E (almost certain).

The likelihood of an event's occurrence is assessed with standard industry controls in place; however, the severity (i.e. consequence) is assessed without controls.

The risk ratings are aligned with Western Gas' risk tolerance and associated response guidance to manage or to reduce (as necessary) the risks as described in Table 5-2. Review of the standard industry control measures for each of the risks and proposing additional control measures is then considered, as required.

The severity of impacts from several unplanned (i.e. accident/incident) hydrocarbon release events to the marine environment are not acceptable, but the risk of these occurring has been assessed on the basis of Western Gas' risk rating and acceptability criteria (refer to Section 5.2.5).

Additionally, control measures to mitigate the impacts of these unplanned events are also risk assessed (e.g. spill response activities).

Table 5-2: Western Gas risk rating and risk tolerance

Risk Rating		Risk Tolerance	Definition and Response
	High	Intolerable (Unacceptable)	If the risk level is High, it is considered to be unacceptable. If a high-risk result remains, once all available controls have been identified, the task must not be undertaken. Further review, consultation and risk assessment is required.
	Medium	Tolerable (Acceptable)	A risk defined as Medium is considered tolerable. Although risk is tolerable, efforts should still be made to reduce them to levels that are as low as reasonably practicable (ALARP).
	Low	Acceptable	A risk defined as Low is considered acceptable. If a risk is acceptable, this does not necessarily preclude the initiation of improvements if they are economic, readily identified and practicable.

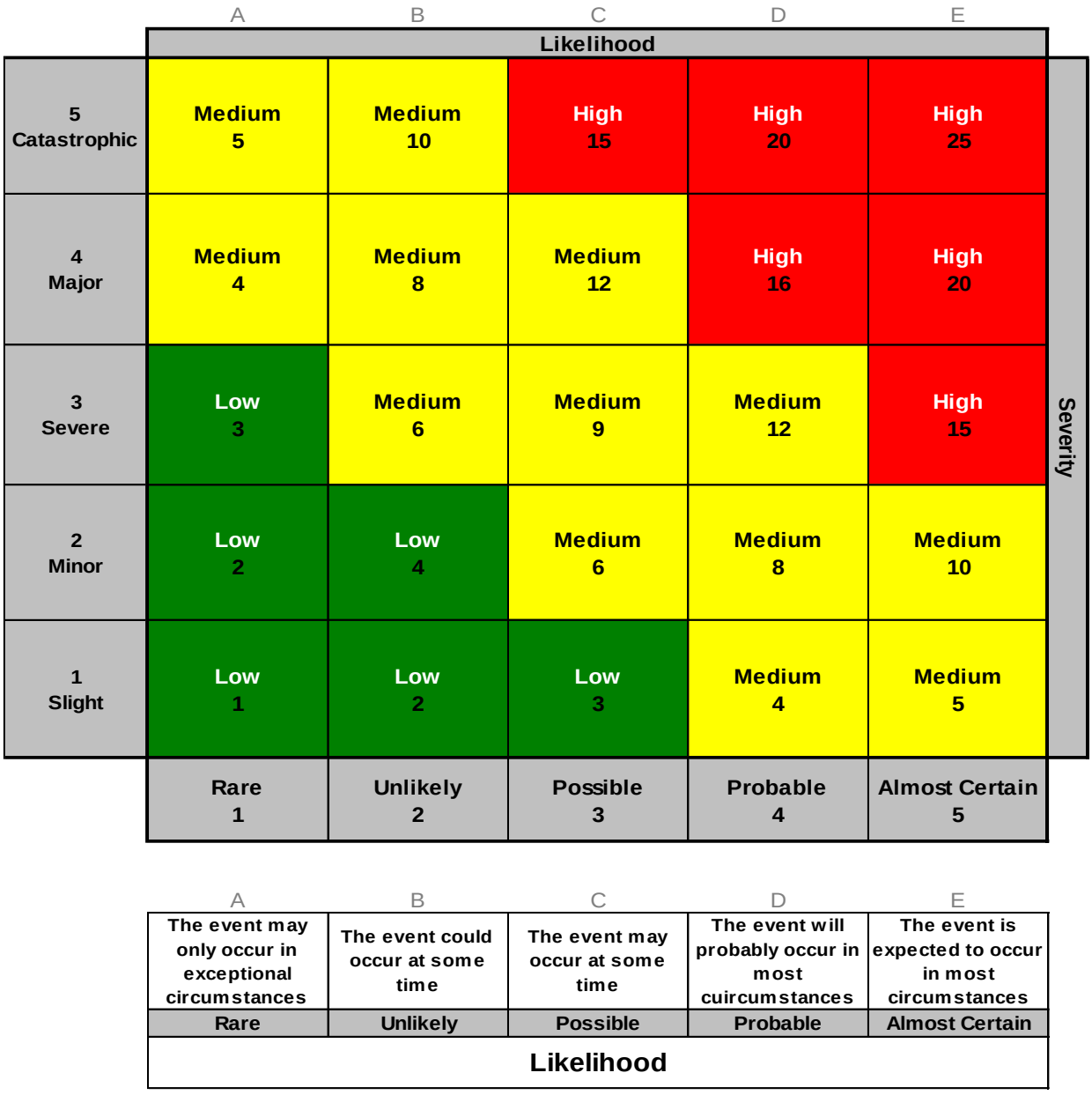

Figure 5-2: Western Gas HSE qualitative risk matrix

5.2.3 Environmental Impact Assessment Methodology (Planned Events)

The impact assessment methodology for planned events is based on the risk assessment methodology outlined in Section 5.2.2. However, for planned events, environmental impacts are assessed solely on the severity (i.e. consequence) component of the risk matrix as per the descriptors in **Figure 5-2**. Corresponding Western Gas acceptability criteria and response guidance for severity levels are also described in Table 5-3.

Table 5-3: Western Gas severity categories and descriptors

Severity/ Consequence Level	Environment Severity Descriptor	Impact Acceptability (only applicable for planned events)	Notes on Impact
Catastrophic	Massive effect; environmental impact could last for decades; long term contamination requiring remediation.	Unacceptable	Not meeting legal, community or stakeholder requirements and expectations or Western Gas standards. Impact not acceptable based on severity and the planned event leading to the impact.
Major	Major effect; environmental impact could last for years; area becomes restricted for a limited period of time.	Unacceptable	Not meeting legal, community or stakeholder requirements and expectations or Western Gas standards. Impact not acceptable based on severity and the planned event leading to the impact.
Severe	Severe effect; environmental impact could last for months; reportable quantity spill or release; spill or release requires clean-up.	Unacceptable	Impact not acceptable and the planned activity leading to the impact cannot progress without additional long term impact reduction measures. Increased resources and management focus required to ensure impact reduced to ALARP and an acceptable level.
Minor	Minor effect; environmental impact could last for weeks; spill or release external to facility; no clean-up required.	Acceptable with impacts managed via the Company's Management Systems and ALARP demonstrated.	Impact is acceptable if reasonable safeguards/management systems are confirmed to be in place, where it has been demonstrated as being ALARP and of an acceptable level.
Slight	Slight effect; environmental impact could last for days; no long-term consequences; spill or release internal to facility.	Acceptable, with impacts managed via the Company's Management Systems and ALARP demonstrated.	Impact is generally regarded as acceptable by a broad range of stakeholders. Adequate resources and management focus to ensure impact are ALARP and of an acceptable level.

5.2.4 ALARP Demonstration

Regulation 10A(a) of the OPGGS (Environment) Regulations requires that the Environment Plan must demonstrate that the environmental impacts and risks of the activity will be reduced to ALARP.

For an activity to be considered ALARP, the Environment Plan must demonstrate, through reasoned and supported arguments, that there are no other practicable control measures that could reasonably be implemented to reduce the environmental impacts and risks of the Activity. The key principles underpinning the ALARP principle include:

- Reasonable practicability - There are no reasonably practicable alternatives to the activity.

- There are no additional reasonably practicable measures available to further reduce the risk or impact.
- The sacrifice (cost, time, effort) for implementing further control measures is grossly disproportionate to the reduction in risk or impact and the environmental benefit gained.

Control measures should be implemented that are not grossly disproportionate in 'cost' to the reduction in environmental risk or impacts, or benefit gained by the environment. Such 'costs' can be health risks, safety risks, alternative environmental impacts/risks, financial cost and/or schedule related costs. The 'costs' can also be associated with the technical feasibility, reliability and operability of an activity or a control measure.

In alignment with NOPSEMA's ALARP Guidance Note (N-04300-GN0166, Rev 6, 2015), Western Gas have adapted the approach developed by Oil and Gas UK (OGUK) (OGUK, 2014) for use in an environmental context to determine the assessment technique required to demonstrate that potential impacts and risks are ALARP (Figure 5-3). Specifically, the framework considers impact severity and several guiding factors:

- Activity type
- Risk and uncertainty
- Stakeholder influence

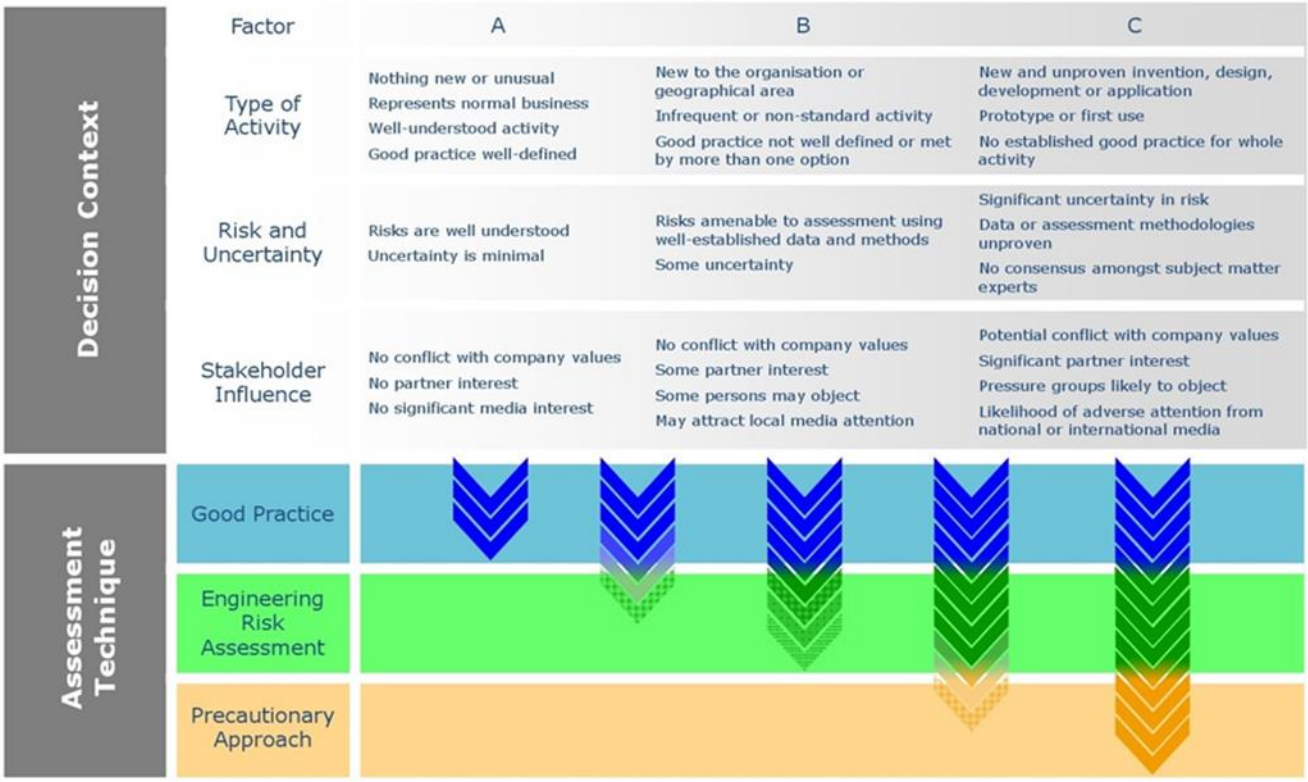

Figure 5-3: ALARP decision support framework (Oil & Gas UK 2014)

The hierarchy of control is a key principle underpinning the ALARP principle[5]. The hierarchy of controls for environmental hazards typically includes:

- Eliminate – Remove the risk; eliminate the hazard.
- Substitute – Replace risk with a less hazardous one.
- Engineering – Introduction of engineering controls to prevent the source of risk.
- Administrative – Implementation of procedures, competency and training to minimise the risk.
- Protective – Introduce protective measures and equipment.

A **Type A** decision is made if the risk is relatively well understood, the potential impacts are low, activities are well practised, and there are no conflicts with company values, no partner interests and no significant media interests. However, if good practice is not sufficiently well-defined, additional assessment may be required.

A **Type B** decision is made if there is greater uncertainty or complexity around the activity and/or risk, the potential impact is moderate, and there are no conflict with company values, although there may

5 NOPSEMA (2012). Control Measures and Performance Standards Guidance Note. N040300-GN0271. Revision No. 4. December 2012.

be some partner interest, some persons may object, and it may attract local media attention. In this instance, established good practice is not considered sufficient and further assessment is required to support the decision and ensure the risk is ALARP.

A **Type C** decision typically involves sufficient complexity, high potential impact, uncertainty, or stakeholder influence to require a precautionary approach. In this case, relevant good practice still must be met, additional assessment is required, and the precautionary approach applied for those controls that only have a marginal cost benefit.

In accordance with the regulatory requirement to demonstrate that environmental impacts and risks are ALARP, Western Gas has considered the above decision context in determining the level of assessment required. This is applied to each aspect described in Section 6.

The assessment techniques considered include:

- Good practice
- Engineering risk assessment
- Precautionary approach

5.2.4.1 Good Practice

OGUK (2014) defines 'Good Practice' as:

The recognised risk management practices and measures that are used by competent organisations to manage well-understood hazards arising from their activities.

'Good Practice' can also be used as the generic term for those measures that are recognised as satisfying the law. For this EP, sources of good practice include:

- Requirements from Australian legislation and regulations
- Relevant Australian policies
- Relevant Australian Government guidance
- Relevant Industry standards
- Relevant International conventions

If the ALARP technique is determined to be 'Good Practice', further assessment ('Engineering Risk Assessment') is not required to identify additional controls. However, additional controls that provide a suitable environmental benefit for an insignificant cost are also identified at this point.

5.2.4.2 Engineering Risk Assessment

All potential impacts and risks that require further assessment are subject to an 'Engineering Risk Assessment'. Based on the various approaches recommended in OGUK (2014), Western Gas believes the methodology most suited to this activity is a comparative assessment of risks, costs, and environmental benefit. A cost–benefit analysis should show the balance between the risk benefit (or environmental benefit) and the cost of implementing the identified measure, with differentiation required such that the benefit of the risk reduction measure can be seen and the reason for the benefit understood.

5.2.4.3 Precautionary Approach

OGUK (2014) state that if the assessment, considering all available engineering and scientific evidence, is insufficient, inconclusive, or uncertain, then a precautionary approach to impact and risk management is needed. A precautionary approach will mean that uncertain analysis is replaced by conservative assumptions that will result in control measures being more likely to be implemented.

That is, environmental considerations are expected to take precedence over economic considerations, meaning that a control measure that may reduce environmental impact is more likely to be implemented. In this decision context, the decision could have significant economic consequences to an organisation.

Following the determination of ALARP Decision Context, and identification of controls, the residual environmental risk is evaluation. Table 5-4 shows the determination of ALARP for residual risk.

Table 5-4: Demonstration of ALARP

Residual Risk			
Risk (Figure 5-2)	High (intolerable)	Medium (tolerable)	Low (acceptable)
Impact (Figure 5-3)	Severe, major or catastrophic (unacceptable)	Minor (acceptable)	Slight (acceptable)
ALARP Determination	Activity is not ALARP and should not be carried out	The risk and impact are tolerable/acceptable, and ALARP is demonstrated. Efforts should still be made to identify control measures (if any) that are not disproportionate to the benefit gained, to demonstrate the levels that are reduced to ALARP.	Control measures are consistent with good industry practice, then ALARP is demonstrated. If a readily available control measure will further reduce the impact or risk and the cost of implementation is not disproportionate to the benefit gained, then it is considered 'reasonably practicable' and is implemented.

5.2.5 Acceptability Determination

Regulation 10A(c) of the OPGGS(E)R requires that the Environment Plan demonstrates that the environmental impacts and risks of the Activity will be of an acceptable level. The Acceptable level of impact is considered for each receptor potentially affected by an impact or risk.

The Acceptable Level of Impact is determined for each receptor, based on the values and sensitivities of that receptor in the Project Area relevant to this EP. Acceptable Level of Impact considers several important factors, including sensitivity of the receptor at the location (e.g. BIAs, critical habitats, protected areas), vulnerability of the receptor to change (i.e. is the receptor particularly vulnerable to disturbance events), timing of the activity (i.e. does the activity timings correspond to any important behaviours).

The Acceptable Level of Impact is compared against the predicted level of impact / risk resulting from the proposed activity, as determined during the Impact and Risk Assessment, to determine Acceptability of the impact or risk.

In the context of 'Acceptability' several elements need to be considered. In this Environment Plan, the environmental impacts and risks associated with the activity are determined 'Acceptable' if the following criteria are met:

- Principles of Ecologically Sustainable Development (ESD): The activity (and associated potential risks and impacts) will not contravene the Principles of ESD, as described in Section 3A of the EPBC Act. Review of the five principles of ESD under the EPBC Act in relation to acceptability against the activity is detailed in the Table 5-5.
  - For planned (routine) events, this is achieved when residual environmental severity (i.e. consequence) is considered 'Minor' or 'Slight' and has been demonstrated ALARP.
  - For unplanned (i.e. accident/incident) events, this is achieved when residual environment risk is considered 'Medium' (tolerable), or 'Low' (acceptable), and has been demonstrated ALARP;
- Internal Context: The activity (and associated potential risks and impacts to the environment) is consistent with Western Gas corporate policies, standards and procedures;
- External Context: Stakeholder objections or claims related to the activity (and associated potential risks and impacts) have been considered and addressed through the consultation process; and
- Other Requirements: The activity (and associated potential risks and impacts to the environment) is consistent with relevant legislation, industry standards and guidelines, offshore practice or benchmarking.

Table 5-5: Activity relevant principles of ESD

No.	ESD Principle	Relevance
(a)	decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations	The environmental impact and risk assessment determines impact consequence levels considering the duration and extent of the impact, receptor recovery time and the effect of the impact at a population, ecosystem, or industry level. The assessment of impact consequence levels for the proposed activity simultaneously assesses of the activity's potential implications against this principle. Additional assessment of this principle in relation to acceptability will not be conducted.
(b)	if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation	For planned (routine) events, this is achieved when residual environmental severity (i.e. consequence) is considered 'Minor' or 'Slight' and has been demonstrated ALARP. For unplanned (i.e. accident/incident) events, this is achieved when residual environment risk is considered 'Medium' (tolerable), or 'Low' (acceptable), and has been demonstrated ALARP. If the above criteria are met, where there is significant scientific uncertainty associated with the aspect; additional assessment against this principle is required.
(c)	the principle of inter-generational equity—that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations	For planned (routine) events, this is achieved when residual environmental severity (i.e. consequence) is considered 'Minor' or 'Slight' and has been demonstrated ALARP. For unplanned (i.e. accident/incident) events, this is achieved when residual environment risk is considered 'Medium' (tolerable), or 'Low' (acceptable), and has been demonstrated ALARP; The assessment of this principle is implemented through further details on ALARP assessment highlighting assurance that potential impacts and risks are managed, and the environment is maintained for the benefit of future generations.
(d)	the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making	Evaluate if there is the potential to affect biological diversity and ecological integrity.
(e)	improved valuation, pricing and incentive mechanisms should be promoted	This principle refers to activities which involve valuation, pricing and/or incentive mechanisms for the production, delivery, distribution or consumption of goods and services, especially those that are derived from natural or social capital or from ecological services. This principle is not relevant to the proposed activity as the proposed activity does not involve the production, delivery, distribution or consumption of goods and services.

5.2.6 Application of the Impact and Risk Management Processes

Section 6 identifies the environmental impacts of planned activities along with the relevant control measures. Section 7 describes the environmental effects of the Activity's unplanned events (i.e. accidents/incidents) on the environment, identifies control measures to reduce the risks of the unplanned events as far as practicable, and assesses the residual environmental risk with the implementation of additional control measures.

The results of the risk assessment are summarised in Table 6-1 and Table 7-1 for planned and unplanned events respectively. While assessment outcomes were based solely on environmental risks, risks to company reputation, regulatory compliance, or community relationships were also considered but not assessed.

The oil spill response strategies outlined in Section 8 were risk assessed separately along with ALARP and Acceptability justifications. The assessment of the spill response strategies does not include ranking the risk (severity or likelihood) as per the risk matrix. The aim of the assessment was to identify if each spill response strategy is viable with respect to several environmental and operational considerations. Subsequently, ALARP and Acceptability justifications for each of the response strategies were made to enable a decision on their adoption.

5.2.7 Environmental Performance

One of the aims of the Environmental Risk Assessment Methodology is to identify the appropriate control measures to reduce the impacts and risks of the activity to ALARP and to an acceptable level. Establishment of environmental performance outcomes (EPO), environmental performance standards (EPS) and their associated measurement criteria (MC) of these control measures is a process that also considers legal requirements, relevant guidelines and stakeholder views. EPOs, EPS and their associated MC are described in Section 6 and Section 7. The environmental performance outcomes, environmental performance standards and their associated measurement criteria must be consistent with Western Gas' corporate policy and be:

- Specific: well defined and not open to interpretation;
- Measurable: can be measured and where possible in a quantitative manner;
- Achievable: can be met (i.e. realistic);
- Relevant: relate to the potential environmental impacts and risk of the activity; and
- Time-based: include a time component (where relevant).

6 IMPACT ASSESSMENT OF PLANNED EVENTS

Division 2.3 - Evaluation of environmental impacts and risks

The environment plan must include:

13(5)a: details of the environmental impacts and risks for the activity; and

13 (5)b: an evaluation of all the impacts and risks, appropriate to the nature and scale of each impact or risk; and

13(5)c: details of the control measures that will be used to reduce the impacts and risks of the activity to as low as reasonably practicable and an acceptable level.

To avoid doubt, the evaluation mentioned in paragraph (5)(b) must evaluate all the environmental impacts and risks arising directly or indirectly from:

13(6)a: all operations of the activity; and

13(6)b: potential emergency conditions, whether resulting from accident or any other reason.

13(7)a set environmental performance standards for the control measures identified under paragraph (5)(c); and

13(7)b set out the environmental performance outcomes against which the performance of the titleholder in protecting the environment is to be measured; and

13(7)c include measurement criteria that the titleholder will use to determine whether each environmental performance outcome and environmental performance standard is being met.

6.1 SECTION OVERVIEW

The purpose of this Section is to address the requirements of Regulation 13(5), 13(6) and 13(7) of the OPGGS (Environment) Regulations by providing an assessment and evaluation of the potential environmental impacts for the Activity and detail control measures that will be applied to reduce impacts to an acceptable level, demonstrating how the measure being taken will reduce the level of impact to ALARP. This Section of the EP focusses on planned events during the Activity.

The ENVID assessment described in Section 5 identified seven (7) planned events representing sources of environmental impact. The severity ratings of all the impacts identified were determined to be ‘slight’ as per the established severity criteria (Table 5-3).

Table 6-1 provides a summary of all the planned events identified and assessed at the ENVID workshop. For each planned event, the potential impact arising is assessed and described, demonstrating that the impact has been reduced to ALARP and to an acceptable level, and environmental performance outcomes, environmental performance standards and measurement criteria are met. The implementation strategy (Section 9) provides the details regarding the management, roles, competency, monitoring, emergency response and reporting.

Table 6-1: Summary of impact assessment of planned events

Activity		Biological Environment Affected						Socio-Economic Environment Affected				Impact Assessment
		Whales	Turtles	Fish/ Sharks	Seabirds	Seabed	Marine Biota	Commercial Fisheries	Shipping Activities	Tourism	Greenhouse Gas	Severity
Section 6.3	**Physical Presence (wellhead in-situ)**											
	Presence of subsea infrastructure	-	-	-	-	-	-	✓	-	-	-	Slight
Section 0	**Interaction with other Marine Users**											
	Timing and location of vessel							✓	✓			Slight
	Presence of subsea infrastructure											
Section 6.5	**Seabed Disturbance**											
	Manoeuvring of ROV					✓						Slight
Section 6.6	**Noise Emissions**											
	Routine vessel operations (incl. thrusters if using DP system, ROV)	✓	-	-	-	-	-	-	-	-	-	Slight
Section 6.7	**Atmospheric Emissions**											
	Survey vessel's machinery and engines, generators and mobile/ fixed plant and equipment	-	-	-	-	-	-	-	-	-	✓	Slight
Section 6.8	**Routine Liquid Waste Discharges**											
	Sewage	-	-	-	-	-	✓	-	-	-	-	Slight
	Grey water	-	-	-	-	-	✓	-	-	-	-	
	Brine	-	-	-	-	-	✓	-	-	-	-	
	Cooling water	-	-	-	-	-	✓	-	-	-	-	
	Bilge water	-	-	-	-	-	✓	-	-	-	-	
	Deck drainage	-	-	-	-	-	✓	-	-	-	-	

Activity		Biological Environment Affected						Socio-Economic Environment Affected				Impact Assessment
		Whales	Turtles	Fish/ Sharks	Seabirds	Seabed	Marine Biota	Commercial Fisheries	Shipping Activities	Tourism	Greenhouse Gas	Severity
	Food/ putrescible waste	-	-	-	-	-	-	-	-	-	-	
Section 6.9	**Solid Waste Discharge**											
	General (non-hazardous) waste	✓	✓	✓	-	✓	-	-	-	-	-	Slight
	Hazardous waste	✓	✓	✓	-	-	-	-	-	-	-	

6.2 PLANNED EVENTS EXCLUDED FROM THE SCOPE OF THE ENVIRONMENT PLAN

The following planned events are not considered to be applicable within or outside of the Operational Area and were not further deliberated within the scope of this EP.

Light Emissions

Lighting will be used on the vessel at night for safe conduct of operations and to adhere to required maritime safety regulations. There are no standards by recognised bodies for acceptable levels of lighting to the most sensitive environmental receptors, which are generally considered to be seabirds or turtles. The most relevant is the Commonwealth of Australia's Recovery Plan for Marine Turtles in Australia 2021-2027 (CoA, 2017), which notes that the starting point for design should be to locate developments sufficiently far from the coast to ensure that lights are not visible from turtle nesting beaches or the adjacent sea. Other relevant considerations are comparison to good oilfield practice and professional judgement. The illumination of work areas is normal oilfield practice and necessary for safe operations. The Activity will occur approximately 180 km (97 nm) from Barrow Island and approximately 148 km (78 nm) from the nearest mainland coast (North West Cape) in an open ocean environment.

No sensitive receptors such as turtle nesting beaches or seabird roosting/ foraging habitat are known from within the Operational Area. On this basis, no effects of lighting on sensitive receptors are predicted.

Vessels in Transit to Permit Areas

The survey vessel will transit between either Exmouth or Dampier Port and the Operational Area. During transit, the vessels will be governed by the relevant marine legislation, outlined within vessel specific management plans which will be reviewed by Western Gas prior to mobilisation. This EP covers only the environmental impacts and risks associated with the vessel once the vessel is within the Operational Area.

6.3 PHYSICAL PRESENCE (WELLHEADS IN-SITU)

The physical presence of the wellheads remaining in situ relates to the suspended wellhead (Glenloth-1) for the duration of the EP and the permanently abandoned wellheads (Chester-2, Mentorc-2, Glencoe-2H and Snapshot-1).

The decommissioning options assessment (Section 3) presented Option C (leave in-situ) as the preferred option for the permanently abandoned wellheads in terms of technical, environmental, and economic criteria.

The physical presence of the wellheads will continue to:

- Provide a hard substrate resulting in the creation of a new habitat;
- Potentially interrupt natural sediment movement in the immediate vicinity of the wellheads remaining permanently in-situ; and
- Introduce potential contaminates to the water column and sediment surrounding the wellheads as they degrade over time;

for the duration of this EP.

Wellhead composition

As the wellheads will remain in situ (one suspended for the duration of the EP and four permanently), over time the wellheads will corrode (either internally or externally). In the long term, this could result in the introduction of contaminants from the wellhead composition and surface coatings or paint. The release of corrosion and paint material has the potential to change water quality and sediment quality, adversely impacting benthic habitats and communities in the surrounding water column.

Wellhead material is mostly constructed of low-alloy steel. Low alloy steel used for wellheads typically includes chromium, molybdenum and manganese as alloying agents in varying amounts, and in some compositions also nickel and silicon. Table 6-2 summarises the range of minimum and maximum percentage compositions across three commonly used wellhead material specifications (AISI 8630, AISI 4130, ASTM A182 F22).

Table 6-2: Typical Wellhead Composition (AISI 8630, AISI 4130, ASTM A182 F22)

Element	Typical wellhead material composition ranges	
	Minimum %	Maximum %
Iron	95.04	98.22
Carbon	0.05	0.33
Chromium	0.4	2.5
Molybdenum	0.15	1.13
Manganese	0.3	0.95
Nitrogen	0	0.75
Silicon	0	0.5
Sulphur	0	0.04
Phosphorus	0	0.04

Recent inspection of the Glenloth-1 wellhead shows no discernible degradation (Figure 6-1). It is reasonable to assume, therefore that corrosion is not possible at this depth due to lack of presence of oxidants such as oxygen, hydrogen or hydroxide. All wellheads are the same age and type, and located at similar water depths, therefore Glenloth-1 is a good analogue for other locations.

Figure 6-1: Photos from recent inspection of Glenloth-1 wellhead (Western Gas, 2023) [Left: Well conductor debris cap; Right: Guide base connection to wellhead]

The wellheads did not produce hydrocarbons and so are not predicted to have accumulated toxic contaminants, such as naturally occurring radioactive materials (NORMs) or mercury. Therefore these materials are not present to contaminate the surrounding environment.

Some elements of the wellhead structure (mud mat and debris cap) have two-pack epoxy paint coverage. Whilst this is expected to breakdown over time there is no evidence of any deterioration of the paint in the past 12 years at the Glenloth-1 location.

There are some plastics in the Viton seal ring which provide a pressure seal between various of the wellhead housings and casing hangers. These fluropolymer elastomers are highly resistant to breakdown in a wide variety of aggressive and corrosive fluids and well fluids. Based on the condition of the wellhead from the Dec-22 survey indicating no corrosion or material loss (over a period of ¬12 years) any degradation of the metallurgy and exposure to the very small amount of seal material will takes decades if not centuries.

In accordance with good Industry Practice the well was circulated to 9.66ppg Potassium Chloride (KCl) brine inhibited with minor additives (surfactant and corrosion inhibitor) designed to minimise potential for corrosion of the casing. The weighted brine is designed to remain in place below lighter hydrostatic of seawater. The MS700 wellhead is a mechanical system, all components of which are not activated via control lines and control line hydraulic fluids. Therefore there are no fluids resident in the wellhead which could escape the well head or which may damage the local environment.

6.3.1 Potential Impacts

Potential receptors that may be impacted by the physical presence of the wellheads include:

- Physical environment (water quality, sediment quality, benthic habitat)
- Ecological environment (benthic communities)

6.3.1.1 Physical Environment

Corrosion of the wellheads over time could result in the release of trace amount of metals (e.g. iron and chromium) to the water column and surrounding sediments. Due to the robustness of the materials of the wellhead and the deepwater location of the wellhead, corrosion is likely to be a relatively slow process about 0.2 mm/year (Melchers, 2005). Degradation of the wellhead over time may also result in the gradual, progressive release of Viton as these components within the wellhead slowly become exposed to seawater (i.e., after the metal casing around them corrodes).

Studies of erosion/accretion around subsea structures (e.g. shipwrecks, artificial reefs) indicate indirect impacts may be limited to within 20 m of the structure (Smiley 2006; Lewis and Pagano 2016). Given the smaller sizes of the wellheads (approximately 3m by 3m), this is considered reasonable. Due to the low current speeds at the wellhead location, the structures are likely to collapse in place and particles of material fall to the seafloor in the immediate vicinity. Assessment of a similar structure determined that the wellheads would no longer be significantly proud of the seabed after 120 years, and would be completed buried after 150 years (Woodside, 2022a).

The main release of contaminants from the wellheads is iron, which makes up ~98% of each wellhead. The other elements, for example chromium and molybdenum, are widely found in the environment and are not present in quantities that present a risk of impact. Given the low toxicity of iron (iron oxides are included on the OSPAR PLONOR list) and the slow release rate over many decades and the potential for it to collapse and be covered in sediments, the iron may be expected to be buried and ultimately assimilated into the surrounding marine environment with no adverse effects.

As the structure degrades, other compounds encased in the iron will be released. Paint is likely to break down over time and become mixed with the sea floor sediments and corrosion particles from the wellhead. Viton from the seals will eventually be exposed to seawater and begin to degrade. Plastics are known to breakdown in seawater over many hundreds and thousands of years, and will therefore eventually be released into the water column in very small quantities. Weighted brine within the well remains in place through hydrostatic pressure from seawater, with no risk of release to the marine environment as the structure degrades.

Subsequently, changes to the physical environment will be highly localised and not significant, with contamination occurring over a very long time period and the source of contamination being fairly small. Consequence of any impacts is considered to be ‘slight’.

6.3.1.2 Ecological Environment

Changes to the physical environment can result in impacts to marine fauna which depends upon that environment, in this case to benthic habitats and communities in the direct vicinity of the wellheads.

Benthic habitats and communities in the Operational Area are representative of the region and water depth; typically sparse and dominated by scavengers and filter feeders. There are no sensitive habitats known to occur within the Operational Area, and the Operational Area does not overlap with any KEFs or AMPs.

The Threat Abatement Plan for the Impacts of Marine Debris on the Vertebrate Wildlife of Australia's Coasts and Oceans (Commonwealth of Australia, 2018) includes an objective to understand the scale of impacts from marine plastic and microplastic on key species, ecological communities and locations. The discharge of negligible quantities of plastic (Viton) is therefore an applicable discharge under this plan. The petroleum activity will not be inconsistent with the actions within the Threat Abatement Plan as the quantity of material released and the slow duration of release means that any impacts from the degradation of the wellheads referred to under this EP will be negligible.

6.3.2 ALARP Demonstration

A summary of the ALARP assessment undertaken for the physical presence of the well heads is presented in Table 6-3. This assessment was completed as outlined in Section 5.2.4 and includes existing standard industry controls, consideration of additional controls, and acceptance or justification if the control was not considered suitable (Table 6-3). The result of this ALARP assessment contributes to the overall acceptability of the impact. All impacts due to planned events are treated and reduced to ALARP.

Table 6-3: ALARP Demonstration for Physical Presence (wellheads in-situ)

Hierarchy	Controls	Accept/ Reject	Justification
Existing Controls			
Eliminate	N/A		
Substitute	N/A		
Engineering	Complete Removal of the Wellheads	R	As detailed in Section 3, leaving in-situ is the preferred decommissioning outcome as it provides a benefit from an environmental, and technical perspective. Attempting to remove the wellhead would also introduce technical risks. As such, the costs to remove the wellhead are considered disproportionately high compared to the low risk of environmental effects of leaving the wellhead in-situ.

Hierarchy	Controls	Accept/ Reject	Justification
	Wellhead Monitoring	R	There is no compelling reason for wellhead monitoring given the environmental assessment is predicting negligible impacts. The level of uncertainty with the associated environmental impacts assessment is considered low.
	Wellhead Maintenance	R	There is no justification for maintaining the wellhead. The wellhead is not expected to be contaminated with any hazardous material. The well has been permanently plugged and abandoned. Hence the wellhead is of no use.
Administrative	*Environmental Protected (Sea Dumping) Act 1981* – Sea Dumping Permit	A	If required, a Sea Dumping Permit will be obtained.
Pollution Control	N/A		
Additional Controls			
	N/A		

6.3.2.1 ALARP Summary

The impact assessment and evaluation has identified a range of existing standard controls and additional controls that when implemented are considered to manage the impacts of the Activity on other users to an ALARP level. As no further alternative or additional reasonable control measures were identified and the potential consequences are 'slight', impacts from Physical Presence (wellheads in-situ) are considered to be reduced to ALARP.

6.3.3 Acceptability

The other decommissioning options assessed in Section 3.1.4 (removal by external cutting; internal cutting and capping) would require additional vessel campaigns, introducing additional environmental impacts, including vessel emissions and discharges, further impact to other users and unplanned risks (e.g. accidental release of hydrocarbons). These options received a lower preference ranking for technical feasibility, risks and financial costs. While removing the wellheads would also result in negligible environmental impacts, this option introduces company financial costs, and environmental risks (e.g. vessel fuel oil spills). Western Gas has concluded that leaving the wellheads in situ represents a better environmental outcome compared to removal and the impacts and risks have been reduced to ALARP and will be of an acceptable level. In addition, removal will require additional financial costs. Therefore, the potential consequences from Physical Presence (wellheads in-situ) are considered to have a 'slight' impact. There will be no significant impacts other than localised reduction in quality of the physical environment (water, sediment, habitat) over a very long time duration. The impacts were considered acceptable with the industry standard controls implemented. On this basis, it

is determined that the controls in place will manage the impacts of the physical presence of the well heads to an acceptable level.

Acceptability Statement Summary		
Consideration	**Acceptability Statement**	**Acceptability**
Principles of ESD	The activity will not contravene the Principles of ESD, based on: • Impacts have been assessed using the Western Gas Risk Matrix, which considers duration and extent of impacts • Severity of planned event is evaluated as slight and has been demonstrated ALARP • Impacts will not affect biological diversity or ecological integrity.	✓
Internal Context	The activity (and associated potential impacts and risks) is consistent with Western Gas corporate policies, standards and procedures.	✓
External Context	No stakeholder objections or claims related to the activity (and associated potential risks and impacts) have been received	✓
Other Requirements	The activity (and associated potential risks and impacts to the environment) is consistent with relevant legislation, industry standards and guidelines, offshore practice or benchmarking, including: • Threat Abatement Plan for the Impacts of Marine Debris on the Vertebrate Wildlife of Australia's Coasts and Oceans	✓

6.3.4 Environmental Performance Outcome, Performance Standards and Measurement Criteria

Performance Outcome		Performance Standard	Measurement Criteria
Seabed disturbance limited to the existing well head footprint		**PS 5.1.1** Western Gas will apply and submit for a Sea Dumping Permit with the appropriate agency to allow for the permanently abandoned wellheads to be left in-situ on the marine seabed.	Western Gas correspondence to DCCEEW regarding the permanently abandoned wellheads to be left in-situ.

6.4 INTERACTION WITH OTHER MARINE USERS (VESSEL OPERATIONS)

The survey is expected to take up to seven days, including contingencies, related to inspection activities at the suspended wellhead (Glenloth-1).

The physical presence of the survey vessel at the well site during inspections may interfere with other users of the area which may include shipping traffic, commercial fishers and defence. The vessel presence may force temporary diversion of the routes of these other sea users from the area.

Once the survey is completed, the vessel will demobilise from the Permit Areas. The well will remain suspended with the wellhead in place on the seabed.

6.4.1 Potential Impacts

An established shipping fairway traverses Permit Areas (Figure 4-5), however Glenloth-1 is located outside the fairway. The wellhead does not have an elevation that could pose any risk to vessel movements, but there is the potential for some minor (localised) displacement of commercial shipping and/or defence vessels outside the fairway if it was traversing the Operational Area during ROV activities. The very short duration of inspection activities would restrict the potential for disruption and impact of disruption.

Petroleum activities on the NWS have been ongoing for many years and therefore other users of the sea are familiar with the requirement to navigate around vessels that are holding position while undertaking works. As such, the potential impact arising from the disruption to commercial shipping and defence is considered to be low. Potential impacts associated with vessel collisions are discussed in Section 7.1.5

Given the water depth and the distance from the nearest shoreline, recreational fishing is not anticipated in the Permit Areas. However, the presence of the vessel during the survey and of the wellhead on the seabed has the potential to displace commercial fishing activity.

There are four Commonwealth (Southern Bluefin Tuna, Western Deepwater Trawl, Western and Billfish and North West Slope Trawl Fishery) and one State commercial fishery (Mackerel Managed Fishery) that operate within the vicinity of the Operational Area. There is no current active Commonwealth or State fishing occurring within the Operational Area.

Overall, the severity of the impact to commercial shipping, commercial fishing and defence with standard controls in place is considered to be ‘slight’ on the Western Gas Risk Matrix.

6.4.2 ALARP Demonstration

A summary of the ALARP assessment undertaken for the physical presence of the vessel and well heads is presented in Table 6-4. This assessment was completed as outlined in Section 5.2.1 and

includes existing standard industry controls, consideration of additional controls, and acceptance or justification if the control was not considered suitable (Table 6-4). The result of this ALARP assessment contributes to the overall acceptability of the impact. All impacts due to planned events are treated and reduced to ALARP.

Table 6-4: ALARP assessment for physical presence

Hierarchy	Controls	Accept/ Reject	Justification
Existing Controls			
Eliminate	Do not conduct the survey	R	NOPSEMA have requested the survey as part of the WOMP (Section 1.5.2.2)
Substitute	N/A		
Engineering	Navigation (including lighting, compass/radar), bridge and communication equipment will be compliant with appropriate marine navigation and vessel safety requirements under the International Convention of the Safety of Life at Sea (SOLAS) 1974 and *Navigation Act 2012* (or equivalent).	A	Legislative requirement. Control is feasible, standard practice with benefits outweighing any cost sacrifice.
	Navigational aids (AIS) will alert marine vessels and aircraft of position of the survey vessel to avoid collision, and alert survey vessel personnel of impending collision.	A	Legislative requirement. Control is feasible, standard practice with benefits outweighing any cost sacrifice.
	Bridge-watch on vessel to be maintained 24-hours per day.	A	Legislative requirement. Control is feasible, standard practice with benefits outweighing any cost sacrifice.
Administrative	Crew undertaking vessel bridge-watch qualified in accordance with International Convention STCW95; AMSA Marine Order – Part 3: Seagoing Qualifications or certified training equivalent.	A	Legislative requirement. Control is feasible, standard practice with benefits outweighing any cost sacrifice.
	Notification of vessel location, duration of activities, etc. to AMSA Rescue Coordination Centre (RCC), which triggers RCC to issue an AusCoast Warning, and to the Australian Hydrographic Service (AHS) who will issue a 'Notice to Mariners'.	A	Operator established control. Control is feasible, standard practice with benefits outweighing any cost sacrifice.
	Stakeholders potentially affected by the Activity will be consulted/ advised of relevant activities associated with suspended wells.	A	Operator established control. Control is feasible, standard practice with benefits outweighing any cost sacrifice.
Pollution Control	N/A		
Additional Controls			
Administrative	Notification that the well is temporarily suspended to stakeholders, including AHS who will issue a 'Notice to Mariners' and/or mark the wells on marine charts as appropriate. Notification to include positional coordinates of well heads.	A	Operator established control. Control is feasible, standard practice with benefits outweighing any cost sacrifice

Hierarchy	Controls	Accept/ Reject	Justification
Administrative	Stakeholders potentially affected by the inspection survey will be advised of confirmed survey dates at least one month prior to commencement.	A	Operator established control. Control is feasible, standard practice with benefits outweighing any cost sacrifice

6.4.2.1 ALARP Summary

The impact assessment and evaluation has identified a range of existing standard controls and additional controls that when implemented are considered to manage the impacts of the Activity on other users to an ALARP level. As no further alternative or additional reasonable control measures were identified and the potential consequences are 'slight', impacts to other marine users from Physical Presence are considered to be reduced to ALARP.

6.4.3 Acceptability

The area affected represents a relatively small area available for shipping, with no fishing activities occurring in the vicinity of the Operational Area. Given that the suspended well survey is not located in a designated shipping fairway, the very short duration of the inspection survey (up to seven days, including contingencies), the effect of the physical presence of the vessel on other marine users is considered to be acceptable on the basis of a 'slight' impact. There will be no significant impacts other than short-term and localised displacement to commercial shipping and to some local coastal marine vessel traffic. The impacts were considered acceptable with the industry standard controls implemented. On this basis, it is considered that the controls in place will manage the impacts of the physical presence of the vessel on other sea users to an acceptable level.

Acceptability Statement Summary		
Consideration	**Acceptability Statement**	**Acceptability**
Principles of ESD	The activity will not contravene the Principles of ESD, based on: • Impacts have been assessed using the Western Gas Risk Matrix, which considers duration and extent of impacts • Severity of planned event is evaluated as slight and has been demonstrated ALARP • Impacts will not affect biological diversity or ecological integrity.	✓
Internal Context	The activity (and associated potential impacts and risks) is consistent with Western Gas corporate policies, standards and procedures.	✓
External Context	No stakeholder objections or claims related to the activity (and associated potential risks and impacts) have been received	✓
Other Requirements	The activity (and associated potential risks and impacts to the environment) is consistent with relevant legislation, industry standards and guidelines, offshore practice or benchmarking.	✓

6.4.4 Environmental Performance Outcomes, Performance Standards and Measurement Criteria

Performance Outcome	Performance Standard	Measurement Criteria
No collisions/incidents between the survey vessel and other marine users during the Activity	**PS 5.3.1.** *Navigation Act 2012*; International Convention of the Safety of Life at Sea (SOLAS) 1974; Marine Order - Part 30: Prevention of Collisions, Issue 8; Marine Order 21, Issue 8 (Safety of Navigation and Emergency Procedures); and International Convention of Standards of Training, Certification and Watch-keeping for Seafarers (STCW95): Navigation (including lighting, compass/radar), bridge and communication equipment will be compliant with appropriate marine navigation and vessel safety requirements. Automatic Identification System (AIS) on vessels is fitted and maintained in accordance with Regulation 19-1 of Chapter V of SOLAS. Crew undertaking vessel bridge-watch will be qualified in accordance with International Convention of STCW95, AMSA Marine Order -Part 3: Seagoing Qualifications or certified training equivalent. Bridge-watch on vessel to be maintained 24-hours per day.	Records demonstrating compliance with standard maritime orders and equipment. Vessel Marine Logbook demonstrating bridge-watch maintained 24-hours per day.
	PS 5.3.2. **Establish Activity Area:** Notification of vessel location, duration of activities, etc. to AMSA RCC, which triggers RCC to issue an AusCoast Warning, and to the Australian Hydrographic Service (AHS) who will issue a 'Notice to Mariners'.	Documentation of notification to AMSA RCC and AHS advising of the Activities including vessel; locations and duration of activities.
	PS 5.3.3. **Stakeholder Engagement Strategy:** Stakeholders potentially affected by the Activity will be consulted/ advised of relevant details.	Records maintained of stakeholder consultation and feedback in Stakeholder Consultation Log, including any complaint 'incidents'.
	PS 5.3.4. **Well Suspension Notification:** As the well will remain in suspension, advise AHS who will issue a 'Notice to Mariners' and/or mark the wells on marine charts.	Documentation of notification to AHS advising of continued suspension of the well.

6.5 SEABED DISTURBANCE

It is intended that one well (Glenloth-1) will be left in suspension and the wellhead will remain in place on the seabed during this period of suspension. The wellhead will displace an area of seabed equivalent to their footprint for the duration of the Activity and potentially cause localized disturbance (scouring or accretion) of immediately surrounding areas. During the inspection survey, seabed disturbance can result from manoeuvring of the ROV. The four (4) wellheads being left in-situ are not expected to have an impact on the seabed as there is no change to the environment in which they are currently present. The impact of seabed disturbance from unplanned dropped objects overboard are discussed in Section 0.

One vessel will remain at the well location for the duration of the inspection survey. The vessel will have dynamic positioning (DP) capability and no anchoring will be undertaking during the inspection of the wellhead.

6.5.1 Potential Impacts

The survey vessel will have a DP capability and no anchoring will be undertaking during the inspection of the wellhead. Consequently, there will be no impacts to the seabed from the vessel. Given the frequency and duration of the ROV surveys, the small potential area of disturbance associated with ROV activity will have negligible impacts.

The subsea infrastructure remaining on the sea floor (i.e. above the mudline) at the wellsite consists of the wellhead system (including suspension cap) and a mud-mat. The associated seabed footprint is approximately 9 m^2. The continued presence of this infrastructure is not likely to alter the extent of existing impacts to benthic habitats, as the wellhead has been in place for some time but will effectively defer recovery for the duration of the Activity. Localised changes to water movements may also affect the areas immediately surrounding the mud-mat through erosion or accretion of sediments. However, at the depths prevailing at the wellsite, water movements are unlikely to generate sufficient currents for this effect to be significant.

The severity of the impact to benthic habitats is affected by their complexity and density of associated biota. The seabed across the Permit Areas is considered to be essentially featureless with sediments which support burrowing infauna and sparse epifauna (Margvelashvili, 2006). In 2012, a review of the information available on the biophysical benthic habitats within the then Permit Area WA-390-P (which WA-70-R falls within) was commissioned by HESS (RPS, 2012[6]). The review combined site-specific survey data collected by HESS, data collected from other developments in the vicinity of the Permit

[6] RPS (2012) Marine Benthic Habitat Review. Hess Equus Project. Permit WA-390-P and Pipeline Corridors. Prepared by RPS for Hess Exploration Australia Pty Ltd.

Area and publicly available regional datasets. Based on the seabed surveys undertaken at those sites, the seabed typically consists of a homogenous substrate of biogenic calcareous ooze typical of similar habitats found at these depths throughout the NWS region, with habitat and assemblages well represented in the region and of low conservation value. No rare, endangered, isolated species or habitat of significance was present within the Permit Area. The soft sediments contain infauna and macro-invertebrates typical of the habitats in these depths on the NWS (RPS, 2012[7]).

Given the widespread habitat distribution, the localised seabed disturbance footprint, and the ability of existing habitat to recover once the Activity ceases, the impact to seabed is considered to be 'slight'.

The Exmouth Plateau Key Ecological Feature (KEF) overlaps with the Permit Areas. The Exmouth Plateau KEF is a regionally and nationally unique deep-sea plateau that may modify the flow of deep waters, generating internal tides and may contribute to upwelling of nutrients, thus serving an important ecological role. Given the extent of the potential seabed disturbance (9 m^2) in relation to the extent of the Exmouth Plateau (~5,000 km^2) (Baker *et al*., 2008[8]), the impact to the KEF is considered to be 'slight'.

Overall, the severity of the seabed disturbance from continued presence of the well heads is considered to be 'slight' on the Western Gas Risk Matrix.

6.5.2 ALARP Demonstration

A summary of the ALARP assessment undertaken for seabed disturbance arising from footprint of the wellheads and presence of the survey vessel is presented in Table 6-5. This assessment was completed as outlined in Section 5.2.1 and includes existing standard industry controls, consideration of additional controls, and acceptance or justification if the control was not considered suitable (refer to). The result of this ALARP assessment contributes to the overall acceptability of the impact. All impacts due to planned events are treated and reduced to ALARP.

Table 6-5: ALARP assessment for seabed disturbance

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
Existing Controls				
Eliminate	Dynamic Positioning (DP) System as method for station keeping of the survey vessel.	A	Control is feasible, standard practice with benefits outweighing any cost sacrifice	**PS 5.4.1**

7 Ibid.

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
	Do not conduct the survey	R	NOPSEMA have requested the survey as part of the WOMP (Section 1.5.2.2)	
Engineering	N/A			
Administrative	Survey vessel will not anchor in the Operational Area during normal operations.	A	Control is feasible, standard practice with benefits outweighing any cost sacrifice	**PS 5.4.2**
	ROV will not contact seabed outside mud-mat during normal operations	A	Control is feasible, standard practice with benefits outweighing any cost sacrifice	**PS 5.4.3**
Pollution Control	N/A			

6.5.2.1 ALARP Summary

The impact assessment and evaluation has identified standard controls that when implemented are considered to manage the impacts from the wellhead footprint, ROV manoeuvring and vessel anchoring resulting in seabed disturbance to an ALARP level. With the size of the survey vessel, the deep waters at the well sites and the very short duration of activity at the site, DP is considered a preferred alternative to anchoring. The ROV is required to approach the wellhead to conduct inspections. As the wellhead is already in place and its removal would require permanent plugging and abandonment of the well to have been completed, there is no reasonable alternative to having the wellhead on the seabed whilst suspended. The inherent impacts to seabed habitats from the presence of the wellhead while remaining suspended and the ROV activities are minimal. With no reasonable additional controls identified to reduce environmental impact, the impacts are 'slight' and considered to be reduced to ALARP.

6.5.3 Acceptability

Leaving the well suspended is consistent with Western Gas policies and procedures and is standard industry practice on the NWS (and elsewhere). The seabed in the Permit Areas is composed of fine sediments that are considered to be colonised by low density benthic fauna. When considered in the context of similar seabed habitat widely represented on the shelf slope in the region, the portion of seabed directly affected is extremely small. As no significant impacts are expected, with seabed disturbance being localised, the impacts were considered 'slight' and ALARP, the controls in place will manage the impacts associated with seabed disturbance to an acceptable level.

Acceptability Statement Summary		
Consideration	**Acceptability Statement**	**Acceptability**
Principles of ESD	The activity will not contravene the Principles of ESD, based on:	✓

Acceptability Statement Summary		
Consideration	**Acceptability Statement**	**Acceptability**
	• Impacts have been assessed using the Western Gas Risk Matrix, which considers duration and extent of impacts • Severity of planned event is evaluated as slight and has been demonstrated ALARP • Impacts will not affect biological diversity or ecological integrity.	
Internal Context	The activity (and associated potential impacts and risks) is consistent with Western Gas corporate policies, standards and procedures.	✓
External Context	No stakeholder objections or claims related to the activity (and associated potential risks and impacts) have been received	✓
Other Requirements	The activity (and associated potential risks and impacts to the environment) is consistent with relevant legislation, industry standards and guidelines, offshore practice or benchmarking.	✓

6.5.4 Environmental Performance Outcome, Performance Standards and Measurement Criteria

Performance Outcome	Performance Standard	Measurement Criteria
Seabed disturbance limited to the existing well head footprint	**PS 5.4.1.** Contracted survey vessel has DP capability.	Contract documents stipulate DP capability.
	PS 5.4.2. Vessels will not anchor within Operational Area during normal operations unless in an emergency (and only if safe to do so).	Logbook shows no vessel anchoring within the Operational Area during normal operations.
	PS 5.4.3. ROV will not contact seabed outside mud-mat during normal operations	ROV inspection logs show no contact to seabed during normal operations

6.6 NOISE EMISSIONS

During the survey, noise will be generated by the vessel propellers/thrusters and associated machinery/engines, as well as by the ROV.

To assist in locating the wellhead, an ROV may use various geophysical and hydrographic survey techniques such as Multibeam echo-sounder (MBES), Side-scan Sonar (SSS) or Ultra-short Baseline System (USBL).

Vessel Generated Noise

The vessel will be either stationary or operating at slow speeds while undertaking activities within the Operational Area.

The vessel will emit noise from propeller cavitation, thrusters, hydrodynamic flow around the hull, and operation of machinery and equipment. Most sounds associated with vessels are broadband, but low frequency sound (i.e., below 1 kHz) can be produced from machinery noise (e.g., engine noise) and hydrodynamic noise (e.g., water flowing past the hull and propeller singing). The main source of vessel noise will be from propellers (during transit). The source level of support vessels is 182 dB SPL RMS (McCauley, 1998).

Geophysical and Hydrographic survey techniques

In order to achieve the commitments for wellhead inspection under the Glenloth-1 WOMP, the ROV is required to be equipped with digital imaging sonar (Blueview M900; MBES) and two obstacle avoidance sonars (Tritech Super SeaKing; SSS) mounted forward and aft on the ROV for location of the wellhead. For the Tritech sonar systems the maximum range at low frequency is 300m and when operated at high frequency is 100m.

The Tritech avoidance sonars (SSS) are operated throughout the dive duration (estimated 2.5 hours over 2 dives). The digital imaging sonar (MBES) is only operated when on bottom to identify the wellhead structure and is then no longer used.

Based on a recent study of generic MBES equipment, the expected source level is 220 dB re 1 µPa @ 1 m RMS (Lurton, 2016). The Tritech avoidance sonars have a source level of 210dB re 1µPa a 1m (according to the manufacturer). Measurements of a similar system, the Reson SeaBat 8101 MBES operating at 240 kHz were reported in Chorney et al. (2011). These measurements show that at 40 m, the PK levels are approximately 170 dB re 1 µPa, and the per-pulse SEL 130 dB re 1 μPa^2s. Zykov (2013) modelled an R2Sonic 2022, another similar MBES, and found that the sound levels would not exceed an unweighted 171 dB re 1 μPa^2s more than 2 m from the source while conducting a 2.5 hr geophysical survey.

Both MBES and SSS generates only high frequency signals, and as such will only be relevant for fauna with sensitivity to signals of approximately 200 kHz or higher, which excludes low-frequency cetaceans, fish, and turtles.

Based on this, the continuous noise generated by the vessel for the duration of the survey is considered the credible worst-case to sensitive receptors, and is used as the basis for the impact assessment.

6.6.1 Potential Impacts

Underwater noise has the potential to adversely affect marine fauna and in extreme cases cause physiological harm. Underwater noise generated by the Activity may impact on marine fauna by:

- Causing behavioural changes including displacement from biologically important habitat areas (such as feeding, resting, breeding, calving and nursery sites);
- Masking or interference with other biologically important sounds such as communication or echolocation systems used by certain cetaceans for navigation and location of prey;
- Causing physical injury to hearing and other internal organs; and
- Indirectly impacting on predator or prey species.

Although cetaceans, marine reptiles and migratory shark species may occur in the Operational Area, it (and surrounding Permit Areas) does not contain significant feeding, breeding or resting areas. Therefore, any species that do occur will be transient and migrating through the area on their way to feeding, breeding and/or nesting areas.

6.6.1.1 Cetaceans

In 2011/2012, underwater acoustic measurements conducted by HESS in Permit Area WA-390-P (now WA-70-R) between April – July and October – January detected several pygmy blue whale vocalisations, with a peak from early November to late December which corresponds to the reported southbound migration period for the species. The sound intensity levels of these recordings indicated that the pygmy blue whales were approximately 10 – 50 km (5.4 – 27 nm) from the noise loggers, located approximately in the centre of the Permit Area (RPS, 2010[9]).

Noise generated is not expected to affect toothed cetaceans. However, baleen whales are sensitive to marine noise due to their use of low-frequency signals (range 12 Hz – 8 kHz but predominantly <1 kHz) for communication. Studies on a baleen whale (e.g. humpback whales) suggested that migration behaviour may be disturbed by levels of sound at 150 dB re 1 µPa (NRC, 2003[10]). The blue whale's migration route is known to overlap the Permit Areas and hence may potentially be affected by similar sounds levels. Whales in feeding, breeding or resting areas may be sensitive to levels of 140 dB re 1 µPa (DEWHA, 2008b[11]).

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9 RPS (2010). Deep Water Drilling Program Environment Plan. Report prepared for Hess Exploration Australia Pty Ltd.

10 National Research Council (NRC) (2003). Ocean noise and marine mammals. Summary review for the National Academies National Research Council. The National Academies Press, Washington D.C., United States.

11 Department of Water, Environment, Heritage and the Arts (DEWHA). (2008b). North-west Marine Bioregional Plan – Bioregional Profile: A description of ecosystems, conservation values and uses of the North-west Marine Region. DSEWPaC, Canberra, ACT. Available to download from: http://www.environment.gov.au/resource/north-west-marine-bioregional-plan-bioregional-profile-description-ecosystems-conservation.

For baleen whales, the threshold for physical injury (defined as the onset of permanent threshold shift) from pulse and non-pulse sources has been estimated by Southall *et al*. (2007) [12] as occurring at the received sound exposure levels of 198 dB re 1 µPa and 215 dB re 1 µPa respectively. The approach of Southall *et al*. (2007)[13] 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. A whale swimming past the vessel would not receive cumulative sound exposure level (SEL) sufficient to cause physiological effect.

Southall *et al*. (2007)[14] conducted a comprehensive review of data published describing behaviour of marine mammals in response to sound. They defined the threshold for behaviour response as being, "Moderate changes in locomotion speed direction and/or dive profile but no avoidance of the sound source, brief minor shift in group distribution and moderate cessation or modification of vocal behaviour". The review of published data suggests that threshold for behaviour response is highly variable between species, within species and even the same individual animal at different times. For baleen whales the threshold for behavioural response occurs at received sound level of between 120 to 160 dB re 1 uPa.

6.6.1.2 Turtles

A study by Eckart *et al*. (2006)[15] on leatherback turtles addresses threshold shift in turtles. This study demonstrated that turtles will suffer temporary threshold shift and eventually permanent threshold shift from noise (seismic) impulses with sound exposure levels greater than 185 dB re 1 uPa2.s. A turtle would need to approach within 100 m (0.05 nm) or remain at 1 km (0.5 nm) for a period of approximately 26 minutes for physiological impact to occur. Neither of these is considered to be a credible scenario with the current control mechanisms in place. A turtle swimming past the vessel would need to pass within 1 m (0.001 nm) to receive cumulative SEL sufficient to cause physiological effect. Turtle hearing is most sensitive in the frequency range of 100–700 Hz.

Sea turtles have been recorded as demonstrating a startle response to sudden noises (Lenhardt *et al*., 1983[16]). However, few studies have investigated threshold level necessary for behavioural effects. Early

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12 Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.T., Gentry, R.L., Greene Jr., C.R., Kastak, D., Ketten, D.R., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A. and Tyack, P.L. (2007). Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations. Aquatic Mammals, 33(4): 411-521.

13 Ibid.

14 Op cit 12.

15 Eckert, S.A., Bowles, A. and Berg, E. (1998). The effect of seismic airgun surveys on leatherback sea turtles (*Dermochelys coriacea*) during the nesting season. Technical report to BHP (Petroleum) Trinidad Ltd.

16 Lenhardt, M.L., Bellmund, S., Byles, R.A., Harkins, S.W. and Musick, J.A. (1983). Marine Turtle reception of bone conducted sound. Journal of Auditory Research, 23: 119-1125.

work by O'Hara and Wilcox (1990)[17] looked at the use of noise as acoustic deterrents. They found that airguns with a source level of approximately 220 dB re 1µPa at 1m (measured in the 25 to 1000 Hz range) were effective as a deterrent for a distance of about 30 m (0.016 nm). Moein *et al*. (1995)[18] also used airguns to investigate means to repel loggerhead turtles. Avoidance was observed at 175 dB re 1µPa at 1m exposure. McCauley *et al*. (2000)[19] found behavioural avoidance at 155 to 164 dB re 1 uPa2.s.

6.6.1.3 Fish

There is a wide range of susceptibility to noise pulses 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. Using a similar approach to the DEWHA Policy Statement (DEWHA, 2008a[20]) and the derived relationship of Hastings and Popper (2005)[21] threshold criteria for physiological harm has been calculated to be:

- For a 0.1 kg fish: single exposure of 199 dB re 1 µPa2.s; and
- For a 1 kg fish: single exposure of 200 dB re 1 µPa2.s.

Most pelagic fish are expected to exhibit avoidance behaviour and swim away when noise reaches levels at which it might 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[22]).

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17 O'Hara, J. and Wilcox, J.R. (1990). Avoidance responses of loggerhead turtles, *Caretta caretta*, to low frequency sound. Copeia, 1990(2):564-567.

18 Moein, S.E., Musick, J.A., Keinath, J.A., Barnard, D.E., Lenhardt, M. and George, R. (1995). Evaluation of seismic sources for repelling sea turtles from hopper dredges. In: Sea Turtle Research Program, Summary Report. Final Report. Prepared for US Army Engineer Division, South Atlantic, Atlanta, GA, and US Naval Submarine Base, Kings Bay, GA. Technical Report CERC-95 Original not seen, cited in Moein-Bartol, S.E. 2008. Review of auditory function of sea turtles. *Bioacoustics* 2008: 57-59. Accessed April 2015 from: http://www.seaturtle.org/PDF/BartolSM_2008_Bioacoustics.pdf.

19 McCauley, R.D., Fewtrell, J., Duncan, A.J., Jenner, C., Jenner, M-N., Penrose, J.D., Prince, R.I.T., Adhitya, A., Murdoch, J. and McCabe, K. (2000). Marine seismic surveys – A study of environmental implications. APPEA Journal 2000, pp. 692-708.

21 Popper, A.N. and Hastings, M.C. (2009). Review Paper: The effects of anthropogenic sources of sound on fishes. Journal of Fish Biology, 75: 455-489.

22 McCauley, R. D (1994). The environmental implications of offshore oil and gas development in Australia – seismic surveys. In: Swan, J.M., Neff, J.M. and Young, P.C. (eds). Environmental Implications of Offshore Oil and Gas Development in Australia. – The findings of an Independent Scientific Review. pp. 19-122. Australian Petroleum Exploration Association, Sydney.

A whale swimming past the survey vessel holding station would not receive cumulative sound exposure level sufficient to cause temporary threshold shift, however a turtle may if it approaches closer to within 1 m (0.016 nm) of the vessel. Temporary threshold shift is, by definition, a short-term temporary effect and does not represent long-term harm to the individual animal.

The proximity at which behavioural effects may commence for whales, turtles and fish is summarised in Table 6-6

Table 6-6: Predicted range within which behavioural effects (including avoidance) may commence for whales, turtles and fish

Operations	Whale	Turtle	Fish
Vessel in Holding Position	0 – 3,000 m (0 – 0.16 nm)	0 – 300 m (0 – 0.016 nm)	0 – 50 m (0 – 0.025 nm)

6.6.2 ALARP Demonstration

A summary of the ALARP assessment undertaken for the impacts associated with noise emissions is presented in Table 6-7. This assessment was completed as outlined in Section 5.2.1 and includes existing standard industry and legislative controls, consideration of additional controls, and final acceptance or justification if the control was not considered suitable. The result of this ALARP assessment contributes to the overall acceptability of the impact. All routine impacts due to planned events are treated and reduced to ALARP.

It is not feasible to remove all sources of noise from the Activity. With the appropriate controls presented, which are consistent with guidelines and represent international practice, the impact of noise emitting activities and sources of noise impacting marine fauna is considered to be reduced to ALARP in order to allow the activities to proceed safely.

Timing the monitoring survey to avoid periods of peak whale abundance has been considered. The benefit that may accrue from avoiding periods of peak whale density is not considered to be significant, given the very short duration that the vessel will be holding station at any location, the levels of shipping activity (and associated noise) that occurs in the Permit Areas and based on the 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 humpback whales from the threatened category (IUCN, 2012[23]).

[23] IUCN. (2012) IUCN Red List of Threatened Species. Accessed November 2014 from: http://www.iucnredlist.org/details/13006/0.

The cost that would be associated with avoiding periods of peak whale density is highly variable ranging from no cost, should it happen to coincide with survey contractor and suitable vessel availability, to introducing logistical complications, financial costs and biosecurity risks if it requires bespoke mobilisation of a vessel from overseas locations. There may also be an increased exposure to delays/risks associated with cyclone season. Given that the procedures proposed for minimising impacts to whales have been demonstrated to be effective, it is considered that the potential cost of additional control of varying the timing of the inspection survey to avoid peak whale abundance is grossly disproportionate to the negligible benefit that may accrue.

Table 6-7: ALARP assessment for noise emissions

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
Existing Controls				
Engineering	N/A			
Administrative	Vessels to be operated in accordance with the EPBC Regulations 2000 Part 8 Division 8.1 (Regulation 8.05) to avoid interactions with cetaceans and whale sharks.	A	Legislative requirement - control is feasible, standard practice with benefits outweigh any cost sacrifice	**PS 5.5.1**
	Environmental awareness induction provided to vessel crew to advise marine fauna interaction requirements.	A	Control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.	**PS 5.5.2**
Pollution Control	N/A			
Additional Controls				
Eliminate	Do not conduct the survey	R	NOPSEMA have requested the survey as part of the WOMP (Section 1.5.2.2)	
Substitute	Prevent or reduce use of vessels/ROV during peak cetacean migration periods.	R	The use of vessels/ROV is essential for the Activity. The very short duration of the inspection activity makes the risk of impact extremely low. Restricting scheduling options could complicate logistic arrangements and affect the availability/cost of a suitable vessel, particularly given the desire to source a vessel operating locally, for negligible environmental benefit.	

6.6.2.1 ALARP Summary

The impact assessment and evaluation has identified a range of existing standard controls including legislative requirements and those that represent industry practice, that when implemented are considered to manage the noise impacts from the Activity to ALARP. The proposed inspection survey requires a vessel at the well heads which will inevitably generate noise. The use of machinery and equipment on the vessel is necessary for operations and the ROV is essential to undertake the inspections. With no reasonable additional controls identified, other than not proceeding with the

wellhead inspections, it is considered that the impacts due to noise emissions have been reduced to ALARP.

6.6.3 Acceptability

With the management controls in place to manage the noise generated during the monitoring survey, including vessel protocols and adherence to the fauna interaction requirements in accordance with Part 8 Division 8.1 of the EPBC Regulations 2000, general noise emissions are not expected to significantly impact on marine fauna within the receiving environment. Marine fauna such as cetaceans and turtles are considered transitory species and will not remain in the area.

The behavioural effects that may arise are not considered likely to cause significant effects at the population level, as defined by the EPBC Act Significance Guidelines (DoE, 2013[24]). The Permit Areas are not known to provide significant feeding or breeding areas for marine mammals, turtles or fish.

Overall, the impact of noise on marine fauna is predicted to be 'slight'. Given the control measures in place for the management of noise, the very short duration of the noise generating activity (up to seven days, including contingencies) and that the levels of noise generated from the survey are typical of offshore vessel activities undertaken elsewhere and in Australian waters, the impacts from noise to marine fauna are considered to be acceptable.

Acceptability Statement Summary		
Consideration	**Acceptability Statement**	**Acceptability**
Principles of ESD	The activity will not contravene the Principles of ESD, based on: • Impacts have been assessed using the Western Gas Risk Matrix, which considers duration and extent of impacts • Severity of planned event is evaluated as slight and has been demonstrated ALARP • Impacts will not affect biological diversity or ecological integrity.	✓
Internal Context	The activity (and associated potential impacts and risks) is consistent with Western Gas corporate policies, standards and procedures.	✓
External Context	No stakeholder objections or claims related to the activity (and associated potential risks and impacts) have been received	✓
Other Requirements	The activity (and associated potential risks and impacts) to the environment is consistent with relevant legislation, industry standards and guidelines, offshore practice or benchmarking, including: • Conservation Management Plan for the Blue Whale (COA 2015)	✓

[24] Department of the Environment (DoE) (2013). Matters of National Environmental Significance. Significant Impact Guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999. Available from: http://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf..

6.6.4 Environmental Performance Outcome, Performance Standards and Measurement Criteria

Performance Outcome	Performance Standard	Measurement Criteria
Vessel machinery/ equipment maintained to prevent excessive noise emissions. No adverse vessel interactions with marine megafauna.	**PS 5.5.1.** **OPGGS Act 2006 – (s. 280 (2) (c)) - EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans**: Vessels will not knowingly travel greater than 6 knots within 300 m (0.16 nm) of a cetacean or whale shark (Caution Zone) and minimise noise. Vessels will not knowingly approach closer than 100 m (0.05 nm) of a cetacean or whale shark known to be in the area, or 50 m (0.027 nm) of a dolphin (with the exception of bow riding). Vessels must 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 (0.027 nm) from the cetacean.	Records of breaches of interaction requirements outlined in EPBC Regulations 2000 Part 8 Division 8.1 (Regulation 8.05) reported via Incident Report Form and documented in Monthly Incident Report and Environmental Performance Report.
	PS 5.5.2. Environmental awareness induction provided to vessel crew prior to activities to advise marine fauna interaction requirements.	Induction attendance records demonstrate that environmental awareness inductions have been conducted for vessel crew, including sightings and recording information.

6.7 ATMOSPHERIC EMISSIONS

Machinery and vessels associated with the monitoring survey will be powered by internal combustion engines and will generate atmospheric emissions, principally CO_2. Less significantly, air pollutants such as NOx and SOx may also be emitted.

The average diesel fuel usage is expected to be approximately 1,000 L per day, totalling 7,000 L of fuel usage based on contingencies. The atmospheric emissions have been calculated using E&P Forum (1994)[25] methods (assuming one vessel in continuous use) and are presented in Table 6-8.

Table 6-8: Estimated atmospheric emissions from a vessel

Emission	Vessel (tonnes/day)	Total for Activity (tonnes)
CO_2	6.537	45.759
SOx	0.002	0.014
NOx	0.140	0.98

[25] Methods for Estimating Atmospheric Emissions for E&P Operations', The Oil Industry International Exploration and Production Forum, Report No. 2.59/197, September, 1994.

6.7.1 Potential Impacts

Atmospheric emissions generated during the monitoring survey will result in a localised, temporary reduction in air quality in the environment immediately surrounding the emission point and contribute to the global greenhouse effect. Gaseous emissions under normal circumstances quickly dissipate into the surrounding atmosphere.

Potential receptors in the immediate area exposed to reduced air quality, other than workers associated with the survey, are seabirds. Given the offshore location of the well heads and with the nearest landfall with important habitat being the Northwest Cape (~145 km), the impact of atmospheric emissions on seabirds is considered to be insignificant.

6.7.2 ALARP Demonstration

A summary of the ALARP assessment undertaken for atmospheric emissions is presented in Table 6-9. This assessment was completed as outlined in Section 5.2.1 and includes existing standard industry controls, consideration of additional controls, and acceptance or justification if the control was not considered suitable (refer to Table 6-9). The result of this ALARP assessment contributes to the overall acceptability of the impact. All impacts due to planned events are treated and reduced to ALARP.

Table 6-9: ALARP assessment for atmospheric emissions

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
Existing Controls				
Substitute	N/A			
Engineering	Machinery/ equipment/ engines onboard the vessel are maintained based on a planned maintenance programme.	A	Control is feasible, standard practice with minimal cost. Benefits outweighing any cost sacrifice.	**PS 5.6.1**
Administrative	Vessel bunkering will use marine-grade diesel (sulphur content of less than 3.5%) as the primary fuel source.	A	Legislative requirement. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 5.6.2**
	Vessel hold a current IAPP Certificate indicating that they meet the requirements of MARPOL Annex VI.	A	Legislative requirement - control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 5.6.3**
	Vessel engines will meet NOx emission levels as required by Regulation 13 of MARPOL Annex VI.	A	Legislative requirement. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 5.6.4**
	Ozone-depleting substances will be managed in accordance with Regulation 13 of MARPOL Annex VI.	A	Legislative requirement. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 5.6.4**

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
Pollution Control	No waste incineration onboard the vessel	A	Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 5.6.5**
Additional Controls				
Eliminate	Use of renewable energy to power vessel.	R	Large vessels require a reliable and steady fuel supply. At present no renewable powered vessel that meet those criteria is available or commercially viable.	
	Do not conduct the survey	R	NOPSEMA have requested the survey as part of the WOMP (Section 1.5.2.2)	

6.7.2.1 ALARP Summary

The impact assessment and evaluation has identified a range of existing standard controls that when implemented are considered to manage the atmospheric emissions impacts due to the planned Activities. The monitoring survey cannot occur without a vessel on site which requires fuel for power, mobile plant and equipment. Power generation through the combustion of conventional fuels is essential to power the vessel thrusters, mobile plant and equipment. An alternative fuel source (solar, wind, biofuels) has not been commercially proven for use in large vessels. With no reasonable additional controls identified, other than not proceeding with the survey, and adoption of the standard industry controls including legislative requirements and Marine Orders and the use of low sulphur diesel fuel, the impacts from atmospheric emissions are considered to be reduced to ALARP.

6.7.3 Acceptability

The Activity is located in an area where air emissions will disperse and rapidly assimilate with the surrounding environment and given the distance from any sensitive habitats and the short duration of the survey (up to seven days, including contingencies), the impacts to air emissions are considered 'slight'. Atmospheric emissions from vessels in Australian waters are permissible under the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*, which reflect MARPOL Annex VI requirements. The proposed controls are consistent with relevant legislation, industry standards/guidelines and international maritime regulations, and are in line with standard controls for offshore petroleum activities. As such, it is considered that the controls and management measures in place will manage the predicted impacts associated with atmospheric emissions to an acceptable level.

Acceptability Statement Summary		
Consideration	**Acceptability Statement**	**Acceptability**
Principles of ESD	The activity will not contravene the Principles of ESD, based on: • Impacts have been assessed using the Western Gas Risk Matrix, which considers duration and extent of impacts • Severity of planned event is evaluated as slight and has been demonstrated ALARP Impacts will not affect biological diversity or ecological integrity.	✓
Internal Context	The activity (and associated potential impacts and risks) is consistent with Western Gas corporate policies, standards and procedures.	✓
External Context	No stakeholder objections or claims related to the activity (and associated potential risks and impacts) have been received	✓
Other Requirements	The activity (and associated potential risks and impacts to the environment) is consistent with relevant legislation, industry standards and guidelines, offshore practice or benchmarking.	✓

6.7.4 Environmental Performance Outcome, Performance Standards and Measurement Criteria

Performance Outcome	Performance Standard	Measurement Criteria
All planned atmospheric emissions due to the inspection survey will be managed in accordance to the relevant legislative requirements and marine orders. No incineration of waste onboard the vessel.	**PS 5.6.1.** Vessel Master or delegate ensures emission producing equipment including engines maintained based on a Preventative Maintenance System.	Preventative Maintenance System includes machinery/ equipment/ engines onboard vessel. Maintenance records up to date.
	PS 5.6.2. **Protection of the Sea (Prevention of Pollution from Ships) Act 1983 – Part IIID:** Only low sulphur diesel will be used.	Bunker delivery notes indicate only low sulphur diesel is used.
	PS 5.6.3. **AMSA Marine Order – Part 97: Marine Pollution Prevention - Air Pollution:** Vessel will hold a current International Air Pollution Prevention (IAPP) Certificate.	Vessel holds a current IAPP Certificate.
	PS 5.6.4. **MARPOL Annex VI:** Equipment containing ozone-depleting substances (ODS) shall be maintained and, in the case of a support vessel having rechargeable systems containing ODS, an ODS Record Book shall be maintained onboard. No discharge of ODS.	Audit/vessel inspection record provides evidence that ODS Record Book is up to date.
	PS 5.6.5. No waste incineration will occur onboard the vessel	No waste incineration recorded in the vessel's Garbage Record Book.

6.8 ROUTINE LIQUID DISCHARGES

During the inspection survey, the vessel will produce the following liquids:

- Sewage;
- Grey water;
- Food/putrescible waste;
- Brine (from the water treatment plant);
- Cooling water; and
- Deck drainage and bilge water.

As the Operational Area is located more than 22 km from the territorial baseline, all of these liquid wastes will be discharged to the marine environment as permitted under MARPOL Annex IV and V.

6.8.1 Sewage, Grey Water and Food/Putrescible Waste

The average volume of sewage and grey water (water from galley sinks, laundry facilities, showers and washbasins) generated per person per day is 100 litres, and approximately 30-40 kg in total of food waste is generated per day.

The discharge of sewage and food waste in Australian waters is permissible under the Commonwealth *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* if in accordance with conditions stipulated in Part IIIB and Part IIIC. Treated sewage will be disposed of overboard through a MARPOL certified sewage treatment plant. Food waste produced onboard the vessel will either be macerated to less than 25 mm (0.98") prior to discharge overboard or collected and transferred on return to port at a licenced waste facility.

6.8.2 Brine

Depending on the contracted vessel, potable water may be produced onboard the vessel using reverse osmosis machinery. Reverse osmosis 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. The brine wastewater stream will also contain residual anti-scalant (cleaning agent) used in the cleaning of the potable water supply system. The volume of brine solution discharged is dependent on the requirement for potable water and would vary dependent on the number of people onboard the vessel.

Conversely, due to the very short time frame of the planned Activities, the vessel may carry enough potable water for the duration of the survey and therefore negate the requirement to create potable water.

6.8.3 Cooling Water

Depending on the contracted vessel, seawater may be used as a heat exchange medium for the cooling of machinery engines on board the vessel.

Seawater is pumped onboard the vessel through heat exchangers and is subsequently discharged at the sea surface with a temperature elevation of 2-5^{o}C above ambient. The seawater intake is dosed with a biocide (chlorine) to control marine fouling of the cooling water system. Chlorine will not be discharge directly to sea; the majority of chlorine will be neutralised within the cooling water systems.

The cooling water discharge points vary on each vessel, although they all adopt the similar discharge design that allows cooling water to be discharged above the water line in order to facilitate cooling and oxygenation of this wastewater stream before mixing with the surrounding waters.

6.8.4 Deck Drainage and Bilge Water Discharges

Deck drainage from rainfall and wash down activities on the deck may contain particulate matter and residual chemical residues, such as detergent, oil and grease, and hydraulic fluid. Deck drainage is diverted to a deck drainage system and discharged overboard.

Oily water from machinery spaces and bunded areas is directed to a bilge water holding tank, treated and released overboard or stored for appropriate disposal.

6.8.5 Potential Impacts

The discharge of sewage, grey water, food waste, brine, cooling water and oily water to the marine environment could affect water quality and marine biota in surface waters. The changes in water quality may include:

a) Increased turbidity in the water column which may temporarily inhibit photosynthesis by phytoplankton by decreasing light availability in surface waters;
b) Nutrient enrichment of surrounding waters potentially resulting in localised oxygen depletion and phytoplankton blooms;
c) Elevated salinity and water temperature which may impact phytoplankton and sensitive marine fauna close to the source; and
d) Acute toxicity effects on marine fauna or bioaccumulation of toxins.

6.8.5.1 Sewage, Grey Water and Food/Putrescible Waste

The discharges of these waste streams will result in a localised increase in nutrients levels and biological oxygen demand of the receiving marine waters. However, no significant impacts are expected from these discharges given the biodegradable nature of the waste, the small volumes released relative to the receiving environment's assimilative capacity, lack of nearby habitats sensitive to any nutrient increases and the highly dispersive nature of the receiving ocean environment. The North West Shelf is characterised as a highly productive ecosystem in which nutrients and organic matters are rapidly recycled (Furnas and Mitchell, 1999[26]). Hence the daily nutrient loadings are inconsequential in comparison to the daily turnover of nutrients that takes place. Based on these factors, the impact of these discharges on the marine environment is considered to be 'slight'.

6.8.5.2 Brine

The brine solution will be quickly dispersed and diluted to undetectable levels within a few metres of the discharge point. The area of detectable change in water quality is likely to be less than 10 m radius. Most marine species are able to tolerate short-term fluctuations in salinity in the order of 20-30% (Walker and McComb, 1990[27]).

Given the relatively low volume of discharge, very short duration of the activity, relatively localised low increase in salinity, significant water depth and open ocean environment, the discharge of brine is expected to have an insignificant effect on water quality and the potential impact to the marine environment is considered to be 'slight'.

6.8.5.3 Cooling Water

Cooling water discharged will be subject to turbulent mixing and rapid loss of heat to the surrounding waters. The area of detectable increase in seawater temperature is likely to be less than 10 m radius.

Given the low temperature differential and the rapid mixing with the surrounding marine environment, the change in water quality due to cooling water discharge is considered to be short-term and the potential impact on the marine environment is considered to be 'slight'.

The majority of biocide (chlorine) will be neutralised within the cooling water systems. On discharge, the low residual concentrations of chlorine in the cooling water discharges will be rapidly diluted by the prevailing current. Given the relatively low discharge volumes and open ocean conditions resulting in

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26 Furnas, M.J. and Mitchell, A.W. (1999). Wintertime carbon and nitrogen fluxes on Australia's North West Shelf. Estuarine, Coastal and Shelf Science, 49: 165-175.

27 Walker D.I. and McComb A.J. (1990). Salinity response of the seagrass *Amphibolus Antartica*: an experimental validation of field results. Aquatic Botany 36: 359–366.

rapid mixing, the change in water quality is expected to be short-term and the potential impact on the marine environment is considered to be ‘slight’.

6.8.5.4 Deck Drainage and Bilge Water Discharges

Drainage from areas of a high risk of hydrocarbon or chemical contamination will be managed via a closed drainage system that drains to a tank where it is treated such that the oil in water content is less than 15 ppm prior to discharge overboard in accordance with MARPOL Annex I (Oil) enacted in Commonwealth water by the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*, or sent to shore for disposal.

Potential impacts from acute toxicity effects would be limited to passive marine biota (i.e. planktonic organisms and fish larvae) that become entrained in the waste stream; mobile marine fauna such as fish would be able to move away from the area.

Due to the small volumes of deck drainage, the very low levels of contaminants likely to be entrained in the discharge and the rapid dilution and dispersal that will result at the oceanic location, the environmental effects will be temporary, localised and limited to the surface waters (<5 m). Temporary reduction in water quality due to the discharge of oily water and the effect on the marine environment is considered to be ‘slight’.

6.8.6 ALARP Demonstration

A summary of the ALARP assessment undertaken for the impacts associated with routine liquid waste discharges is presented in Table 6-10. This assessment was completed as outlined in Section 5.2.1 and includes existing standard industry and legislative controls, consideration of additional controls and acceptance or justification if the control was not considered suitable (refer to Table 6-10). The result of this ALARP assessment contributes to the overall acceptability of the impact. All routine impacts due to planned events are treated and reduced to ALARP.

Table 6-10: ALARP assessment for routine liquid discharges

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
Existing Controls				
Eliminate	N/A			
Substitute	N/A			
Engineering	N/A			
Administrate	Current International Sewage Prevention Pollution Certificate onboard vessel.	A	Legislative and/or Marine Orders requirement. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 5.9.1**

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
	Current International Oil Prevention Certificate onboard vessel.	A	Legislative and/or Marine Orders requirement -control is feasible, standard practice with benefits outweigh any cost sacrifice	**PS 5.9.2**
Administrative	Where Offshore Chemical Notification Scheme (OCNS) rating of D or E or a CHARM rating of Silver or Gold rated chemicals are used that are intended to be released to the marine environment, no further control required. If non-rated chemicals are used that are intended to be released to the marine environment, chemical selection procedures outlined in Western Gas Chemical Risk Assessment Procedure (WG-EHS-PRO-001) will be followed.	A	Control based on Western Gas requirements must be accepted. Control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.	**PS 5.9.3**
	The sewage treatment plant onboard the vessel is maintained based on a Planned Maintenance System.	A	Control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.	**PS 5.9.1**
Pollution Control	No discharge of untreated sewage within 12 nm (22.2 km) of the territorial baseline, and no discharge of treated sewage within 3 nm (5.6 km) of the territorial baseline.	A	Legislative and/or Marine Orders requirement. Control is feasible, standard practice with benefits outweigh any cost sacrifice	**PS 5.9.5**
	Macerate sewage and putrescible/food waste to less than 25 mm (0.98") prior to discharge when >3 nm (5.6 km) and <12 nm (22.2 km) from the territorial sea baseline.	A	Legislative and/or Marine Orders requirement. Control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.	**PS 5.9.5**
	Oily water discharged only if oil in water content does not exceed 15 ppm. If limit cannot be met, oily water waste is stored and transferred via licensed vessel for disposal onshore.	A	Legislative and/or Marine Orders requirement. Control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.	**PS 5.9.6**
Additional Controls				
Eliminate	Store all putrescible or food waste onboard and ship to shore for disposal.	R	This option would be to contain food wastes offshore and ship them to shore for disposal with disproportionate financial costs and HSE risks. While this option avoids the discharge of food wastes to sea it merely moves the environmental impact to another location rather than reducing it. No net environmental benefit would accrue from this option	

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
	Do not conduct the survey	R	NOPSEMA have requested the survey as part of the WOMP (Section 1.5.2.2)	
Engineering	Incineration of putrescible/ food waste.	R	While this option avoids the discharge of food wastes to sea due to the potential volumes of waste it has substantial safety and exposure risk, associated with fire onboard the vessel and emission quality, and has been discounted as impracticable.	

6.8.6.1 ALARP Summary

The risk assessment and evaluation has identified a range of controls that when implemented are considered to manage the impacts of routine liquid waste discharges during the Activity on the marine environment. The onboard treatment of liquid wastes and their discharge to the marine environment are consistent with all relevant codes and standards and are considered to be a more environmentally sound method of disposal compared to onboard storage and transport back to shore for disposal at suitable waste facilities.

Several alternative controls were considered:

1. Ship to shore of food waste: This would involve the containment of food wastes offshore and then shipping them to shore for disposal. While this option avoids the discharge of food wastes to sea it merely moves the environmental impact to another location rather than reducing it. No net environmental benefit would accrue from this option; and
2. Incineration of food wastes onboard: While this option avoids the discharge of food wastes to sea, it has substantial safety risk, associated with fire onboard the vessel, and has been discounted as impracticable.

With the implementation of standard and appropriate management controls and with no other additional controls or alternatives available that would offer a net environmental benefit, it is considered that the impacts of liquid waste discharges to the marine environment have been reduced to ALARP.

6.8.7 Acceptability

Treated sewage, grey water, macerated food waste, brine, cooling water and oily water will be generated during the Activity. The release of these liquid wastes from vessels in Australian Commonwealth waters is permissible under the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*, which reflect MARPOL Annex I (oil pollution), IV (sewage) and V (garbage) requirements appropriate to vessel class.

Based on the alternatives considered, it was assessed that no net environmental benefit would result from their implementation and that the sacrifice involved made these options not in line with ALARP principles and therefore not considered further.

In determining acceptability, consideration has been given to the potential cumulative effects of different liquid discharges from multiple sources. The environmental impacts associated with the planned discharge of liquid wastes during the inspection survey are considered 'Slight' on the basis of no significant impact on the marine environment.

No reasonably practicable alternative controls have been identified or are currently available in Australia that would provide significant net environmental benefit. On this basis, it is concluded that implementation of the accepted controls for the discharge of liquid waste including compliance with relevant legislation, MARPOL requirements and relevant Marine Orders, which are internationally accepted and standard practice across the oil and gas industry in Australian waters, reduces the level of impact to an acceptable level.

Acceptability Statement Summary		
Consideration	**Acceptability Statement**	**Acceptability**
Principles of ESD	The activity will not contravene the Principles of ESD, based on: • Impacts have been assessed using the Western Gas Risk Matrix, which considers duration and extent of impacts • Severity of planned event is evaluated as slight and has been demonstrated ALARP • Impacts will not affect biological diversity or ecological integrity.	✓
Internal Context	The activity (and associated potential impacts and risks) is consistent with Western Gas corporate policies, standards and procedures.	✓
External Context	No stakeholder objections or claims related to the activity (and associated potential risks and impacts) have been received	✓
Other Requirements	The activity (and associated potential risks and impacts) to the environment is consistent with relevant legislation, industry standards and guidelines, offshore practice or benchmarking.	✓

6.8.8 Environmental Performance Outcome, Performance Standards and Measurement Criteria

Performance Outcome	Performance Standard	Measurement Criteria
Routine liquid discharges are managed in accordance with relevant legislation and relevant Marine Orders.	**PS 5.9.1.** **MARPOL Annex IV: Sewage (as implemented in Commonwealth Waters by the Protection of the Sea (Prevention of Pollution from Ships) Act 1983); AMSA Marine Order – Part 96: Marine Pollution Prevention – Sewage:** Vessel to have a valid International Sewage Prevention Pollution (ISPP) Certificate.	Record of a valid ISPP certificate for the vessel. Sewage treatment plant onboard vessel on Preventative Maintenance System and records maintained.

Performance Outcome	Performance Standard	Measurement Criteria
	PS 5.9.2. **AMSA Marine Orders - Part 91: (Marine Pollution Prevention – Oil) 2014, as appropriate to vessel class:** Vessels to have a valid current International Oil Pollution Prevention (IOPP) certificate for the prevention of oil pollution from vessels.	Record of a valid IOPP certificate for the vessel.
	PS 5.9.3. Where Offshore Chemical Notification Scheme (OCNS) rating of D or E or a CHARM rating of Silver or Gold rated chemicals are used that are to be released to the marine environment, no further control required. If non-rated chemicals are required that are to be released to the marine environment, chemical selection procedures outlined in Western Gas Chemical Risk Assessment Procedure (WG-EHS-PRO-001) will be followed.	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. Where chemicals intended to be discharged to the marine environment are not D/E rated through OCNS or Gold/Silver rated through CHARM, then documented evidence to show that Western Gas Chemical Risk Assessment Procedure (WG-EHS-PRO-001) has been followed.
	PS 5.9.4. **Protection of the Sea (Prevention of Pollution from Ships) Act 1983 – Part IIIB:** No discharge of untreated sewage within 12 nm (22.2 km) of the territorial baseline. No discharge of treated sewage within 3 nm (5.6 km) of the territorial baseline. No discharge of sewage to cause discoloration or visible solids.	Records confirm that waste discharge is recorded in waste discharge log and demonstrate that: No discharge of untreated sewage within 12 nm (22.2 km) of territorial baseline; No discharge of treated sewage within 3 nm (5.6 km) of the territorial baseline; and No discharge of sewage that cause discoloration or visible solids.
	PS 5.9.5. **Protection of the Sea (Prevention of Pollution from Ships) Act 1983 – Part IIIC:** Putrescible and other food waste discharge from the vessel (when inside the 500 m [0.27 nm] safety exclusion zone) must be ground or comminuted to <25 mm (0.98") and discharged only when >12 nm (22.2 km) from the territorial baseline.	Maintenance records demonstrate that there is a functioning macerator onboard the vessel.
	PS 5.9.6. **MARPOL Annex I: Oil (as implemented in Commonwealth Waters by the Protection of the Sea (Prevention of Pollution from Ships) Act 1983 – Part II (Section 9), as appropriate to vessel class; AMSA Marine Order 91 (Marine Pollution Prevention – Oil) 2014:** Liquid from drains is only discharged if the oil in water content does not exceed 15 ppm. 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.	Documented use of oil record book to record all oil or oily water requiring disposal onshore. Oil in water meter maintenance and calibration records up-to-date.

6.9 SOLID AND LIQUID WASTE

Vessels produce a variety of solid and liquid wastes (not discharged via the overboard drainage discharge system), including domestic and industrial wastes, such as aluminium cans, bottles, paper and cardboard, scrap steel and hazardous materials such as chemicals and chemical containers, batteries, waste oil and medical wastes.

Waste is segregated onboard the vessel and stored in designated skips and waste containers. All waste will be managed, containerised and transported to shore for disposal in line with Western Gas Waste Management Plan (WG-EHS-PLN-005). Wastes are segregated into the following categories:

- Non-hazardous waste (or general waste)[28];
- Hazardous waste.

Solid waste onboard may unintentionally enter the marine environment from overfull bins, from bins that are not covered or have been left open, or items that have not been stored correctly, or overfilling and during adverse weather/sea state.

6.9.1 Non-Hazardous Waste

General non-hazardous waste includes 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 vessel would be low due to the very short duration of the survey (expected 3 days in total).

6.9.2 Hazardous Waste

Hazardous wastes are defined as wastes that are or contain ingredients harmful to health or the environment. Hazardous wastes that may be generated by the vessel includes oil contaminated materials (e.g. sorbents, filters and rags), waste oil, hydrocarbon/chemical containers and batteries. The volumes of hazardous wastes expected to be generated are very small. All hazardous waste materials will be stored in appropriate containers, as per requirements of the safety data sheet (SDS) of the relevant hazardous material(s) in the waste.

6.9.3 Potential Impacts

Although hazardous waste presents a greater risk to the environment, it is generated in lower quantities compared to non-hazardous waste.

[28] Recyclables and scrap metals fall under the non-hazardous waste for categorisation purpose.

The *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* prohibits the disposal of waste into the sea except in the case of non-hazardous waste, such as putrescible food waste, sewage and grey water. Food waste must pass through comminutor or grinder so that the wastes are capable of passing through a screen with opening less than 25 mm (0.98") and discharged only when the ship is at a distance of not less than 3 nm (5.6 km) from the nearest land (Section 6.8).

Ineffective management of solid wastes may result in pollution and contamination of the environment. Disposing of waste overboard would cause moderate impacts overtime. However, in line with the provisions of relevant legislation and Marine Orders, the only waste that is permissible to be discharged overboard from the vessel is food-waste, sewage and grey water (Section 6.8). All other waste (hazardous and non-hazardous) is stored, transported and disposed onshore. Therefore, in the course of normal operations, impacts on the marine environment from routine solid waste are considered to be low.

The unintentional release of solid wastes to the marine environment could cause pollution and contamination, with either direct or indirect effects on marine organisms, including damage to benthic habitats through direct contact. Chemical effects such as physiological damage through ingestion or absorption may occur to individuals at the seabed, sea surface or within the water column.

Potential receptors affected by the solid waste include benthic habitats, fish, marine mammals, marine reptiles and seabirds. Any potential water quality changes caused by leaking chemicals and associated impacts to marine species (e.g. plankton, invertebrates, fish) are expected to be localised given hazardous wastes are likely to be in small quantities (e.g. batteries, chemical containers, oily rags). Release of non-hazardous solid wastes to the marine environment could also result in reduced water quality.

Marine fauna (e.g. fish, marine mammals, marine reptiles and seabirds) can also be harmed through entanglement or ingestion of non-hazardous solid wastes. Marine turtles and seabirds, in particular, may be at risk from disposed plastics which may cause entanglement or be ingested causing damage to internal tissues. In the worst case, this could be lethal to an affected individual.

The severity of the impact of accidental loss of single items or units overboard of solid waste depends on the type and quantity of waste lost. Controls are in place to prevent accidental release of solid waste overboard or during transport to shore. As a result, any accidental release is not expected to result in significant environmental harm due to expected small volumes/quantities of release and in general high proportion of inert properties.

Overall, the severity of the solid waste discharge with standard industry controls in place is considered to be ‘slight’ on the Western Gas Risk Matrix given the low volumes of waste generated and the type of waste.

6.9.4 ALARP Demonstration

A summary of the ALARP assessment undertaken for the impacts of solid waste is presented in Table 6-11. This assessment was completed as outlined in Section 5.2.1 and includes existing standard industry controls, consideration of additional controls and acceptance or justification if the control was not considered suitable (refer to Table 6-11). The result of this ALARP assessment contributes to the overall acceptability of the associated impact.

Table 6-11: ALARP assessment for solid waste management

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
Existing Controls				
Eliminate	N/A			
Substitute	N/A			
Engineering	N/A			
Administrate	Manage waste in line with the waste management hierarchy to eliminate, reduce, recycle/reuse and keeping final disposal as least preferred as per Western Gas Waste Management Plan (WG-EHS-PLN-005).	A	Operator established control. Control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.	**PS 5.10.3**
Administrative	Implement Western Gas Waste Management Plan (WG-EHS-PLN-005) to waste generation, storage, transport/transfers and treatment/disposal-the contractor's Waste Management Plan is bridged with the above referred plan.	A	Operator established control. Control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.	**PS 5.10.3**
	Any loss or discharge of hazardous waste materials to the sea will be reported to the AMSA Rescue Coordination Centre (RCC).	A	Control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.	**PS 5.10.2**
Pollution Control	Waste containers (bins etc.) provided for waste containment are to be clearly marked and suitably covered to prevent material being blown overboard	A	Legislative and/or Marine Orders requirement. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 5.10.1**
	All wastes will be tracked and logged, sent to shore for recycling or disposal at a government approved waste disposal site.	A	Legislative and/or Marine Orders requirement. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 5.10.1**
	Inspections of the waste management containers and storage areas to be done.	A	Control is feasible, standard practice with minimal cost with benefits outweighing any cost sacrifice.	**PS 5.10.1**

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
	Crew inductions to include requirements for waste management.	A	Control is feasible, standard practice with minimal cost. Benefits outweigh any cost sacrifice.	**PS 5.10.4**
Additional Controls				
Eliminate	Do not conduct the survey	R	NOPSEMA have requested the survey as part of the WOMP (Section 1.5.2.2)	

6.9.4.1 ALARP Summary

The impact assessment and evaluation has identified a range of existing standard controls for the management of solid waste during offshore petroleum activities that when implemented are considered to manage the impacts from the disposal and management of solid waste on the environment. The generation of solid hazardous and non-hazardous waste is unavoidable. No additional or alternative management procedures have been identified that would reduce the environmental impacts associated with solid waste. On this basis, it is concluded that implementation of the standard controls for management of solid waste including compliance with all MARPOL requirements, which are internationally accepted and implemented across the oil and gas industry, reduces the level of impact to an acceptable level. With no additional controls identified, other than not proceeding with the Activity, it is considered that the impacts of solid wastes have been reduced to ALARP.

6.9.5 Acceptability

The disposal of hazardous and non-hazardous solid wastes occurs onshore in full accordance with all regulatory requirements. Western Gas has procedures in place for verifying waste management procedures for the storage of wastes onboard the vessel and for onshore disposal by waste removal contractors. The disposal of solid waste to onshore facilities is consistent with industry practice and has been demonstrated to be ALARP. Therefore, the impact associated with solid waste discharge is considered to be environmentally acceptable.

Acceptability Statement Summary		
Consideration	**Acceptability Statement**	**Acceptability**
Principles of ESD	The activity will not contravene the Principles of ESD, based on: • Impacts have been assessed using the Western Gas Risk Matrix, which considers duration and extent of impacts • Severity of planned event is evaluated as slight and has been demonstrated ALARP • Impacts will not affect biological diversity or ecological integrity.	✓
Internal Context	The activity (and associated potential impacts and risks) is consistent with Western Gas corporate policies, standards and procedures.	✓

Acceptability Statement Summary		
Consideration	**Acceptability Statement**	**Acceptability**
External Context	No stakeholder objections or claims related to the activity (and associated potential risks and impacts) have been received	✓
Other Requirements	The activity (and associated potential risks and impacts) to the environment is consistent with relevant legislation, industry standards and guidelines, offshore practice or benchmarking.	✓

6.9.6 Environmental Performance Outcome, Performance Standards and Measurement Criteria

Performance Outcome	Performance Standard	Measurement Criteria
No unplanned release of hazardous and non-hazardous solid waste to the marine environment. Waste is managed in accordance to the Western Gas approved vessel Waste Management Plan which is in line with the relevant legislative requirements.	**PS 5.10.1.** **Protection of the Sea (Prevention of Pollution from Ships) Act, 1983 - Parts IIIA & IIIC; and MARPOL Annex V – Regulation for the Prevention of Pollution by Garbage from Ships:** All solid waste (other than sewage, grey water and putrescible wastes) will be contained onboard and sent ashore for recycling, disposal or treatment. Waste containers (bins etc.) provided for waste containment are to be clearly marked and suitably covered to prevent material being blown overboard. All solid waste tracked, logged and sent to shore for recycling or disposal at a government approved waste disposal site.	Waste records for the vessel maintained in Garbage Record Book or manifests, including transport, treatment, recycling and disposal. Inspection records on vessel show appropriate waste containment/ storage.
	PS 5.10.2. **Marine Orders - Part 94/Order 95: Marine Pollution Prevention - Packaged Harmful Substances:** Any loss or discharge to sea of harmful materials is reported to the AMSA Rescue Coordination Centre (RCC).	Vessel Incident Report includes any discharge or loss to sea of solid hazardous waste. Records of reports of loss or discharge to sea of harmful materials logged with AMSA RCC.
	PS 5.10.3. **Vessel Waste Management Plan:** Waste management plan for survey will be implemented, including preventative and mitigating controls. Inventory of waste type, source and quantities will be maintained.	Documentation showing vessel's waste management plan reviewed and approved by Western Gas prior to commencement of survey. Records of waste inventory.
	PS 5.10.4. Site inductions conducted include Western Gas waste management requirements.	Waste management induction attendance records.

7 RISK ASSESSMENT OF UNPLANNED EVENTS

The purpose of this Section is to address the requirements of Regulation 13(5), 13(6) and 13(7) of the OPGGS (Environment) Regulations by providing an assessment and evaluation of the potential environmental risks for the Activity and detail control measures that will be applied to reduce risks to an acceptable level, demonstrating how the measure being taken will reduce the level of risk to ALARP. This Section of the EP focusses on unplanned events during the Activity.

The ENVID assessment described in Section 5 identified five (5) unplanned events representing sources of environmental risk. The risk ratings of all the impacts identified were determined to be 'low' for all five (5) unplanned events as per the established risk matrix (Table 5-2). Table 7-1 provides a summary of all the unplanned events identified and assessed at the ENVID workshop. For each unplanned event the potential impact arising is assessed and described, that the impact has been reduced to ALARP and to an acceptable level is demonstrated, and environmental performance outcomes, environmental performance standards and measurement criteria are provided.

Two (2) unplanned events were considered not to represent a credible source of environmental risk, for the reasons outlined in the following.

Loss of Well Integrity

Loss of well integrity was not considered a credible risk since:

- Four (4) wells (Chester-2, Mentorc-2, Glencoe-2H and Snapshot-1) have been plugged and abandoned to the acceptance of NOPSEMA (Section 1.5.2.2).
- One (1) well (Glenloth-1) is suspended following drilling in accordance with the drilling WOMP and relevant regulations, including installation of primary and secondary barriers in situ to assure isolation of hydrocarbon or water bearing formations and prevent hydrocarbons flowing to surface. Testing to verify the integrity of the installed barriers was conducted following plugging, in accordance with applicable HESS standards (as the titleholder at the time when the well was suspended, industry good practice and regulatory approvals in force at the time of well construction. All hydrocarbon bearing formations are contained by primary and secondary barriers.

  No intervention work or removal of current well barriers is planned under the existing WOMP or this Environment Plan, therefore there is no risk to the current integrity of the well. The well remains appropriately suspended, with effective barriers in place.

  The adequacy of the measures put in place for Glenloth-1's well suspension was reviewed against contemporaneous barrier standards and industry good practice in the Well Management Framework Glenloth-1 – Ongoing Temporary Suspension Well Operations Management Plan

submitted to NOPSEMA by Western Gas in December 2021. Following assessment, NOPSEMA accepted the WOMP and confirmed that it was satisfied the WOMP met the criteria set out in regulation 5.08(c) of the Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011.

For additional detail refer to Section 1.5.2.2.

Given the robust verification of barriers at the time of installation, in line with industry good practice, Western Gas and regulatory requirements, which was endorsed/accepted by NOPSEMA, loss of well fluids from the wells was deemed non-credible and not further assessed by the ENVID. In the extremely unlikely event that an inspection provides an indication that the suspended well is not meeting the expectation of no evidence of well fluid releases, Western Gas will respond as per the controls below which have associated performance outcomes, performance standards and measurement criteria.

- Evaluate the associated risk in accordance with Western Gas' Risk Management Standard (WG-HSE-004)
- Notify NOPSEMA
- Develop and implement a management response, including further inspections, remedial action and/or revision to this EP as appropriate.

Confirmation of the well status via the inspections will be evidenced via the ROV inspection logs and included in subsequent performance reporting to NOPSEMA.

Performance Outcome	Performance Standard	Measurement Criteria
1 annual inspection to confirm no evidence of well fluid release to the marine environment.	**PS 6.4.1.** Well Operations Management Plan Aus Suspended Wells (EP-AU-SUF-RPT-0145 Rev 1): Well status will be established by five yearly visual surveillance program utilising ROV (or similar) technology Well Surveillance Plan (WSP) developed and implemented for the well head surveillance survey that includes: • Verification and acceptance criteria. • Use of videography with continuous time and date recording (or equivalent alternative) technology to allow quantification of any well releases (i.e. continuous stream bubbles or otherwise) if present. • Requirements for maintaining records of surveillance outcomes.	Records show ROV inspection completed no later than end calendar year 2022. ROV inspection log describes well status. ROV inspection report provides quantification of any observed releases. Records show verification and acceptance criteria applied as stipulated by the WSP.
	PS 6.4.2. Western Gas Risk Management Standard (WG-HSE-004): • Any changes in well status indicated by ROV inspection (or otherwise) assessed	Documented assessment of risk associated with any change in well status, and of related response actions.

Performance Outcome	Performance Standard	Measurement Criteria
	in accordance with the Western Gas Risk Management Standard.	
	PS 6.4.3. WA-474-P, WA-70-R Suspended Wells Oil Pollution Emergency Plan (OPEP) (WG-EHS-PLN-002): Notification to NOPSEMA as per the Notification Plan.	Record of notification to NOPSEMA as per the OPEP Notification Plan.
	PS 6.4.4. Western Gas Performance Measurement and Monitoring Standard (WG-HSE-011): Well status via the inspection is included in the annual performance report to NOPSEMA.	Annual performance report to NOPSEMA describes well status.

Introduction of Marine Invasive Species

The risk of IMS being introduced and causing impacts in the Operational Area was not considered to be credible given that:

- The survey vessel will be sourced locally and have been previously working on the NWS.
- There will be no requirement for ballast water exchange onsite during the wellhead inspections.
- The environmental conditions of the Operational Area (very deep waters, light limiting, low habitat biodiversity) are unfavourable for IMS colonisation.

Consequently, the risk of IMS introduction was not further assessed during the ENVID.

Table 7-1: Summary of risk assessment of unplanned events

Activity		Biological Environment Affected						Socio-Economic Environment Affected				Impact Assessment	
		Whales	Turtles	Fish/ Sharks	Seabirds	Seabed	Marine Biota	Commercial Fisheries	Shipping Activities	Tourism	Greenhouse Gas	Inherent Risk	Residual Risk
Section 7.1	**Diesel Spill from Fuel Tank Rupture**												
	Loss of containment due to vessel collision	✓	-	✓	✓	-	✓	✓	-	-	-	Low	Low
Section 7.2	**Spill of Environmentally Hazardous Chemicals or Refined Oil**												
	Operator error	✓	-	-	-	-	-	-	-	-	-	Low	Low
	Loss of containment-tank overflow	✓	✓	✓	-	-	-	-	-	-	-	Low	Low
	Mechanical failure	✓	-	-	-	-	-	-	-	-	-	Low	Low
	Dropped objects	✓	-	-	-	-	-	-	-	-	-	Low	Low
	Vessel collision	✓	-	-	-	-	-	-	-	-	-	Low	Low
	Structural failure	-	-	-	-	-	-	-	-	-	✓	Low	Low
	ROV failure	-	-	-	-	-	-	-	-	-	✓	Low	Low
Section 0	**Interference with Marine Fauna**												
	Vessel movements	✓	✓	-	-	-	-	-	-	-	-	Low	Low
	Vessel interaction/strike with marine fauna	✓	-	-	-	-	-	-	-	-	-	Low	Low
Section 0	**Dropped Objects**												
	Dropped objects	-	-	-	-	✓	-	-	-	-	-	Low	Low
Section 0	**Interaction with other Marine Users (wellhead in-situ)**												
	Presence of subsea infrastructure	-	-	-	-	-	-	✓	-	-	-	Low	Low

7.1 SURFACE RELEASE OF MARINE DIESEL OIL FROM A VESSEL

During the inspection survey, there is a possibility of a vessel collision occurring between the vessel undertaking the inspection survey and a third party. A vessel collision could occur as a result of vessel equipment/navigation failure, adverse weather conditions or human error.

Marine diesel oil (MDO) is stored onboard the vessel as a fuel for vessel engines and generators. The rupture of a single fuel tank on a support vessel would require a direct collision from the side of the vessel with enough force to rupture a wing tank. The survey vessel has not been contracted for the Activity, as such, the most credible maximum volume likely to be released from a rupture of a vessel tank is estimated to be from 14 m^3 up to 1,000 m^3.

A worst-case estimate of 1,000 m^3 of loss of MDO from the rupture of a support vessel fuel tank was therefore used to determine the spill EMBA.

7.1.1 Hydrocarbon Characteristics

Most diesels are classified as Group II oils in terms of the International Tanker Owners Pollution Federation Limited (ITOPF) classification (ITOPF, 2014[29]) and AMSA (2013a[30]). Marine diesel oils (MDOs) are generally considered to be low viscosity with low persistence, which are readily degraded by naturally occurring microbes. About 40.6% of the MDO mass should evaporate within the first 24 hours (180°C < BP < 265°C). After several days, 95% of the MDO mass should evaporate (265°C < BP <380°C). Around 5% (by mass) of MDO will not evaporate at atmospheric temperatures and will persist within the environment. Table 7-2 provides details on the characteristics of MDO.

Table 7-2: Estimated MDO properties

Hydrocarbon Type	API	Initial Density (g/m³)	Viscosity (cP)	Component Boiling Point (°C)	% Volatiles <180 °C	% Semi-volatiles 180-265 °C	% Low Volatility 265-380 °C	% Residual >380 °C	% Aromatic or whole oil <280 °C
					Non-persistent			Persistent	
Marine Diesel Oil	37.6	0.829 @ 25 °C	4.0 @ 25 °C	% of total	6.0	34.6	54.4	5.0	3.0
				% of aromatics	1.0	1.0	0.2	-	-

29 International Tankers Owners Pollution Federation Limited (ITOPF). 2014. 2014/2015 Handbook.

7.1.2 Spill Modelling Methodology

The worst-case credible release scenario for this EP was defined as a loss of containment due to vessel collision. Western Gas utilised representative modelling conducted by RPS from BHP's *Stybarrow Decommissioning and Field Management* activity to determine the potential impacts of a MDO release from a vessel collision. The above modelling was considered a representative analogue as:

- The modelled scenario was the same as the worst-case credible scenario identified for this proposed activity; a vessel collision resulting in an instantaneous release of 1000 m^3 MDO into the marine environment.
- The scenario modelled a release of 1000 m^3 MDO which was the largest single fuel tank volume considered for the proposed activity (consistent with AMSA guidelines (2013)).
- A 1,000 m^3 fuel tank is considered conservative for the proposed activity given the initial estimates of the survey vessels fuel tank volumes range from 14 m^3 up to 1,000 m^3 (Section 7.1).
- The potential impact(s) from the analogue modelling is considered conservative as it was modelled on a location closer to Exmouth, Western Australia (55km north-west), compared to the proposed activity (150km north-west).
- The metaocean conditions for the proposed activity are similar to the modelled locations given the proximity and the bioregion they are both located within.

The quantitative hydrocarbon spill modelling was performed by RPS (2022) using a three-dimensional (3D) hydrocarbon spill trajectory and weathering model, SIMAP (Spill Impact Mapping and Analysis Program). The stochastic model within SIMAP performs multiple simulations for a given release site, randomly varying the release time for each simulation. The model uses the spill time to select samples of current and wind data from a long time series of wind and current data.

Results of the replicate simulations are statistically analysed and mapped to define contours of percentage probability of contact at identified thresholds around the hydrocarbon release point. The modelling considered 300 spill simulations in total (100 for each season (summer, transitional and winter)). The stochastic approach captures a wide range of potential weathering outcomes under varying environmental conditions, which is reflected in the aggregated spatial outcomes showing the areas that might be affected by sea surface and subsurface hydrocarbons.

The modelling outcomes provide a conservative understanding of where a largescale MDO release could travel in any metocean condition. Therefore, the modelling results represent the maximum extent that may be affected.

7.1.3 Hydrocarbon Exposure Values

The EMBA presented in Figure 4-1 was defined as described in Section 7.1.2. This methodology used the exposure threshold values presented in Table 7-3.

Table 7-4 presents justification for the exposure thresholds used to define the EMBA. The table also details how different exposure threshold values are relevant to the impact assessment for an MDO release (Section 7.1.5).

Table 7-3: Summary of exposure thresholds used to define the EMBA (NOPSEMA, 2019)

Hydrocarbon Component	Units	EMBA Exposure Value
Surface hydrocarbons	g/m^2	1
Shoreline hydrocarbons	g/m^2	10
Entrained hydrocarbons	ppb	100
Dissolved hydrocarbons	ppb	50

Table 7-4: Descriptions of hydrocarbon exposure thresholds

Threshold Exposure Value	Description
Surface Hydrocarbons	
1 g/m^2	**Low:** It is recognised that 1 g/m^2 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 it is considered relevant to approximate the area of effect to socio-economic receptors. This exposure value has been used to define the spatial extent of the EMBA from surface hydrocarbons.
10 g/m^2	**Moderate:** 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 loss of thermal protection of their features. This has been estimated by at 10 to 25 g/m^2 (French-McCay, 2009; Koops et al., 2004). Furthermore, based on literature reviews on acquatic birds and marine mammals, the exposure value for harmful impacts is 10 g/m^2 (Clark 1984; Engelhart 1983; Geraci and St Aubin, 1988; Jenssen, 1994). The exposure value is used to determine the risk of exposure that can cause adverse impact to turtles, seasnakes, marine mammals and seabirds. This threshold was selected as a reasonable and conservative value to apply to the risk evaluation with respect to surface hydrocarbons.
50 g/m^2	**High:** This high exposure value for surface oil is above the minimum threshold observed to cause ecological effect. At this concentration surface hydrocarbon would be clearly visible on the sea surface.
Shoreline Hydrocarbons	
10 g/m^2	**Low:** This exposure value defines the area for potential socio-economic impacts (for example: reduction of aesethic value). This exposure value has been used to define the spatial extent of the EMBA from shoreline hydrocarbons.

Threshold Exposure Value	Description
Surface Hydrocarbons	
100 g/m^2	**Moderate:** 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 that oil thickness of 0.1 mm (100 g/m^2) as the lethal exposure values for benthic epifaunal intervebrates on intertidal habitats (rock, artificial, or human-made) and in intertidal sediments (mud, silt, and gravel) (French McCay, 2004; French McCay et al., 2003; French McCay, 2009). It is also the impact threshold assumed for the oiling of birds (French McCay, 2004). This exposure value has been used to inform the risk evaluation with respect to accumulated shoreline hydrocarbons and the threshold for shoreline response, based on possible clean-up options.
1,000 g/m^2	**High:** This low exposure value predicts the area likely to require intensive clean-up efforts.
Entrained Hydrocarbons	
10 ppb	**Low:** 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 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 the reported threshold values, which also depend on the test organism, exposure duration, oil type and the initial oil concentration. The 1 ppb exposure value represents the very lowest concentration and corresponds with the lowest trigger levels for hydrocarbons in water recommended in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality: Volume 1 – the Guidelines* (Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, 2000)
100 ppb	**Moderate:** 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. 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 (Clark et al., 2001; Gulec et al., 1997; Gulec and Holdway, 2000) and 45 to 465,000,000 ppb (Barron et al., 2004; Gulec and Holdway, 2000) respectively. This exposure value has been used to define the spatial extent of the EMBA from total submerged hydrocarbons and used to describe the environmental sensitivities within the EMBA. This exposure value has been used to inform the risk evaluation with respect to entrained hydrocarbons and used to describe environmental sensitivities within the EMBA.
Dissolved Aromatic Hydrocarbons	
10 ppb	**Low:** This low exposure value establishes the planning area for scientific monitoring (based on potential for exceeding water quality triggers).
50 ppb	**Moderate:** This exposure value approximates toxic effects, particularly sub-lethal effects to sensitive species (NOPSEMA, 2019). French McCay et al (2002) indicates an average 96-hour LC50 of around 50 and 400 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. This exposure value has been used to inform the risk evaluation with respect to dissolved hydrocarbons and used to describe environmental sensitivities within the EMBA.

7.1.4 Spill Modelling Results

The EMBA for the worst-case MDO release is presented in Figure 4-1. The outer extent of the EMBA is derived from the oil spill modelling defined using the hydrocarbon exposure thresholds in Table 7-3 and is based on the combined area of contact for all hydrocarbon components (surface, shoreline, dissolved and entrained hydrocarbons). The modelling results below are presented for each hydrocarbon component at the hydrocarbon thresholds defined in Table 7-4.

7.1.4.1 Surface Hydrocarbons

Table 7-5 summarises receptors with the potential to be contacted at low (Section 7.1.4.1.1), moderate (Section 7.1.4.1.2) and high (Section 7.1.4.1.3) surface hydrocarbon exposure thresholds.

Table 7-5: Summary of receptors with the potential to be contacted at the low, moderate and high surface hydrocarbon exposure thresholds

Receptor	Probability of Surface Hydrocarbon Exposure (%)			Minimum Time before Surface Hydrocarbon Exposure (days)		
	Low	Moderate	High	Low	Moderate	High
Gascoyne AMP	62	32	22	0.17	0.17	0.21
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula KEF	45	22	16	0.08	0.08	0.08
Exmouth Plateau KEF	2	-	-	1.92	-	-
Continental Slope Demersal Fish Communities KEF	100	100	100	0.04	0.04	0.04

7.1.4.1.1 Low Exposure (> 1 g/m^2)

Surface hydrocarbons at the low exposure value are predicted to travel up to 164 km northeast of the release location. Receptors with the potential to be contacted at the low exposure value are:

- Gascoyne AMP
- Canyons linking to the Cuvier Abyssal Plain and the Cape Range Peninsula KEF
- Exmouth Plateau KEF
- Continental Slope Demersal Fish Communities KEF

7.1.4.1.2 Moderate Exposure (> 10 g/m^2)

Surface hydrocarbons at the moderate exposure value are predicted to travel up to 92 km southwest of the release location. Receptors with the potential to be contacted at the moderate exposure value are:

- Gascoyne AMP

- Canyons linking to the Cuvier Abyssal Plain and the Cape Range Peninsula KEF
- Continental Slope Demersal Fish Communities KEF

7.1.4.1.3 High Exposure (> 50 g/m^2)

Surface hydrocarbon at the high exposure value are predicted to travel up to 79 km northeast of the release location. Receptors with the potential to be contact at the high exposure values are:

- Gascoyne AMP
- Canyons linking to the Cuvier Abyssal Plain and the Cape Range Peninsula KEF
- Continental Slope Demersal Fish Communities KEF

7.1.4.2 Shoreline Accumulated Hydrocarbons

There was no predicted shoreline accumulation of hydrocarbons at or above the low, moderate, or high thresholds.

7.1.4.3 Dissolved Hydrocarbons

Table 7-6 summarises receptors with the potential to be contacted at low (Section 7.1.4.3.1), moderate (Section 7.1.4.3.2) and high (Section 7.1.4.3.3) dissolved hydrocarbon exposure thresholds.

Table 7-6: Summary of receptors with the potential to be contacted at the moderate dissolved hydrocarbon threshold

Receptor	Maximum Instantaneous Dissolved Hydrocarbon Concentration (ppb)	Probability of Instantaneous Dissolved Hydrocarbon Exposure (%)
Gascoyne AMP	197	8
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula KEF	306	16
Exmouth Plateau KEF	13	-
Continental Slope Demersal Fish Communities KEF	525	42

7.1.4.3.1 Low Exposure (> 10 ppb)

Dissolved hydrocarbons at the low exposure value are predicted to travel up to 157 km south-southwest of the release location. Receptors with the potential to be contacted at the low exposure value are:

- Gascoyne AMP
- Canyons linking to the Cuvier Abyssal Plain and the Cape Range Peninsula KEF
- Exmouth Plateau KEF

- Continental Slope Demersal Fish Communities KEF

7.1.4.3.2 Moderate Exposure (> 50 ppb)

Dissolved hydrocarbons at the moderate exposure value are predicted to travel up to 40 km southwest of the release location. Receptors with the potential to be contacted at the low exposure value are:

- Gascoyne AMP
- Canyons linking to the Cuvier Abyssal Plain and the Cape Range Peninsula KEF
- Continental Slope Demersal Fish Communities KEF

7.1.4.3.3 High Exposure (> 400 ppb)

Dissolved hydrocarbons at the high exposure value are predicted to travel up to 2 km south-southwest of the release location. Receptors with the potential to be contacted at the low exposure value are:

- Continental Slope Demersal Fish Communities KEF

7.1.4.4 Entrained Hydrocarbons

Table 7-7 summarises receptors with the potential to be contacted at low (Section 7.1.4.4.1) and high (Section 7.1.4.4.2) entrained hydrocarbon exposure thresholds.

Table 7-7: Summary of receptors with the potential to be contacted at the moderate entrained hydrocarbon exposure thresholds

Receptor	Maximum Instantaneous Dissolved Hydrocarbon Concentration (ppb)	Probability of Instantaneous Dissolved Hydrocarbon Exposure (%)
Carnarvon Canyon AMP	118	2
Gascoyne AMP	12,507	41
Ningaloo AMP	318	2
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula KEF	26,040	40
Ancient coastline at 125 m depth contour KEF	278	2
Exmouth Plateau KEF	1,523	14
Commonwealth waters adjacent to Ningaloo Reef KEF	318	2
Continental Slope Demersal Fish Communities KEF	43,090	85

7.1.4.4.1 Low Exposure (> 10 ppb)

Entrained hydrocarbon at the low exposure value are predicted to travel up to 1,295 km north-northwest of the release location. Receptors with the potential to be contacted at the low exposure value are:

- Abrolhos AMP
- Argo-Rowley Terrace AMP
- Carnarvon Canyon AMP
- Gascoyne AMP
- Montebello AMP
- Shark Bay AMP
- Ningaloo AMP
- Canyons linking to the Cuvier Abyssal Plain and the Cape Range Peninsula KEF
- Ancient coastline at 125 m depth contour KEF
- Wallaby Saddle KEF
- Exmouth Plateau KEF
- Commonwealth waters adjacent to Ningaloo Reef KEF
- Perth Canyon and Adjacent shelf break, and other west coast canyons KEFs
- Western Demersal slope and associated fish communities KEF
- Continental Slope Demersal fish communities KEF
- Muiron Islands Marine Management Area
- Ningaloo Marine Park

7.1.4.4.2 High Exposure (> 100 ppb)

Entrained hydrocarbon at the high exposure value are predicted to travel up to 507 km south-southwest of the release location. Receptors with the potential to be contacted at the high exposure value are:

- Carnarvon Canyon AMP
- Gascoyne AMP
- Ningaloo AMP
- Canyons linking to the Cuvier Abyssal Plain and the Cape Range Peninsula KEF
- Ancient coastline at 125 m depth contour KEF
- Exmouth Plateau KEF
- Commonwealth waters adjacent to Ningaloo Reef KEF
- Continental Slope Demersal fish communities KEF

7.1.5 Potential Impacts

The known and potential environmental impacts from a diesel spill from a vessel collision include a temporary decline in water quality and toxicity effects to marine flora and fauna. The severity of the impact is dependent on the sensitivity of the receptor (Table 7-8).

The potential for environmental impacts of diesel spills is related primarily to the acute toxicity of the dissolved aromatic hydrocarbon compounds. Potential impacts of a hydrocarbon spill include the physical and chemical alteration of natural habitats, the physical smothering effects on flora and fauna, direct toxic effects and physiological effect on flora and fauna and alteration to biological communities as a result of the effects on key organisms (AMSA, 2002[31]). There is also some potential for impacts to marine fauna associated with ingestion of spilled hydrocarbons, dermal contact with the diesel spill and inhalation of hydrocarbon vapours by species that surface to breathe close to the water surface (NOAA, 2013[32]).

Table 7-8: Impact assessment summary – 1000 m^3 MDO spill

Environmental Receptors	Impact Description
Marine Fauna	
Plankton (including zooplankton, coral larvae and benthic invertebrates)	• Plankton could include the eggs and larvae of marine invertebrates (including coral) and fish. Physical contact of small hydrocarbon droplets may impair plankton mobility, feeding and respiration. • There is potential for localised mortality of plankton due to reduced water quality and toxicity. • The likelihood of impacts to plankton would be determined by the extent and timing of the spill; for example, hard coral spawning occurs primarily in March/April, so there is a heightened potential for impacts to coral eggs and larvae to occur during this period. • The different life stages of plankton often show widely different tolerances and reactions to oil pollution. 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. • The abundance and diversity of epi-benthic invertebrates is likely to be highest in shallow subtidal habitats such as hard corals, seagrasses and macroalgae, which are present along the Ningaloo coastline.
Fish, sharks and rays (including commercial species)	• While no whale shark BIA's overlap the operational area, there are two in proximity – a foraging (high prey density) BIA off the Ningaloo coast (approximately 32 km south the operational area) and a foraging BIA which extends along the North West Shelf (approximately 19 km from the operational area). Whale sharks are oceanic, but also

31 AMSA (2002) The Effects of Maritime Oil Spills on Wildlife including Non-Avian Marine Life. Australian Maritime Safety Authority. http://www.amsa.gov.au/environment/maritime-environmental-emergencies/national-plan/General-Information/oiled-wildlife/marine-life/index.asp.

32 NOAA. (2013). Shoreline Assessment Manual. 4th Edition. U.S. Dept. of Commerce. Seattle, WA: Emergency Response Division, Office of Response and Restoration, National Oceanic and Atmospheric Administration. 73 pp + appendices. Available to download http://www.shorelinescat.com/Documents/Manuals/NOAA%20Shoreline%20Assessment%20Manual.pdf. Accessed November 2014.

Environmental Receptors	Impact Description
	come into shallower coastal waters to feed in surface waters which often coincide with specific productivity events that are a focus of feeding for the animals. • 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. It is possible they may come into direct contact with surface hydrocarbons or hydrocarbons in the water column during their known aggregation around Ningaloo coast. • The most likely impact to fish, shark and rays is from the dissolved aromatic hydrocarbons or entrained hydrocarbon droplets, particularly when through the pathways of ingestion or the coating of gill structures. This could lead to respiratory problems (reduction in oxygen exchange efficiency) or an accumulation of hydrocarbons in tissues. • The shallower intertidal reef areas around the Ningaloo Reef and 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 survival of eggs and larvae and reduced survival and growth of recruits (Giari et al., 2012; Theodorakis et al., 2012). • 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 (International Tanker Owners Pollution Federation, 2011). 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 (Kirby et al., 2018), particularly if they are territorial and unlikely to leave their habitat. • While fish, sharks and rays do not generally break the sea surface, individuals may feed near the surface for short periods. The probability of long-term exposure to a surface slick by fish, shark and ray species is unlikely.

Marine mammals	• Twelve marine mammals were identified by the EPBC PMST for the EMBA. BIAs overlapping the EMBA include:
	  ○ Humpback whale – migration
	  ○ Pygmy blue whale – foraging and migration
	  ○ Dugong – breeding, foraging, nursing and calving
	• Humpback whale migration in this region is characterised by three directional phases being:
	  ○ Northbound phase – starts June, peaks July and tapers off by early August
	  ○ Transitional phase – occurring late August and early September
	  ○ Southbound phase – occurring early August until the end of November
	• Marine mammals (whales, dolphins and dugongs) come to the sea surface to breathe air. They are therefore theoretically vulnerable to 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 are therefore not as sensitive to the physical effects of oiling.
	• 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 destroy epithelial cells in the stomach and intestine.
	• The way whales and dolphins consume their food may 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’ (Helm et al., 2015). 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.
	• Dugongs are common in several locations along the Ningaloo coastline and the Muiron Islands where there are seagrass beds.
	• Dugongs may be indirectly impacted via habitat loss due to reduction in seagrass from contact with entrained hydrocarbons. Direct impacts to dugongs could occur through

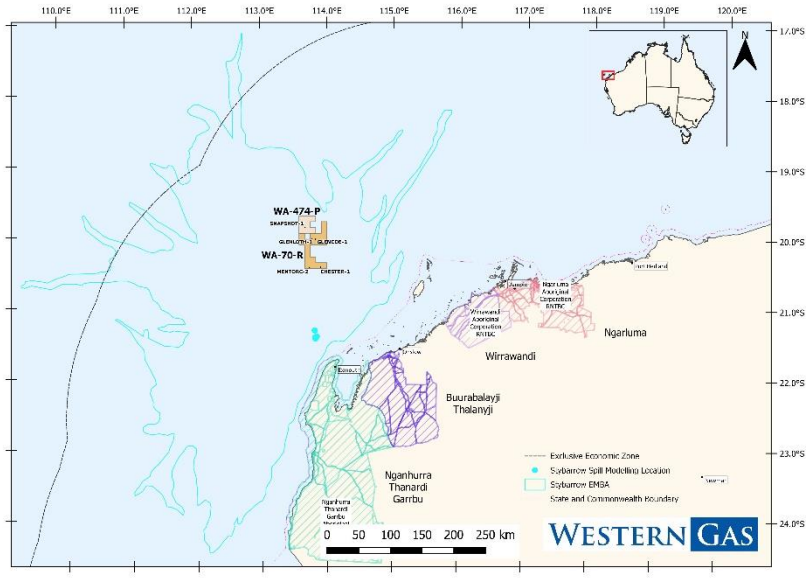
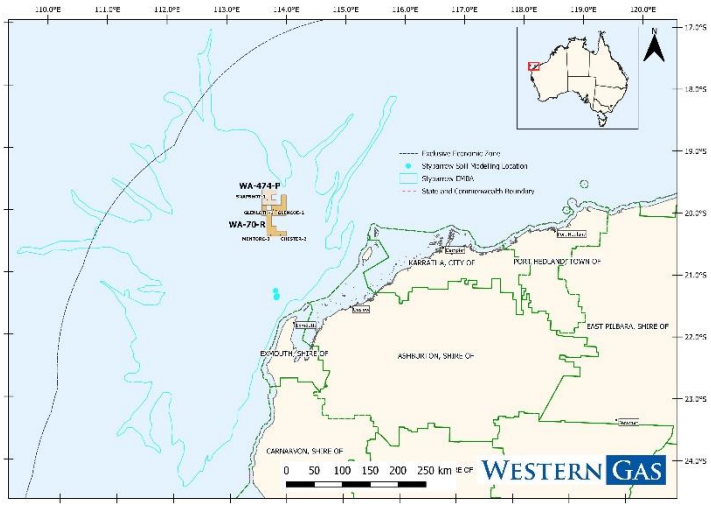
Environmental Receptors	Impact Description
	foraging or ingesting seagrass coated with hydrocarbon. Additionally, where surface slicks are expected to extend into shallower coastal waters, impacts from contact with surface hydrocarbons may also occur as they surface to breathe.

Marine Reptiles	• BIAs and Critical Habitats for the flatback turtle, green turtle, hawksbill turtle and loggerhead turtle are within the extent of the EMBA.
	• Important areas for marine turtles that may be exposed to hydrocarbons include the North West Cape of the Ningaloo coast and the Muiron Islands.
	• Direct contact of marine turtles with hydrocarbon and exposure to hydrocarbons may lead to:
	  ○ Digestion and absorption of hydrocarbons through food contamination or direct physical contact, leading to damage of the digestive tract and other organs
	  ○ Irritation of mucous membranes (nose, throat, eyes), leading to inflammation and infection
	• The greatest potential for impact to turtles or seasnakes is likely to be in feeding areas where surface and entrained hydrocarbons have contacted shallow water foraging habitats (such as seagrass, hard coral and macroalgae).
	• Green, hawksbill, flatback and loggerhead turtles use shallow waters and nesting beaches along coastlines of the Ningaloo Coast and Muiron Islands. The risk at these nesting beaches is for hydrocarbons to contact adult females during nesting season or when newly hatched turtles enter the water from nesting beaches
	• Several species of seasnake are known to occur in 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 may also be susceptible to toxic effects through ingestion of contaminated prey items.

Seabirds and Shorebirds	• Birds exposed to hydrocarbons may suffer a range of internal and external health impacts. Direct contact with hydrocarbons and exposure from hydrocarbons has the potential to cause:
	  ○ 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
	  ○ Disruption of the normal breeding and incubating behaviours.
	• The operational area overlaps with the wedge-tailed shearwater BIA (breeding). The nearest colony of wedge-tailed shearwaters is the Muiron Islands, approximately 46 km south-east of the operational area. A number of other seabird BIAs have been identified within the EMBA.
	• 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.
	• The waters of the North West region of Western Australia support large populations of seabirds, predominantly tern species, and 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 EMBA include albatross, petrels, terns and shearwaters. Seabirds spend most of their time at sea, travelling over large distances to forage over the open ocean, returning to land during breeding only; therefore, some seabirds may transit the offshore waters of 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 to their vast distribution area. The risk of

Environmental Receptors	Impact Description
	impact is greater should a release occur within the chick-rearing period, where adults forage closer to breeding colonies. • Shoreline-accumulated oil below impact threshold is predicted at Exmouth, Muiron Islands, Flat Island and Peak Island. These habitats (particularly those with intertidal mud flats and sandy beaches) are important staging sites for migratory shorebirds and important breeding sites. Given no hydrocarbons were predicted to accumulate on shorelines above impact thresholds and the low persistent nature of MDO, significant impacts from shoreline accumulation are not anticipated.
Shoreline Habitats	
Given no hydrocarbons were predicted to accumulate on shorelines above impact thresholds and the low persistent nature of MDO, significant impacts to shoreline habitats are not anticipated. No impacts are predicted to occur	
Intertidal / Sub-tidal Habitats	
Intertidal sandy beaches / mud flats	• Sandy beaches and intertidal sediments occur extensively along the Ningaloo coast and the Muiron Islands. • The above represents 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. • Temporary declines in infauna and epifauna populations may have indirectly affect feeding shorebirds, seabirds and migratory wading birds. • Given no hydrocarbons were predicted to accumulate on shorelines above impact thresholds and the low persistent nature of MDO, significant impacts from shoreline accumulation are not anticipated**.**
Macroalgal and seagrass beds	• 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 surface hydrocarbons but may be exposed to entrained hydrocarbons. • Impact of hydrocarbons on macroalgae, particularly on intertidal shores, largely depends on the degree of exposure, the degree of wave and tidal action and how much of the hydrocarbon adheres to the seagrass or macroalgae. Macroalgae is predicted to recover quickly as a result of wind, wave and tidal-driven coastal processes that naturally flush the hydrocarbons. • Impacts could include reduced capability for photosynthesis if the seagrass or macroalgae were smothered, or toxic effects could occur from contact with the hydrocarbon. • Impacts to seagrass may present secondary impacts to species reliant on the habitat, such as dugongs.
Coral reefs	• Potential exists for corals to be contacted by entrained hydrocarbons along the Ningaloo coastline and Muiron Islands. • Direct contact by dissolved hydrocarbons can cause lethal and sub-lethal effects in corals, depending on the time and duration of exposure of the concentrations, with sub-lethal effects including decreased growth rates and reduced reproductive success (International Petroleum Industry Environmental Conservation Association, 1992). In the worst-case instance, irreversible tissue necrosis and death could occur. 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. • Given MDO has a relatively low persistence and is not considered a sticky oil, coral exposure to the worst-case MDO release is expected to be temporary.
Mangroves	• Potential exists for mangroves to be contacted by hydrocarbons along the Ningaloo coastline and Muiron Islands. • Mangrove root systems (including pneumatophores) are sensitive to physical oiling from surface hydrocarbons. Impacts to mangroves include yellowing of leaves, defoliation, reduced reproductive output and success, mutation and increased sensitivity to other

Environmental Receptors	Impact Description
	stresses (NOAA 2010). There is the potential for stands of mangroves at shorelines, notably along the Ningaloo Coastline (such as at Mangrove Bay and at Yardie Creek) to be contacted. • Given no hydrocarbons were predicted to accumulate on shorelines above impact thresholds and the low persistent nature of MDO, significant impacts from shoreline accumulation are not anticipated.
Socio-Economic Receptors	
Fisheries	• The EMBA overlaps Commonwealth- and State-managed fisheries. • Hydrocarbons in the water column can have toxic effects on fish (as outlined above) and cause 'tainting', reducing catch rates and rendering fish unsafe for consumption. • Exclusion zones surrounding a spill can directly impact fisheries by restricting access for fishermen.
Tourism and Recreation	• There is a wide variety of nature-based tourism and recreational activities, including recreational fishing, that occurs in the EMBA. Much of this occurs in the Ningaloo/Exmouth area during the peak tourism season from April to October, although some of the offshore islands also attract visitors such as the Muiron Islands. In 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. • Impacts to recreational fishing may also occur due to impacts to fish as described for fisheries above.
Defence	• These training zones overlap the operational area and EMBA. However, they are designated for aerial training and are unlikely to be impacted by a hydrocarbon release.
Shipping	• 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 NOTMAR being issued to avoid the area, leading to the potential diversion from normal shipping routes.
Oil and Gas Activities	• Multiple oil and gas operators have operations within the EMBA. In a large-scale release, 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.
Indigenous Heritage	• Indigenous heritage sites are largely restricted to the terrestrial environment. Given no hydrocarbons were predicted to accumulate on shorelines above impact thresholds and the low persistent nature of MDO, significant impacts to indigenous heritage sites are not anticipated.
Native Title Determined Areas	• The EMBA is adjacent to but does not overlap the following determined Native Title claims: ○ Gnulli over the lands and waters of North West Cape - determined on 17 December 2019 resulting in the creation of two Prescribed Body Corporate(s). The Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC) assumed responsibility for native title matters in the north of the Determination area.

Environmental Receptors	Impact Description
	○ Thalanyji over lands in the Ashburton region – determined on 18 August 2008.. 
Maritime Heritage	• There are a number of shipwrecks in the EMBA. Notable shipwrecks include three historic shipwrecks at Pt Cloates along the Ningaloo Coast (Fin, Perth and Zvir) and one historic shipwreck at North West Cape (Fairy Queen). It is unlikely contact would have any lasting impact on these sites, apart from a possible temporary reduction in aesthetic value for a period. • Surface hydrocarbons will have no impact on shipwrecks. • Hydrocarbons in the water column may potentially impact those microbial and encrusting communities that may in turn affect the structural integrity of the shipwreck.
Local Government Areas	• The EMBA is adjacent to but does not overlap the following Local Government Areas: ○ Shire of Exmouth ○ Shire of Ashburton. 
Protected and Significant Areas	

Environmental Receptors	Impact Description
World Heritage and National Heritage	• The Ningaloo Coast with World Heritage and National Heritage listings falls within the EMBA.

Australian and State Marine Parks	The EMBA overlaps several marine parks:
	• Australian Marine Parks:
	  ○ Gascoyne
	  ○ Ningaloo
	  ○ Carnarvon Canyon
	• State Marine Parks
	  ○ The EMBA does not overlap state waters

Key Ecological Features	The EMBA overlaps several KEFs • Continental Slope Demersal Fish Communities • Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula • Commonwealth waters adjacent to Ningaloo Reef • Exmouth Plateau • Western Demersal Slope and associated fish communities • Wallaby Saddle • Perth Canyon and adjacent shelf break, and other west coast canyons.

7.1.6 ALARP Demonstration

Table 7-9: ALARP assessment for MDO spill from a fuel tank rupture

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
Existing Controls				
Eliminate	N/A		Vessel presence is required in the operational area to proceed with the Activity.	
Substitute	N/A		Vessel presence is required in the operational area to proceed with the Activity.	
Engineer	Vessels equipped with navigation aids and communication equipment compliant with navigational requirements of Navigation Act 2012, SOLAS; AMSA; and Marine Orders 21 and 30.	A	Control based on legislative requirements must be accepted. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.2.1**
Separate	Establishment of a 500 m exclusion zone around project vessels	A	Control is based on legislative requirements and must be accepted; reduces the likelihood of vessel collision with third-parties.	
	N/A			
Administrate	Crew undertaking vessel bridge watch qualified in accordance with International Convention of	A	Control based on legislative requirements must be accepted. Control is feasible, standard	**PS 6.2.1**

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
	STCW95, AMSA Marine Order – Part 3: Seagoing Qualifications or certified training equivalent.		practice with benefits outweighing any cost sacrifice.	
	Bridge-watch is maintained on all vessel 24-hours per day.	A	Control based on legislative requirements must be accepted. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.2.1**
	Notification of survey location, duration of activities, etc. to AMSA RCC and AHS who issue a 'Notice to Mariners' prior to commencement of the Activity.	A	Control based on legislative requirements must be accepted. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.2.2**
	Relevant stakeholders consulted/advised of survey activities prior to commencement of the survey.	A	Control based on Western Gas requirements must be accepted. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.2.3**
Pollution Control	Implement and maintain vessel MARPOL-compliant SOPEP.	A	Control based on legislative requirements must be accepted. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.2.4**
	Develop and maintain Western Gas WA-474-P, WA-70-R Suspended Wells OPEP (WG-EHS-PLN-002).	A	Control based on legislative requirements must be accepted. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.2.5**
Additional Controls				
Eliminate	Do not conduct the survey	R	NOPSEMA have requested the survey as part of the WOMP (Section 1.5.2.2)	

7.1.6.1 ALARP Summary

The risk assessment and evaluation has identified a range of controls that when implemented are considered to manage the risk of vessel collision during the survey. Without bulk storage of MDO onboard the vessels sufficient for the survey campaign (seven (7) days, including contingencies), the Activity would take substantially longer with frequent bunkering activities, or a supply vessel would have to sail out and bunkering would have to occur at sea. Both of these alternative options would increase the risk of vessel collision and risk of spills to the marine environment.

All vessels are equipped with navigational aids and safety equipment as required under the *Navigation Act 2012* and other relevant standards. With the implementation of standard and appropriate control

measures and with no other additional controls or alternatives available that would offer a net environmental benefit, it is considered that the risk of loss of MDO due to vessel collision is reduced to ALARP.

7.1.7 Acceptability

The likelihood of a vessel collision occurring and resulting in the loss of bulk storage MDO is rare with all practicable control measures in place to prevent collisions. Control measures are consistent with legislative codes, standards and procedures, and good oil field practice which include *Navigation Act 2012*, SOLAS 1974, AMSA Marine Orders Part 3, 21 and 30 in relation to safety of navigation and emergency procedures, prevention of collisions and seagoing qualifications.

In the event of a spill occurring, significant impacts are not predicted due to the volumes of MDO on the vessel and the controls in place to manage spill events (SOPEP and OPEP). Vessels also have capability to divert fuel to an alternative tank in the event of a ruptured tank; although this activity would be dependent on health and safety considerations at the time of the spill.

Given the low risk of a vessel collision, the control measures for the prevention of collisions and to respond in the event of a spill (that are consistent with legislative codes, standards, good oilfield practice and Western Gas' policies), and that no reasonably practicable alternative controls have been identified that would provide significant net environmental benefit, Western Gas consider the risk of vessel collision and associated impact from the loss of MDO to the marine environment to be an acceptable level.

Acceptability Statement Summary		
Consideration	**Acceptability Statement**	**Acceptability**
Principles of ESD	The activity will not contravene the Principles of ESD, based on: • Risks have been assessed using the Western Gas Risk Matrix, which considers duration and extent of impacts • Residual environmental risk of unplanned events is evaluated as low (Acceptable) and has been demonstrated ALARP • Risks will not affect biological diversity or ecological integrity.	✓
Internal Context	The activity (and associated potential impacts and risks) is consistent with Western Gas corporate policies, standards and procedures.	✓
External Context	No stakeholder objections or claims related to the activity (and associated potential risks and impacts) have been received	✓
Other Requirements	The activity (and associated potential risks and impacts to the environment) is consistent with relevant legislation, industry standards and guidelines, offshore practice or benchmarking.	✓

7.1.8 Environmental Performance Outcome, Performance Standards and Measurement Criteria

Performance Outcome	Performance Standard	Measurement Criteria
No accidental release of hydrocarbons to the marine environment	**PS 6.2.1.** *Navigation Act 2012*; International Convention of the Safety of Life at Sea (SOLAS); Marine Order – Part 30: Prevention of Collisions; and Marine Order 21 (Safety of Navigation and Emergency Procedures); AMSA Marine Order – Part 3 (Seagoing Qualifications) and International Convention of Standards of Training, Certification and Watch-keeping for Seafarers STCW95: Navigation (including lighting, compass/radar), bridge and communication equipment will be compliant with appropriate marine navigation and vessel safety requirements. Automatic Identification System (AIS) is fitted and maintained in accordance with Regulation 19-1 of Chapter V of SOLAS. Crew undertaking vessel bridge-watch will be qualified in accordance with International Convention of STCW95, AMSA Marine Order – Part 3: Seagoing Qualifications or certified training equivalent. Bridge-watch on vessel to be maintained 24-hours per day.	Documentation demonstrates compliance with standard maritime orders and equipment. Vessel Marine Logbook demonstrates bridge-watch maintained 24-hours per day.
	PS 6.2.2. Establish Activity Area: Notification of vessel location, duration of activities, etc. to AMSA RCC, which triggers RCC to issue an AusCoast Warning, and to the Australian Hydrographic Service (AHS) who will issue a 'Notice to Mariners'.	Documentation of notification to AMSA RCC and AHS advising of the survey activities including vessel location and duration of survey activities.
	PS 6.2.3. Stakeholder Engagement: Relevant stakeholders consulted/advised of site activities prior to commencement of the survey.	Stakeholder Consultation Log.
	PS 6.2.4. MARPOL Annex I (Prevention of Pollution by Oil): In line with MARPOL Annex 1, all vessels involved with the survey of over 400 gross tonnage will have a current Shipboard Oil Pollution Emergency Plan (SOPEP) in place. Oil spill response executed in accordance with vessels' SOPEP.	MARPOL-compliant SOPEP onboard vessels. Vessels incident report records hydrocarbon spills managed in accordance with SOPEP. Documentation showing that SOPEP materials and equipment are maintained and available onboard the vessel.
	PS 6.2.5.	

Performance Outcome	Performance Standard	Measurement Criteria
	Western Gas WA-474-P, WA-70-R Suspended Wells Oil Pollution Emergency Plan (WG-EHS-PLN-002): Western Gas WA-474-P, WA-70-R Suspended Wells Oil Pollution Emergency Plan (WG-EHS-PLN-002) developed and maintained for the duration of the survey. Oil spill response executed in accordance with the OPEP.	Review of incident response report in line with Western Gas WA-474-P, WA-70-R Suspended Wells Oil Pollution Emergency Plan (WG-EHS-PLN-002) in the event of a spill.

7.2 SPILLS OF ENVIRONMENTALLY HAZARDOUS CHEMICALS OR REFINED OIL

Various hydrocarbons and environmentally hazardous chemicals/liquids are stored onboard the vessel for use during the survey. Such liquids include fuel, biocides, corrosion inhibitors, refined oil, lube oil, hydraulic oil, lubricating oils, cleaning and cooling agents, glycol and methanol, and stored or spent chemicals.

Accidental loss of these liquids or liquid wastes to the marine environment could occur as a result of spillage during handling, inadequate bunding and/or storage, inadequate method of securing or container/tank/pipework failure, leak from equipment and/or rupture or failure of ROV hydraulic hoses whilst underwater.

The Oil Spill Risk Database (OSRD) model presented within the AMSA assessment of offshore hydrocarbon spills (DNV, 2011[33]) provided a historical spill frequency of quantities greater than 1 tonne due to storage of diesel or refined oil to be in the order of 3.4×10^{-3} per facility per year.

During ROV operations, the largest credible volume of a subsea leak of hydraulic fluid due to ROV equipment failure or damage is 30 L. During the survey, the volume of spill that could be accidentally released to the marine environment is likely to be small and limited to the volume of individual storage containers (e.g. IBC, fuel drums etc.) stored onboard the vessel deck or storage rooms.

The maximum potential release volume from a single spill or leak event of hydraulic fluid would be limited to the volume of containers, tanks, hoses and pipework. The most credible worst-case shipboard hydraulic fluid spill that could enter the marine environment would be in the region of 160 L (1 bbl) of hydraulic fluid from an on-deck hydraulic hose or container.

7.2.1 Potential Impacts

The accidental discharge of chemicals or refined oil has the potential to cause localised toxic effects on marine fauna (pelagic fish, cetaceans, marine mammals and marine reptiles) and flora (phytoplankton) and a localised reduction in water quality. The potential impacts from a surface spill would most likely be highly localised and restricted to the immediate area in the footprint of the spill in the surface waters and upper layers of the water column. In the event of a leak from a deployed ROV, a reduction in water quality would be confined to the immediate area. There are no emergent habitats within the Operational Area and benthic habitats would not be impacted owing to the water depth (900−1,200 m).

33 Det Norske Veritas (DNV). (2011). Final Report Assessment of the Risk of Pollution from Marine Oil Spills in Australian Ports and Waters. Report for Australian Maritime Safety Authority, Report No PP002916 Rev 5, 14 December 2011. Accessed October 2014 from http://www.amsa.gov.au/forms-and-publications/environment/publications/Other-Reports/index.asp

In the unlikely event of a chemical/refined oil spill, any pelagic fish, cetaceans, marine mammals and marine reptiles will be able to move out of the spill area and any accidental spills would therefore unlikely result in any fatal impacts to these marine fauna. Phytoplankton entrained in the spill plume will be impacted, however, due to the small spill volumes, and rapid dilution and dispersal by prevailing offshore currents, the environmental effects will be temporary and highly localised, with no significant impacts expected owing to the short exposure timeframe to the spill.

7.2.2 ALARP Demonstration

A summary of the ALARP assessment undertaken for the risks and impacts associated with spills of environmentally hazardous chemicals or refined oil is presented in Table 7-10. This process was completed as outlined in Section 5.2.1 and includes all existing standard industry and legislative controls, consideration of additional controls, and acceptance or justification if controls were considered not to be practicable. The result of this ALARP assessment contributes to the overall acceptability of the risks and impacts.

Table 7-10: ALARP Assessment for accidental hazardous chemical and hydrocarbon spills

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
Existing Controls				
Substitute	N/A			
Engineer	N/A			
Separate	All vessel machinery space oily water exceeding 15 ppm must be contained and disposed of at a licensed onshore reception facility or transferred to a carrier licensed to receive waste.	A	Control based on legislative requirements must be accepted. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.4.5**
Administrate	Liquids 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.	A	Control based on legislative requirements must be accepted. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.4.5**
	Current International Oil Pollution Prevention (IOPP) certificate for oily water filter system.	A	Control based on legislative requirements must be accepted. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.4.6**
	Fuels, oils and hazardous chemicals must be stored with secondary containment.	A	Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.4.7**
	Continuous bunding or drip trays used around machinery or	A	Control based on legislative requirements must be accepted.	**PS 6.4.9**

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
	equipment with the potential to leak chemicals/ fuel.		Control is feasible, standard practice with benefits outweigh any cost sacrifice.	
	Critical hoses outside bunded areas are identified and regularly inspected/ maintained/ replaced as part of the Preventative Maintenance System.	A	Control based on legislative requirements must be accepted. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.4.8**
	Scupper plugs or equivalent deck drainage control measures available where hazardous chemicals and hydrocarbons are stored and frequently handled.	A	Control based on legislative requirements must be accepted. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.4.9**
	Vessels will have current MARPOL-compliant Shipboard Oil Pollution Emergency Plan (SOPEP) and Shipboard Marine Pollution Emergency Plan (SMPEP – for noxious liquid) – the latter may be combined with a SOPEP.	A	Control based on legislative requirements must be accepted. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.4.9**
	All shipboard hazardous liquid, chemical and hydrocarbons spills will be managed in accordance with the SOPEP/SMPEP.	A	Control based on legislative requirements must be accepted. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.4.9**
	Spill clean-up equipment is located where hazardous chemicals and hydrocarbons are frequently handled.	A	Control based on legislative requirements must be accepted. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.4.9**
	Any loss or discharge to sea of harmful materials to be reported to the AMSA Rescue Coordination Centre (RCC).	A	Control based on legislative requirements must be accepted. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.4.10**
	Hazardous waste materials (including empty packaging previously containing hazardous substances and contaminated material from spill response activities) are contained onboard for onshore disposal at a licensed reception facility or transferred to a carrier licensed to receive waste.	A	Control based on legislative requirements must be accepted. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.4.11**
	Where Offshore Chemical Notification Scheme (OCNS) rating of D or E or a CHARM rating of Silver or Gold rated chemicals are used, no further control required.	A	Control based on Western Gas requirements must be accepted. Control is feasible, standard practice with benefits outweigh any cost sacrifice.	**PS 6.4.12**

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
	If other non-rated chemicals are required, chemical selection procedures described in the Western Gas Chemical Risk Assessment Procedure (WG-EHS-PRO-001) will be followed.	A	Control based on Western Gas requirements must be accepted. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.4.12**
Pollution Control	N/A as covered above.			
Additional Controls				
Eliminate	Do not conduct the survey	R	NOPSEMA have requested the survey as part of the WOMP (Section 1.5.2.2)	
	Eliminate and/ or minimise chemical and hazardous material inventories.	R	The elimination of the use of chemical products and hydrocarbons is not possible. The type and quantity of hazardous materials onboard the vessel will be optimised for the survey.	

7.2.2.1 ALARP Summary

The risk assessment and evaluation has identified a range of controls that when implemented are considered to manage the risk of a release of hazardous chemicals and hydrocarbons into the marine environment during the survey. Hazardous chemicals and liquids containing hydrocarbons are required to undertake the inspection survey and their elimination is not a viable option. No additional or alternative controls were identified that could further reduce the risk and impact of spill. The extensive mitigation and management controls outlined are therefore considered to reduce the risk to ALARP.

7.2.3 Acceptability

The proposed management controls for preventing and minimising the risk of accidental spills of hazardous chemicals and hydrocarbons occurring are comprehensive and consistent with all relevant legislation and standards and good oil field practice. These controls include ensuring that the chemicals used pose the lowest risk possible to the environment through the implementation of Western Gas' Chemical Risk Assessment Procedure (WG-EHS-PRO-001) for the selection of chemicals will minimise subsequent impacts in the event of an accidental release.

The magnitude of the worst-case spill is unlikely to be greater than 160 L (1 bbl), the size of the largest storage container, and more likely to be less than 80 L (0.5 bbl drum size). A release of this size would be highly localised and the offshore location of the suspended well is such that any spills would be rapidly diluted and dispersed with currents such that the decline in water quality and any environmental

impacts would be temporary. As such significant impacts are not expected due to the short exposure timeframe.

With no additional or alternative controls identified, the risk and impact of spill to the marine environment is considered to be acceptable.

Acceptability Statement Summary		
Consideration	**Acceptability Statement**	**Acceptability**
Principles of ESD	The activity will not contravene the Principles of ESD, based on: • Risks have been assessed using the Western Gas Risk Matrix, which considers duration and extent of impacts • Residual environmental risk of unplanned events is evaluated as low (Acceptable) and has been demonstrated ALARP • Risks will not affect biological diversity or ecological integrity.	✓
Planned Events	The severity of the residual environmental impact assessed as reduced to 'Minor Effect' or 'Slight Effect' on the Western Gas Risk Matrix.	N/A
Internal Context	The activity (and associated potential impacts and risks) is consistent with Western Gas corporate policies, standards and procedures.	✓
External Context	No stakeholder objections or claims related to the activity (and associated potential risks and impacts) have been received	✓
Other Requirements	The activity (and associated potential risks and impacts to the environment) is consistent with relevant legislation, industry standards and guidelines, offshore practice or benchmarking.	✓

7.2.4 Environmental Performance Outcome, Performance Standards and Measurement Criteria

Performance Outcome	Performance Standard	Measurement Criteria
No release of environmentally hazardous chemicals or refined oil/ hydrocarbons to the marine environment.	**PS 6.4.5.** *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* – Part II (Section 9), as appropriate to vessel class: All vessel machinery space oily water exceeding 15 ppm must be contained and disposed of at a licensed onshore reception facility or transferred to a carrier licensed to receive waste. Liquids 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.	Oil in water meter must be operational as evidenced by calibrations prior to commencement of the activity. Documented evidence of use of the Oil Record Book to record all oil requiring disposal onshore.
	PS 6.4.6. AMSA Marine Orders – Part 91: Marine Pollution Prevention – Oil, as appropriate to vessel class: Vessels will have a current International Oil Pollution Prevention (IOPP) certificate for oily water filter system.	Record of current IOPP certificate for vessel.

Performance Outcome	Performance Standard	Measurement Criteria
	PS 6.4.7. Fuels, oils and hazardous chemicals must be stored with secondary containment.	Containment inspection to ensure appropriate secondary containment of fuels, oils and hazardous chemicals.
	PS 6.4.8. Critical hoses outside bunded areas are identified and regularly inspected/maintained/replaced as part of the Preventative Maintenance System.	Preventative Maintenance System records demonstrate inspection of critical hoses comply with equipment specifications.
	PS 6.4.9. MARPOL Annex I (Prevention of Pollution by Oil) and MARPOL Annex III (Prevention of Pollution of Harmful Substances Carried at Sea in Packaged Form): Continuous bunding or drip trays used around machinery or equipment with the potential to leak chemicals/fuel. Scupper plugs or equivalent deck drainage control measures available where hazardous chemicals and hydrocarbons are stored and frequently handled. Vessel will have current MARPOL-compliant Shipboard Oil Pollution Emergency Plan (SOPEP) and Shipboard Marine Pollution Emergency Plan (SMPEP – for noxious liquid) – the latter may be combined with a SOPEP. All shipboard hazardous liquid, chemical and hydrocarbons spills will be managed in accordance with the SOPEP/SMPEP. Spill clean-up equipment is located where hazardous chemicals and hydrocarbons are frequently handled.	Vessel inspection records demonstrate evidence of the following: • Continuous bunding or drip trays around machinery or equipment with the potential to leak. • Spill clean-up equipment, and scupper plugs or equivalent deck drainage control measures available where hazardous chemicals and hydrocarbons are stored and frequently handled. • Spill clean-up kits are well maintained. Current MARPOL-compliant SOPEP/ SMPEP onboard the vessel. Documented evident that SOPEP/ SMPEP materials and equipment is maintained and available on the vessel prior to and during the Activity.
	PS 6.4.10. AMSA Marine Orders – Part 94: Marine Pollution Prevention – Packaged Harmful Substances: Any loss or discharge to sea of harmful materials to be reported to the AMSA Rescue Coordination Centre (RCC).	Documented evidence to show any loss or discharge to sea of harmful materials reported to AMSA RCC.
	PS 6.4.11. Environmental Protection (Controlled Waste) Regulations 2004: Hazardous waste materials (including empty packaging previously containing hazardous substances and contaminated material from spill	Vessel waste records maintained in Garbage Record Book or manifests.

Performance Outcome	Performance Standard	Measurement Criteria
	response activities) are contained onboard for onshore disposal at a licensed reception facility or transferred to a carrier licensed to receive waste.	
	PS 6.4.12. Western Gas Chemical Risk Assessment Procedure (WG-EHS-PRO-001): Where Offshore Chemical Notification Scheme (OCNS) rating of D or E or a CHARM rating of Silver or Gold rated chemicals are used, no further control required. If other non-rated chemicals are required for discharge, chemical risk assessment procedures as described in the Western Gas Chemical Risk Assessment Procedure (WG-EHS-PRO-001) will be followed.	Documented evidence showing that chemicals used are ranked D or better on OCNS ranked list or Silver or better on CHARM rating. Where chemicals are not D/E rated through OCNS or Gold/Silver rated through CHARM, then documented evidence is available to show that the Western Gas Chemical Risk Assessment Procedure (WG-EHS-PRO-001) has been followed.

7.3 INTERFERENCE WITH MARINE FAUNA

The physical presence and movements of the vessel have the potential to impact with marine fauna during the survey. Marine mammals are susceptible to injury or mortality resulting from interactions with vessels, particularly then they rise to the surface to breathe, rest or forage in surface waters. The impact may range from behavioural changes resulting from the presence/movement of the vessel to severe impacts such as serious injury or mortality resulting from vessel strikes with large, slow-moving cetaceans, marine turtles or whale sharks. Behavioural avoidance during the survey may also be caused by the generation of underwater noise (discussed in previous Section 6.6).

The extent of the area affected will be restricted to that around the vessel whilst in the Operational Area. Within the Operational Area, the vessel will be stationary or moving at slow speeds.

The Activity is expected to take up to seven days, including contingencies, for each survey with a survey conducted each year.

7.3.1 Potential Impacts

7.3.1.1 Potential Impacts to Cetaceans

Collisions between vessels and cetaceans are most frequent on continental shelves where high vessel traffic and cetacean habitat occurs (WDCS, 2006[34]). Many more cases go unrecorded simply because large ships do not notice they have hit anything. Vessels collisions can result in death, serious harm from blunt trauma injuries, including fractured bones and haemorrhaging, or propeller lacerations, sometimes with mortality occurring several years after the collision if infection has occurred.

Most whales show distinct avoidance behaviour to vessels with changes in surfacing patterns, swimming speed, duration underwater as well as horizontal and vertical changes in swimming direction (Richardson *et al*., 1995[35]; WDCS, 2006[36]). WDCS (2006)[37] also indicates that some cetacean species, such as humpback whales, will detect and change course to avoid a moving vessel. In general it is thought that cetacean calves and juveniles have a higher risk of impact mostly likely due to less frequent and shorter dives (Szabo and Duffus, 2007[38]).

There is the potential for the vessel or equipment from the vessel involved in operational activities to interact with marine fauna, including potential strike or collision, potentially resulting in severe injury or

34 WDCS (2006). Vessel collisions and cetaceans: what happens when they don't miss the boat. Whale and Dolphin Society. A WDCS Science Report by Dolman, S., William-Grey, V, Asmutis-Silvia, R. and Isaac, S.

35 Richardson, W.J., Greene, C.R. Jr., Malme, C.I. & Thomson, D.H. (1995). Marine mammals and noise. Academic Press, New York. 576 pp.

36 Op cit 34.

37 Op cit 34.

38 Szabo, A.R. and Duffus, D. (2007). Mother-offspring association in the humpback whale (*Megaptera novaeangliae*): Following behaviour in an aquatic mammal. Animal Behaviour, 75: 1085-1092.

mortality. The likelihood of vessel-whale collision being lethal is greatly influenced by vessel speed and vessel size. The risk of a collision causing mortality of the whale increases as the vessel speed increases (Conn and Silber, 2013[39]; Jensen and Silber, 2003[40]).

The Operational Area intercepts a migration BIA for the pygmy blue whale. The Glenloth-1 well, where vessel activities would be focused, is located on the outer boundary of the migration BIA. Migration occurs in a northwards direction from April to July, and in a southwards direction from October to December. Blue Whale Conservation Management Plan (DoE, 2015) lists vessel disturbance (e.g. physical presence and strike) as a potential threat. Considering the stationary or slow moving nature of the vessel in the Operational Area, and the short duration of the activity (7 days per survey, once per year), the likelihood of a collision resulting in mortality is very low. The worst-case consequence from a vessel strike would be the fatality of an individual, which is not expected to result in a decreased population size on a local or regional level. Based on this and the implementation of good practise controls, the activity will be managed in a way that is not inconsistent with the PBW conservation management plan.

7.3.1.2 Potential Impacts to Whale Sharks

Whale sharks spend a significant amount of time at or close to the sea surface (Norman, 1999[41]) and therefore may be more vulnerable to vessel strike. Scars have been observed on whale sharks considered likely to have been caused by contact with vessels and there have been several reports of whale sharks being struck by bows of larger ships (Norman, 1999[42]).

7.3.1.3 Potential Impacts to Marine Turtles

Vessel strike is recognised as an important threat to vulnerable and endangered sea turtles in Australia. Vessel strikes involving contact with propellers would be lethal at almost all speeds. Studies have shown that turtles are less likely to flee from a fast moving vessel than from a slow moving vessel, presumably related to habituation to vessel sounds as background noise and poor visual senses (Hazel *et al*., 2007[43]).

39 Conn, P.B & Silber, G.K. (2013). Vessel speed restrictions reduce risk of collision-related mortality for North Atlantic right whales. Ecosphere, 4(4): 43.

40 Jensen, A.S. and Silber, G.K. (2003). Large whale ship strike database. U.S. Department of Commerce. National Oceanic and Atmospheric Administration. Technical Memorandum NMFS-OPR. 37 pp.

41 Norman, B.M. (1999). Aspects of the biology and ecotourism industry of the Whale Shark *Rhincodon typus* in north-western Australia. MPhil. Thesis, Murdoch University, Western Australia.

42 Ibid.

43 Hazel, J., Lawler, I.R., Marsh, H. & Robson, S. (2007). Vessel speed increases collision risk for the green turtle *Chelonia mydas*. Endangered Species Research, 3: 105-113.

7.3.1.4 Summary of impacts

Considering the vessels are stationary for the majority of the time at each well site, the risk of vessel collision with marine fauna is extremely low and it is unlikely that additional vessel traffic in the area will have a significant impact on migratory fauna species or other transiting marine fauna that may be present. Slow vessel speeds, in combination with the generation of vessel noise, is likely to elicit avoidance behavior of cetaceans from the immediate vicinity of the Operational Area. In the highly unlikely event of a cetacean, whale shark or turtle mortality, the effect is not likely to be significant (as defined by the EPBC Act Significant Impact Guidelines (DoE, 2013[44]) at the population level.

7.3.2 ALARP Demonstration

A summary of the ALARP assessment undertaken for the risks and impacts associated with the interference with marine fauna is presented in Table 7-11. This process was completed as outlined in Section 5.2.1 and includes existing standard industry and legislative controls, consideration of additional controls, and acceptance or justification if controls were considered not to be practicable. The result of this ALARP assessment contributes to the overall acceptability of the risks and impacts.

Table 7-11: ALARP assessment for interference with marine fauna

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
Existing Controls				
Eliminate	N/A			
Substitute	N/A			
Engineer	N/A			
Separate	N/A			
Administrate	Vessel Master to operate vessel in accordance with Part 8 Division 8.1 (r8.04) of the EPBC Regulations 2000.	A	Control based on legislative requirements must be accepted. Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.5.1**
	Environmental awareness briefing to marine crew prior to activities that includes marine fauna interaction requirements.	A	Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.5.2**

[44] DoE (2013). Significant Impact Guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999. Matters of National Environmental Significance. Commonwealth Agencies. Department of the Environment. Commonwealth of Australia.

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
	Sightings of cetaceans, whale sharks and marine turtles are recorded and reported.	A	Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.5.3**
Pollution Control	N/A			
Additional Controls				
Separate	Prevent or reduce use of vessels during peak migration periods.	R	Vessel based inspections are an essential requirement of the Activity. The very short duration of the inspection activity and stationary/slow nature of vessel operations makes the risk of impact extremely low. Restricting scheduling options could complicate logistic arrangements and affect the availability/cost of a suitable vessel, particularly given the desire to source a vessel operating locally, for negligible environmental benefit.	
Eliminate	Dedicated marine fauna observer(s) (MFOs)	R	Potential impacts are low, and activity is of short duration. Therefore, the potential for interaction is considered low. This control has been rejected as the cost of implementation is disproportionate to the limited environmental benefit.	

7.3.2.1 ALARP Summary

The risk assessment and evaluation has identified a range of controls that when implemented are considered to manage the risk of interference with marine fauna during the survey. The presence and movement of the vessel are critical to the Activity and cannot be eliminated if it is to proceed.

Restricting the timing of the survey to avoid peak marine fauna migration periods would raise logistical complications in coordinating survey (ROV) and vessel contractors, potentially affect the availability and/or costs of a suitable vessel (given the desire to utilize a locally based vessel for biosecurity reasons) and increase exposure to delays associated with cyclone season. Considering the very low level of risk due to the nature and duration of the inspection activities, the cost of this option was considered to be disproportionate to any environmental benefit.

With no reasonable additional controls identified, other than not proceeding with the inspection survey, it is considered that the risk of interference/collision with marine fauna during the survey has been reduced to ALARP.

7.3.3 Acceptability

As the potential impact from the Activity is localised, temporary and transient, all reasonable means to minimise risk of vessel collisions, interactions and disturbance with marine fauna due to vessel movements have been taken. In the Operational Area, the vessel will mostly be stationary, further reducing the likelihood of vessel strike. Vessel speed in the vicinity of observed cetaceans is managed in accordance with Part 8 of the EPBC Regulations 2000. Marine crew attend an environmental awareness briefing that includes marine fauna interaction requirements. The activity is typical of offshore activities undertaken elsewhere and in Australian waters and the proposed management control for protection of whales is consistent with regulatory requirements imposed on the whale watching industry and best practice for managing interactions with whales.

No other reasonably practicable alternative control measures have been identified that would provide a net environmental benefit. Western Gas, therefore, consider the proposed control measures are considered effective in reducing the risk and consequence of vessel interference/collision with marine fauna to an acceptable level.

Acceptability Statement Summary		
Consideration	**Acceptability Statement**	**Acceptability**
Principles of ESD	The activity will not contravene the Principles of ESD, based on: • Risks have been assessed using the Western Gas Risk Matrix, which considers duration and extent of impacts • Residual environmental risk of unplanned events is evaluated as low (Acceptable) and has been demonstrated ALARP • Risks will not affect biological diversity or ecological integrity.	✓
Internal Context	The activity (and associated potential impacts and risks) is consistent with Western Gas corporate policies, standards and procedures.	✓
External Context	No stakeholder objections or claims related to the activity (and associated potential risks and impacts) have been received	✓
Other Requirements	The activity (and associated potential risks and impacts) to the environment is consistent with relevant legislation, industry standards and guidelines, offshore practice or benchmarking.	✓

7.3.4 Environmental Performance Outcome, Performance Standards and Measurement Criteria

Performance Outcome	Performance Standard	Measurement Criteria
No injury or mortality to marine fauna (cetaceans, whale sharks and marine turtles) as a result of vessel collision.	**PS 6.5.1.** OPGGS Act 2006 – s.280(2)(c); and EPBC Regulations – Part 8 Division 8.1 (r8.04 Vessels) Interacting with Cetaceans:	Vessel-cetacean-whale shark interaction procedures compliant with requirements outlined in EPBC Regulations Part 8 Division 8.1 (r8.04); exceptions noted in vessel logs.

Performance Outcome	Performance Standard	Measurement Criteria
	Vessel will not knowingly travel greater than 6 knots within 300 m (0.16 nm) of a whale shark and 150 m (0.05 nm) of a dolphin in the Caution Zone. Vessel will not knowingly approach closer than 100 m (0.05 nm) of a whale/whale shark and 50 m (0.027 nm) for a dolphin. A bridge watchkeeper will keep look out for cetaceans, whale sharks and turtles during vessel movements in the Permit Area. If sighted near the path of the vessel, the vessel shall gradually divert to avoid it, or slow down to idling speed, if safe and within the vessel's capability. Sightings of marine fauna (cetaceans, whale sharks and marine turtles) will be recorded and reported to the Vessel Master.	Vessel Log demonstrates bridge watchkeeper on lookout for cetaceans, whale sharks and marine turtles during vessel movements in the Permit Area. Records demonstrate sightings of marine fauna (cetaceans, whale sharks and marine turtles) recorded and reported to Vessel Master.
	PS 6.5.2. Environmental awareness briefing provided to marine crew prior to activities that includes marine fauna interaction requirements.	Signed environmental awareness briefing attendance records demonstrate that marine crews have been informed of marine fauna sighting and recording requirements.
	PS 6.5.3. Sightings of cetaceans, whale sharks and marine turtles will be recorded and reported.	Marine fauna sighting datasheets maintained.
		Summary of cetacean and whale shark sightings for reporting period submitted biannually to DoE.
	PS 6.5.4. **Two dedicated Marine Fauna Observers (MFO) to be stationed aboard vessel**	MFO Training Records Marine fauna sighting datasheets maintained. Vessel logbooks.

7.4 DROPPED OBJECTS

Seabed disturbance can result from the accidental release of an object overboard from the vessel during the survey. Dropped objects can occur (albeit highly unlikely) through unfastening of objects on the vessel deck or through any lifting operation onboard the vessel.

The direct impact to the seabed from a dropped object would be restricted to within the Operational Area. Planned events resulting in seabed disturbance are discussed in previous Section 6.5.

7.4.1 Potential Impacts

In the event of a dropped object overboard there would be localised disturbance to the seabed, potentially resulting in the loss of or change in benthic habitat and associated communities. Potential impacts to the seabed benthos would be restricted to that which lies in the immediate footprint of the dropped object. The area of the seabed potentially affected is estimated to be less than 10 m^2. The severity of the impact to benthic communities/habitat will be dependent on the density of biota, the sensitivity of biota to the disturbance and the recovery potential of the benthic communities affected by the dropped object.

The Permit Area lies within the Exmouth Plateau of the Carnarvon Basin. The sediments on the Exmouth Plateau are primarily muddy sand and sandy mud (Baker *et al*., 2008[45]). Seabed surveys undertaken in Permit Area WA-390-P (which WA-70-R falls within) reported the seabed typically consists of a homogenous substrate of biogenic calcareous ooze typical of similar habitats found at these depths throughout the NWS region, with habitat and assemblages well represented in the region and of low conservation value (RPS, 2012[46]). No rare, endangered, isolated species or habitats of significance were present within the Permit Area. The soft sediments were found to contain infauna and macro-invertebrates typical of the habitats in these depths on the NWS (RPS, 2012[47]).

The fauna typically have a low sensitivity to physical disturbance compared to, for example, sessile epifaunal filter feeders such as sponges or octocorals, and generally display high fecundity rates and recovery rates following physical disturbance. Recovery would occur within weeks by recruitment by planktonic larvae but is most likely to occur through the migration of adults into disturbed areas, either by active migration or passive transport from adjacent undisturbed areas (Savidge and Taghon, 1988[48]).

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45 Baker, C., Potter, A., Tran, M. & Heap, A.D. (2008). Geomorphology and sedimentology of the Northwest Marine Region of Australia. Geoscience Australia, Record 2008/07. Geoscience Australia, Canberra. http://www.environment.gov.au/system/files/resources/d9391818-9d75-4651-9f43-0f4f32415153/files/nw-geomorphology.pdf. Accessed October 2014.

46 Op cit 6.

47 Op cit 6.

48 Savidge, W.B. and Taghon, G.L. (1988). Passive and active components of colonization following two types of disturbance on intertidal sandflat. Journal of Exp. Mar. Bio. Ecol., 115: 137-155.

The Exmouth Plateau Key Ecological Feature (KEF) overlaps with the Permit Areas. The Exmouth Plateau KEF is a regionally and nationally unique deep-sea plateau that may modify the flow of deep waters, generating internal tides and may contribute to upwelling of nutrients, thus serving an important ecological role. Given the extent of the potential seabed disturbance (10 m^2) in relation to the Exmouth Plateau (~5,000 km^2) (Baker *et al*., 2008[49]) and recovery by active recruitment occurring within weeks, the impact is considered to be minor.

Overall, the likelihood of dropped objects occurring is considered 'unlikely' and the severity of the impact is 'slight'. As such, the unmitigated risk with standard controls in place is assessed as 'low'.

7.4.2 ALARP Demonstration

A summary of the ALARP assessment undertaken for the risks and impacts associated with dropped object is presented in Table 7-12. This process was completed as outlined in Section 5.2.1 and included consideration of existing standard industry controls, consideration of additional controls, and acceptance or justification if controls were considered not to be practicable. The result of this ALARP assessment contributes to the overall acceptability of the risks and impacts.

Table 7-12: ALARP assessment for dropped objects

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
Existing Controls				
Eliminate	N/A			
Substitute	N/A			
Engineer	N/A			
Separate	N/A			
Administrate	All lifts to be completed in accordance with the Contractor procedures.	A	Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.6.1**
	All lifting equipment will be certified, is regularly inspected/ maintained and will be used by crew trained in task required.	A	Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.6.2**
	Records of any equipment lost overboard completed.	A	Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.6.3**

[49] Op cit 45.

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
	Recovery of dropped objects where practicable and safe to do so.	A	Control is feasible, standard practice with benefits outweighing any cost sacrifice.	**PS 6.6.3**
Pollution Control	N/A			
Additional Controls				
Eliminate	Do not conduct the survey	R	NOPSEMA have requested the survey as part of the WOMP (Section 1.5.2.2)	

7.4.2.1 ALARP Summary

Lifting operations may be required onboard the vessel, other than safe handling procedures, no other management controls are considered necessary for the prevention of objects being dropped. Given the minor effects of seabed disturbance due to the lack of sensitive seabed features in the Permit Areas, the predicted rapid recovery of the benthic environment following disturbance and the unlikely occurrence of any dropped objects, the risk and impact of dropped objects is considered to be ALARP.

7.4.3 Acceptability

Lifting activities will be performed as per standard contractor procedures in place for the specific activity which are standard procedures typical during offshore petroleum exploration operations elsewhere and in Australia. Through the implementation of the proposed management controls, the risk of any objects being accidentally dropped overboard is reduced to a level that is considered acceptable.

The impact resulting from dropped objects will be localised and temporary. No other reasonably practicable alternative control measures have been identified. Western Gas therefore considers the proposed control measures to be effective in reducing the risk and consequence of dropped objects to an acceptable level.

Acceptability Statement Summary		
Consideration	**Acceptability Statement**	**Acceptability**
Principles of ESD	The activity will not contravene the Principles of ESD, based on: • Risks have been assessed using the Western Gas Risk Matrix, which considers duration and extent of impacts • Residual environmental risk of unplanned events is evaluated as low (Acceptable) and has been demonstrated ALARP • Risks will not affect biological diversity or ecological integrity.	✓
Internal Context	The activity (and associated potential impacts and risks) is consistent with Western Gas corporate policies, standards and procedures.	✓

Acceptability Statement Summary		
Consideration	**Acceptability Statement**	**Acceptability**
External Context	No stakeholder objections or claims related to the activity (and associated potential risks and impacts) have been received	✓
Other Requirements	The activity (and associated potential risks and impacts to the environment) is consistent with relevant legislation, industry standards and guidelines, offshore practice or benchmarking.	✓

7.4.4 Environmental Performance Outcome, Performance Standards and Measurement Criteria

Performance Outcome	Performance Standard	Measurement Criteria
No objects dropped into the marine environment during the survey.	**PS 6.6.1.** All lifts to be completed in accordance with the contractor procedures.	Completed Permit to Work (where applicable) or JSA in line with contractor procedures.
	PS 6.6.2. All lifting equipment will be certified, is regularly inspected/maintained and will be used by crew trained in task required.	Lifting equipment certification valid and current.
		Completed Permit to Work (where applicable) or JSA in line with contractor procedures.
	PS 6.6.3. Records of any equipment lost overboard completed.	Incident log records any objects lost overboard.
		Document of dropped object retrieval.

7.5 INTERACTION WITH OTHER MARINE USERS (WELLHEADS LEFT IN-SITU)

Unplanned interactions with other marine users may occur as a result of the wellheads being temporarily or permanently left in-situ.

The physical presence of the wellheads in-situ may interfere with third-party activities including:

- Current and future commercial fishing activities (accidental damage to trawling equipment);
- Future oil and gas activities that may occur in the area;
- Future shipping activities.

There are no current recognised major shipping routes within the vicinity of the operational area; or any current oil and gas activities within the permit.

Commercial shipping fairways are established by the Australian Maritime Safety Authority (AMSA) and any alerts to changes or hazards within these fairways are managed by 'Notice to Mariners'. The shipping routes that intersect the Permit Areas (Figure 4-5) comes within 5 km of Snapshot-1 and 3 km of Glenloth-1.

7.5.1 Potential Impacts

Potential receptors that may be impacted by the wellheads being left in-situ include:

- Commercial Fisheries;
- Petroleum Industry;
- Shipping Industry.

7.5.1.1 Commercial Fisheries

Fisheries which may be active within the vicinity of the operational area include the Western Deepwater Trawl Fishery. These fisheries use trawling methods hence, the wellheads may represent a trawl net snagging hazard. The NWST Fishery is within the EMBA however, their boundary does not allow them to fish west of the Northwest Cape, therefore there are no active trawling efforts within the Operational Area.

WDTF has low current levels of activity; since 2004–05, 1–3 vessels have been active in the fishery, and only one vessel was active in the fishery in 2020–21 (Patterson et al., 2022). The Operational Area represents a very small percentage of the total management area for the fishery. Oceanographic data for the region indicates there are generally southward moving surface waters with a northward moving subsurface current (DEWHA, 2007) which would make demersal trawling at the depth of the wellhead challenging in terms of maintaining gear symmetry and stability. Additionally, peak wind and wave conditions registered through summer would make trawling difficult for smaller vessels.

The trawlers are equipped with modern wheelhouse electronics including GPS plotters. GPS plotters accurately show the vessel position relative to marked seabed obstacles, such as the wellhead, and enable operators to safely navigate around these obstacles.

Trawl operators have numerous risk mitigation options available to them which either reduce interaction probability or harm level (e.g. modern wheelhouse electronics, vessel safety management systems, AMSA trawler hook-up safety procedures/guidelines, winch tension release mechanisms, hydroacoustic trawl monitoring systems, appropriate breaking load components on trawl gear).

Western Gas consulted with the WDT Fishery and their representative bodies based on the ABARES data showing fishing activity to the south of the Operational Area. Previous consultation conducted by Western Gas with potentially affected fisheries identified that no active commercial state managed fishery is active in deeper than 1000m water depth. The consultation conducted with potential affected commercial fisheries for this EP has not raised any objections or claims (Section 10).

As part of their EP development for the Calthorpe-1 wellhead abandonment, Woodside engaged the Australian Maritime College (AMC) to undertake an independent study on the potential impacts of leaving the Calthorpe-1 wellhead in situ (AMC, 2022, in Woodside, 2022b) to conservatively inform the risk for commercial fishers. The study found current impacts to WDTF were low based on water depth (824 m at the Calthorpe-1 wellhead, compared to water depths between 1,116 and 1,131 m for the wellheads covered by this EP), low overall effort historically, physical challenges of trawling at depth, and the controls used by trawlers to reduce the risk of snagging). Whilst fishing effort in the WDTF is currently low, there is a potential for this to increase in the future. The AMC study considered a tenfold increase in activity when considering the future outlook; however, found that the potential for interaction remained low.

It is considered very unlikely that future commercial fishing activities will occur within the vicinity of the Operational Area, based on the current levels of activity and water depth in the area. If vessels are operating in the area, the wellheads will pose a snag risk within a very small area of the fishery, noting that historically wellheads have been recorded caused fewer snags compared to pipelines and marine debris (Rouse, 2020).

7.5.1.2 Petroleum Industry

The presence of the wellhead on the seabed may interfere with future petroleum activities (e.g. interference with drilling rig placement). However, due to the small footprint of the wellhead (~3 x 3 m) and known presence of the wellhead any such interference would be insignificant.

7.5.1.3 Shipping Industry

The locations of the wellheads are not within the immediate vicinity of any major shipping routes. Interactions with shipping is unlikely currently, or in the future based on the water depth of the area (approximately 1,200 m) and the height of the wellheads in-situ (approximately 3 m).

7.5.2 ALARP Demonstration

A summary of the ALARP assessment undertaken for the risks and impacts associated with interaction with other marine users (wellheads in-situ) is presented in Table 7-13. This process was completed as outlined in Section 5.2.1 and included consideration of existing standard industry controls, consideration of additional controls, and acceptance or justification if controls were considered not to be practicable. The result of this ALARP assessment contributes to the overall acceptability of the risks and impacts.

Table 7-13: ALARP demonstration for Interaction with other marine users (wellheads in-situ)

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
Existing Controls				
Eliminate	N/A			
Substitute	N/A			
Engineering	Complete Removal of the Wellheads	R	As detailed in Section 3, leave in-situ is the preferred decommissioning outcome as it provides a benefit from an environmental, and technical perspective. Attempting to remove the wellhead would also introduce technical risks. As such, the costs to remove the wellhead are considered disproportionately high compared to the low risk of environmental effects of leaving the wellhead in-situ.	
	Wellhead Monitoring	R	There is no compelling reason for wellhead monitoring given the environmental assessment is predicting negligible impacts. The level of uncertainty with the associated environmental impacts assessment is considered low.	
	Wellhead Maintenance	R	There is no justification for maintaining the wellhead. The wellhead is not expected to be contaminated with any hazardous material. The well has been permanently plugged and abandoned. Hence the wellhead is of no use.	

Hierarchy	Controls	Accept/ Reject	Justification	Reference to Performance Standard
	Installation of over-trawlable structure	R	[Refer to Section 3 for Decommissioning Options assessment] As risks of snagging are low, measures to reduce snagging risk are not considered to offer sufficient net benefit compared to the associated costs, including the environmental costs of additional vessel usage etc.	
Administrative	Navigational Charting of Property	A	Wellheads are charted on AHO nautical charts so that marine users are aware of its location and can therefore avoid the wellheads if required thus reducing snag risk.	**PS 6.7.5** **PS 6.7.6**
	Notification to AHO, NPFI, and NPF of wellhead location once confirmed	A	AHO, NPFI, and NPF are made aware of the wellhead location once confirmed by the survey, so they can therefore avoid the wellhead if required thus reducing snag risk.	**PS 6.7.1** **PS 6.7.2** **PS 6.7.3** **PS 6.7.4**
	Environmental Protected (Sea Dumping) Act 1981 – Sea Dumping Permit	A	If required, a Sea Dumping Permit will be obtained.	**PS 5.1.1**
Pollution Control	N/A			
Additional Controls				
	None Identified			

7.5.2.1 ALARP Summary

The impact assessment and evaluation has identified a range of existing standard controls and additional controls that when implemented are considered to manage the impacts of the Activity on other users to an ALARP level. As no further alternative or additional reasonable control measures were identified and the potential consequences are ‘slight’, impacts from Interaction with other Marine Users (wellheads in-situ) are considered to be reduced to ALARP.

7.5.3 Acceptability

The area affected represents a relatively small area available for shipping and fishing activity. Given that the wells are not located in a designated shipping fairway, the absence of fishing activity in the vicinity of the area, the act of leaving wellheads in-situ does not pose any significant impact. Therefore

the potential consequences from Interaction with other Marine Users (wellheads in-situ) are considered to have a 'slight' impact. There will be no significant impacts other than short-term and localised displacement to commercial and to some local coastal marine vessel traffic. The impacts were considered acceptable with the industry standard controls implemented. On this basis, it is considered that the controls in place will manage the impacts of the physical presence of the vessel and well heads on other sea users to an acceptable level.

Acceptability Statement Summary		
Consideration	**Acceptability Statement**	**Acceptability**
Principles of ESD	The activity will not contravene the Principles of ESD, based on: • Risks have been assessed using the Western Gas Risk Matrix, which considers duration and extent of impacts • Residual environmental risk of unplanned events is evaluated as low (Acceptable) and has been demonstrated ALARP • Risks will not affect biological diversity or ecological integrity.	✓
Internal Context	The activity (and associated potential impacts and risks) is consistent with Western Gas corporate policies, standards and procedures.	✓
External Context	No stakeholder objections or claims related to the activity (and associated potential risks and impacts) have been received	✓
Other Requirements	The activity (and associated potential risks and impacts to the environment) is consistent with relevant legislation, industry standards and guidelines, offshore practice or benchmarking.	✓

7.5.4 Environmental Performance Outcome, Performance Standards and Measurement Criteria

Performance Outcome	Performance Standard	Measurement Criteria
Reduce impacts on other marine users through the provision of information to relevant stakeholders such that they are able to plan for their activities and avoid unexpected interference	**PS 6.7.1** Western Gas will notify all relevant stakeholders listed or as revised of the relevant activity details prior to commencement, including activity timing, vessel movements, proposed cessation date and vessel details.	Western Gas correspondence to relevant stakeholders.
	PS 6.7.2 All correspondence with external stakeholders is recorded.	Saved consultation records.
	PS 6.7.3 Consultation Coordinator is contactable before, during and after completion of the planned activity to ensure stakeholder feedback is evaluated and considered during the operational activity phases.	Consultation Coordinator contact details provided to relevant persons in all correspondence.
	PS 6.7.4 Western Gas will not restrict commercial fishing access to the operational area and is committed to concurrent operations where safety of either vessel is not compromised.	Incident records show nil incidents of complaints of restrictions to commercial fishing access to the operational area and show nil incidents of vessel safety being compromised by concurrent operations.

Performance Outcome	Performance Standard	Measurement Criteria
	PS 6.7.5 Wellheads are charted on AHO nautical charts so that marine users are aware of its location and can therefore avoid the wellheads if required thus reducing snag risk.	Correspondence with AHO
	PS 6.7.6 Marine users will not be excluded from the area.	Consultation records.
	PS 6.7.7 AHO, NPFI, and NPF are made aware of the wellhead location once confirmed by the survey, so they can therefore avoid the wellhead if required thus reducing snag risk.	Stakeholder correspondence with AHO, NPFI, and NPF once wellhead location is confirmed

8 HYDROCARBON POLLUTION EMERGENCY RESPONSE

Division 2.3 - Contents of an Environment Plan

14(8)E The implementation strategy must include information demonstrating that the response arrangements in the oil pollution emergency plan are consistent with the national system for oil pollution preparedness and response.

As required by Regulation 14(8AA) of the OPGGS (Environment) Regulations, Western Gas has prepared the Western Gas WA-474-P, WA-70-R Abandoned and Suspended Wells Oil Pollution Emergency Plan (WG-EHS-PLN-002). The OPEP is the primary reference document and key control measure to be implemented in the event of an oil spill during the survey and has been developed as a formal means of establishing the processes and procedures to ensure that Western Gas maintains a constant vigilance and readiness to prevent and, where required, respond to and effectively manage oil spill incidents that may occur during the survey. The OPEP has been developed to be compliant with the OPGGS (Environment) Regulations. This section provides the basis for developing the OPEP.

AMSA is the nominated Control Agency for all spills from vessels in Commonwealth Waters as per the NatPlan (AMSA, 2020). Western Gas will undertake immediate response actions until AMSA is able to assume control of the required spill response.

8.1 SOURCE OF RISK

This EP has identified all credible and worst-case hydrocarbon spill scenarios as:

- Level 2/3: Vessel collision resulting in a ruptured fuel tank releasing 1,000 m^3 of MDO (refer to Section 7.1).
- Level 1: Minor spill onboard of 160 litres of hydraulic fluids or chemicals (refer to Section 7.2).

8.2 PRELIMINARY NET ENVIRONMENTAL BENEFIT ANALYSIS (NEBA) OF RESPONSE STRATEGY OPTIONS

The overall aim of a spill response is to mitigate further damage to the environment. There are numerous spill response options available; however, not all may be effective to meet the aim to protect the environment. This section provides an overview of the available oil spill response strategies along with the preliminary net environmental benefit analysis (NEBA) of each strategy as to their applicability to the credible and worst-case spill scenarios that could occur during the survey (Table 8-1). The NEBA takes into account several criteria including its benefit(s), associated environmental impacts and risks and the operational/functional constraints before the applicability is decided. Once applicability is determined, the response is assessed to evaluate appropriateness as a primary or secondary response. A justification is included on the decision making of each the available strategies.

The focus of the NEBA is to understand the consequences of 'no action' and to select an oil spill response strategy that delivered a net environmental benefit. The NEBA methodology is to:

- List the response strategies available.
- Identify the benefit, environmental impact and operational challenge of each response strategy.
- Evaluate the viability of each response strategy in a particular credible -worst-case scenario.
- Identify all the viable strategies for each credible scenario.
- Formulate options of different strategy combinations.
- Compare these options and select the preferred option.

The preferred option is formulated as follows:

- Primary response strategies will be used and applied as soon as possible in the event of a spill.
- Secondary response strategies are only applied as needed when practical.
- Not applicable (N/A) response strategies are options that will not be used because of a lack of net environmental benefit.

In the event of an accidental hydrocarbon spill, operational NEBAs will be regularly undertaken to evaluate spill response options that have a net environmental benefit. Hence, the combination of spill response options and implementation characteristics of each response option will evolve over time as conditions change on the basis of operational NEBAs.

Table 8-1: Preliminary NEBA of response options for hydrocarbon spills

Spill Response Strategy	Overview of Environmental Benefits	Associated Environmental Risks/ Impacts	Functional/Operational Constraints	Response Applicability (relative to the 'Activity')		Primary or Secondary Response	Justification Note
Source Control – Vessel Spill	Limits and/ or prevents further release of diesel to the marine environment (e.g., initiating emergency shutdown; transfer content from leaking tank to another). Reduces potential water pollution and impact to other sensitive receptors.	No significant impacts.	Health and safety considerations (i.e. where safety of personnel is the priority) may delay implementation under certain circumstances.	Level 1	Yes	Primary	Source control will always be attempted as the immediate primary response in order to halt further release of hydrocarbons to the marine environment from vessel-based spills.
				Level 2/3	Yes	Primary	
Monitor and Evaluate (Operational Monitoring)	Constant monitoring and evaluation is required for real-time decision making during a spill event. This mandatory primary response strategy provides identification of emerging risks to sensitive receptors; information for response planning and assessment of effectiveness of response actions.	Risks/ impacts from operations of monitoring vessels and aircraft (e.g. liquid waste, air emissions from fuel usage, noise, marine fauna interaction, interference with other users, collisions, etc.).	Visual observation activities at night or during poor weather restricted. Stringent safety management requirements for aerial and marine operations employed. Coordination of multiple vessels within limited area.	Level 1	Yes	Primary	Essential surveillance activities ensure constant monitoring and evaluation of the spill event. This response primary response strategy will be implemented in all spill situations at various scales dependent on the nature and scale of the spill.
				Level 2/3	Yes	Primary	
Dispersant Application (Surface) – via Aerial and Vessel Applications	Accelerates the break-up of surface hydrocarbons by reducing the oil-water interfacial tension so that hydrocarbons on the surface become entrained within the water column and disperse via subsurface currents (note reduces but does not eliminate impacts). Potential for high efficacy (75-85%) on surface hydrocarbons (for hydrocarbons amenable to	Discharge of dispersant into environment. Adds chemical to environment when spill is not likely to impact high or extreme environment receptors. Risks/ impacts from operation of vessel and aircraft to support application of dispersant (e.g. liquid waste, air emissions from fuel usage, noise, marine fauna	Dispersant application for diesel spills not appropriate as this hydrocarbon spreads and weathers rapidly such that window for application is less than mobilisation time. Not suitable for hydrocarbons which are non-persistent and highly evaporative such as diesel. Cannot be applied in high wind conditions. Vessel application has a	Level 1	No	Reject	Not applicable for any spill tier. Not applicable for Level 1 and Level 2/3 spills as dispersant are not suitable on hydrocarbon types, no predicted shoreline contact at adopted thresholds, diesel will disperse quickly and naturally.
				Level 2/3	No	Reject	

Spill Response Strategy	Overview of Environmental Benefits	Associated Environmental Risks/ Impacts	Functional/Operational Constraints	Response Applicability (relative to the 'Activity')		Primary or Secondary Response	Justification Note
	dispersant use) when applied within first 24 hours of spill. The trajectory of subsurface dispersed hydrocarbons trajectory influenced only by ocean currents, removing the surface wind component. Accelerates the break-up of surface hydrocarbons reducing potential impacts to surface receptors (e.g. seabirds) and shoreline receptors (e.g. mangroves). Reduction in hydrocarbon waste.	interaction, interference with other users, collisions, etc.). No removal of hydrocarbons from environment. Increased concentration of subsurface hydrocarbons in the water column.	wider range of suitable weather compared to aerial application. Supply chain of dispersant could limit productivity. Requires clear area with no simultaneous operations.				
Containment and Recovery	Contains the spill as close as possible to the spill source. Recovery enables the spread of surface hydrocarbons to be reduced, thereby reducing the risk of impact to sensitive receptors. Removal of hydrocarbons from the marine environment.	Risks/ impacts from operation of vessel-based containment and recovery activities (e.g. liquid waste, air emissions from fuel usage, noise, marine fauna interaction, interference with other users, collisions, etc.). Equipment and labour intensive. Waste disposal of recovered condensate. Cleaning and disposal of contamination from booms and response vessels.	This strategy requires relatively calm conditions with currents speeds <0.5 m/s (<~1 knot). Such conditions are not common. Limited operability given typical weather conditions. Requires slick concentrations >10 g/m^2, hence not suitable for Level 1 and Level 2/3 because of relatively small surface areas predicted with these concentrations.	Level 1	No	Reject	Not applicable for Level 1 and 2 spills given the evaporative and dispersive nature of these hydrocarbons. Weather conditions unlikely to permit efficient offshore containment using booms, weirs and skimmers.
				Level 2/3	No	Reject	No predicted shoreline contact.
Shoreline Protection and Deflection	If modelling predicts impacts to sensitive receptors, then near-shoreline deployment of booming equipment can be undertaken to protect target receptors and to deflect to lower priority areas.	Risks/ impacts from operation of vessel-based protection and deflection activities (e.g. liquid waste, air emissions from fuel usage, noise, marine fauna interaction,	Wind and surface currents are key constraint in the deployment and operations of booms in nearshore coastal environments. Considerable resources and logistics support needed (i.e. equipment and labour intensive). Site constraints such as breaking waves, etc.	Level 1	No	Reject	Not applicable for Level 1 and Level 2/3 spills as no shoreline contact is predicted.
				Level 2/3	No	Reject	Not applicable for Level 1 and 2 spills given the evaporative and

Spill Response Strategy	Overview of Environmental Benefits	Associated Environmental Risks/ Impacts	Functional/Operational Constraints	Response Applicability (relative to the 'Activity')		Primary or Secondary Response	Justification Note
		interference with other users, collisions, etc.). Impacts from securing booms on shallow nearshore benthic environments. Generation of waste from booms and disposal of recovered condensate and water. Potential impacts to intertidal areas if deflected to low sensitivity shorelines.					dispersive nature of these hydrocarbons.
Mechanical Dispersion	Enhances dispersion and break-up of surface hydrocarbons to facilitate natural degradation processes.	Increased concentration subsurface hydrocarbons in the water column. Risks/ impacts from operation of vessel mechanical dispersion activities (e.g. liquid waste, air emissions from fuel usage, noise, marine fauna interaction, interference with other users, collisions, etc.).	Offshore vessels are designed not to cavitate, so not efficient at breaking up hydrocarbon films. Small hydrocarbon droplet size required otherwise material resurfaces, hence for some hydrocarbon types limited benefit unless combined with dispersant application. Wind speeds above 20 knots provide natural dispersion, making this method redundant. Cannot be performed where high concentrations of vapour occur, which is possible in proximity to the source.	Level 1	No	Reject	Not applicable for Level 1 and Level 2/3 spills given the evaporative and dispersive nature of these hydrocarbons.
				Level 2/3	No	Reject	
***In Situ* Burning**	Combustion of hydrocarbons on sea surface reduces the hydrocarbon volume remaining on the surface. Generates modest waste products for recovery and disposal.			Level 1	No	Reject	Not applicable to Level 1 or 2 spills as high evaporation/volatilisation of diesel render in situ burning to not be desirable/required. The experience, equipment and expertise

Spill Response Strategy	Overview of Environmental Benefits	Associated Environmental Risks/ Impacts	Functional/Operational Constraints	Response Applicability (relative to the 'Activity')		Primary or Secondary Response	Justification Note
		Generates highly visible black smoke, particulates and atmospheric emissions including greenhouse gases. Incomplete combustion residues may be toxicologically damaging and could be ingested by marine. Burn residues can also physically impact marine fauna and flora through coating of gills, feathers and fur, etc. Particulates (smoke) in air with associated health risks. Risks/ impacts from operation of vessel-based in situ burning activities (e.g. liquid waste, air emissions from fuel usage, noise, marine fauna interaction, interference with other users, collisions, etc.).	Need a thick hydrocarbon film for ignition/ combustion (5 to 10 mm). Availability of fireproof booms. Never been carried out in Australia, limited experience available nationally. Ignition of the hydrocarbon requires specialist training and equipment. Diesel not suitable for burning. Wind conditions a key constraint as calm conditions required for safe and controlled burning.	Level 2/3	No	Reject	are not readily available in Australia. Safety considerations of in situ burning due to elevated flammability of diesel.
Shoreline Clean-Up	Hydrocarbon removal from shorelines to minimise impacts to marine fauna that may use shorelines: Reduced visual impact. Reduces risk of marine fauna contact and smothering effects. Reduce risk of re-entrainment of hydrocarbons from shoreline back into marine environment.	Potential shoreline disturbance to sensitive habitats (e.g. turtle nesting beaches) from clean-up operations (trampling by response personnel and equipment) can outweigh environmental benefits in some circumstances. Waste from removal of contaminated sediment from beaches and impacts to associated flora and fauna during removal activities. Temporary storage of waste has the potential to cause contamination to areas not originally contacted by the spill. Presence of response personnel, equipment and facilities will increase the risk of hydrocarbon cross contamination from an impacted site to a non-impacted site.	Labour intensive, significant logistics including waste management considerations required. Personnel management and coordination to reduce environmental and safety risks/impacts. Applicability is influenced by shoreline characteristics (substrate type, beach type, exposure to wave action, biological, social, heritage or economic resources, amount of hydrocarbon present) and access to site.	Level 1	No	Reject	Not applicable for Level 1 and Level 2/3 diesel spills as no predicted shoreline contact.
				Level 2/3	No	Reject	

Spill Response Strategy	Overview of Environmental Benefits	Associated Environmental Risks/ Impacts	Functional/Operational Constraints	Response Applicability (relative to the 'Activity')		Primary or Secondary Response	Justification Note
Scientific Monitoring	Primary tool for determining the extent, severity and persistence of environmental impacts and subsequent recovery from hydrocarbon spills	Risks/ impacts from vessel and aerial scientific monitoring activities (e.g. liquid waste, air emissions from fuel usage, noise, marine fauna interaction, interference with other users, collisions, etc.).	Weather constraints.	Level 1	No	Reject	For Level 2/3 spills, Study S1 (Marine Waters) and Study S2 (Hydrocarbons in Representative Commercial and Recreational Fish) will be initiated. Not applicable for Level 1 due to the spill volume and chance of contact with the marine environment.
				Level 2/3	Yes	Primary	
Oiled Wildlife Response	Reduce impacts to wildlife (e.g. onshore exclusion barriers, hazing, pre-emptive capture). Collection and rehabilitation to treat oiled fauna and return to similar suitable habitat.	Risks/ impacts from operation of vessel-based oiled wildlife response activities (e.g. liquid waste, air emissions from fuel usage, noise, marine fauna interaction, interference with other users, collisions, etc.). During hazing could accidentally drive wildlife into spills or separate groups/individuals (e.g. parents/offspring pairs). Potential risk of fauna injury and inappropriate field collection/ handling during pre-emptive capture and post-oiled collection. Rehabilitation activities could result in inadequate/ inappropriate animal husbandry leading to stress/ injury/ death. Inappropriate fauna relocation points leading to disorientation/ stress.	Labour intensive and significant logistics considerations. Wind is a key constraint, calm seas and ideal conditions are considered necessary for capture operations. Weather constraints for use of aerial observation/ tracking fauna. Navigation of multiple vessels within a small area. Availability of suitable space/ location in township for staging area and rehabilitation and fauna treatment areas. Utilisation of local skilled fauna handlers and veterinarians for treatment of oiled wildlife.	Level 1	No	Reject	Not applicable for Level 1 spills as spill volume, offshore location, and high evaporative losses of diesel will have limited impacts to wildlife. Will be implemented as a secondary response option for a Level 2/3 spill should the MES data suggest that it may be required.
				Level 2/3	Yes	Secondary	
				Level 1	Yes	Primary	

Spill Response Strategy	Overview of Environmental Benefits	Associated Environmental Risks/ Impacts	Functional/Operational Constraints	Response Applicability (relative to the 'Activity')		Primary or Secondary Response	Justification Note
Waste Management	Appropriate management of hydrocarbon-contaminated waste to reduce the potential for further contamination of the environment if not disposed of correctly.	Temporary storage and/or the inadequate disposal of waste has the potential to cause contamination to areas not originally contacted by the spill. Risks / impacts from transport of wastes via vessels and/or land vehicle (air emissions from fuel usage, noise, fauna interaction, interference with other users, collisions, etc.).	Appropriate waste receptacles required for potentially large volumes of contaminated waste.	Level 2/3	Yes	Primary	Any hydrocarbon / hazardous contaminated wastes generated during a spill will be managed appropriately.

8.3 MANAGEMENT OF RESPONSE STRATEGIES

8.3.1 Supporting Documents

8.3.1.1 Oil Pollution Emergency Plan (OPEP)

In the event of a Level 2/3 spill, the Western Gas WA-474-P, WA-70-R Suspended Wells Oil Pollution Emergency Plan (WG-EHS-PLN-002) will be implemented in the first instance. Supporting documents will be utilised to support the OPEP including the Western Gas Survey Emergency Response Plan.

8.3.1.2 National Plan for Maritime Environmental Emergencies (NATPLAN)

Outlines the national arrangements, policies and principles for responding to maritime emergencies. Details that the Australian Maritime Safety Authority (AMSA) has jurisdiction and is the Control Agency for vessel spills which affect Commonwealth waters.

8.3.1.3 Oil Spill Response Atlas (OSRA)

The Department of Transport Maritime Oil Spill Response Atlas (OSRA) will be utilised as a guide by the IMT during operational NEBAs to inform appropriate locations to prioritise implementation of response measures.

8.3.1.4 Incident Action Plan

The Western Gas IMT will develop an Incident Action Plan to identify response objectives, strategies and tasks for the proceeding 24 hr period.

8.4 HAZARDS ASSOCIATED WITH SPILL RESPONSE OPERATIONS

While spill response activities are intended to reduce the potential environmental impacts from a hydrocarbon spill, they can exacerbate or cause further environmental impact. Poorly planned, informed and coordinated response activities can result in poor decisions. In order to respond effectively to a hydrocarbon spill the following must be considered:

- Feasibility of the response option: time, availability, cost, benefit, local conditions.
- Impact of utilising the response option.

Natural processes, evaporation and decay (biodegradation and photo-oxidation) will mitigate a substantial proportion of spilled hydrocarbons. These natural recovery processes are likely to be the de facto primary response measure that will attenuate spill impacts in the event of a spill incident for this Activity due to the relatively modest nature and scale of the predicted impacts (Section 6.1).

Nonetheless, Western Gas accepts a degree of uncertainty with regards to these predictions and will be prepared to mobilise resources to respond to a hydrocarbon spill to the marine environment.

The most suitable response strategies have been identified for the predicted nature and scale of the spill incidents associated with this Activity. The OPEP provides for the implementation of strategies in the event of a spill.

8.4.1 Summary of Selected Response Options

The selected spill response options applicable for the Activity were based on the preliminary NEBA (Table 8-1), which are:

- Primary responses
  - Source Control – Vessel Deck Spills (Level 1) and Vessel Tank Rupture Spill (Level 2/3)
  - Monitor and Evaluate (Operational Monitoring) (All Tiers)
  - Scientific Monitoring (Level 2/3)
  - Waste Management (Level 1 and Level 2/3)
- Secondary responses
  - Oiled Wildlife Response (Level 2/3)

8.4.1.1 Source Control – Hydrocarbon Spills (Level 1)

In the event of a Level 1 spill onboard the vessel, source control will be managed by isolating hoses or turning off pumps where applicable and the spillage should be contained within a bunded area. The spill will then be cleaned-up with absorbent materials which are then contained for appropriate disposal. Refer to Section 3.3.3 in the OPEP for the source control plan for Level 1 spills.

8.4.1.2 Source Control – Vessel Tank Rupture Spill (Level 2/3)

If a vessel tank rupture occurs, then the following activities will be implemented to reduce impacts and to control the source of the spill:

- Reduction of the head (pressure) of liquid in the damaged fuel tank by dropping or pumping the tank contents into an alternative tank with spare capacity.
- Consideration of pumping water into the damaged tank to create a water layer that will serve as a barrier between the fuel and the marine environment.
- Consideration of transferring fuel from the leaking tank to other vessel(s).
- Consideration of adjusting the trim of the vessel to reduce fuel flow out of the ruptured tank.

Through immediate implementation of any of these controls a reduction (or cessation) the volume of hydrocarbons released to the marine environment will be immediately realised. Several factors may result in delays or failures to implement these control measures (e.g. inclement metocean conditions, large rupture, personnel injuries) resulting in complete loss of diesel from a fuel tank compartment into the marine environment (~1,000 m^3). Refer to Section 3.3.2 in the OPEP for the source control plan for Level 2/3 vessel tank rupture spills.

8.4.1.3 Monitor and Evaluate (All Tiers)

Monitoring and evaluation of the spill will commence immediately with the Activity's resources (survey vessel). The aim of this strategy is to maintain situational awareness, to inform the IMT to plan responses and to assess the effectiveness of response strategies. Monitor and evaluate tasks will include:

- Visual observation from the vessel
- Visual observation from aircraft (fixed wing or helicopter)
- Oil spill trajectory modelling forecasts
- Visual observation from vessels of opportunity if in the area and/or Western Gas contracted vessels
- Satellite tracking buoys

Direct observations will be undertaken from the vessel and aircraft to monitor the distribution of surface oil. Initial observations will be undertaken by the survey vessel at the incident area. Tracking buoys will be deployed to monitor the movement of the surface slick and verify and assist with oil spill trajectory modelling. Modelling will be commenced to predict the likely behaviour of the surface oil slick and inform response planning and may be supplemented by satellite imagery. Marine fauna (oiled and non-oiled) observations will be recorded. Refer to Section 3.4 in the OPEP for the monitor and evaluate plan.

8.5 POTENTIAL IMPACTS OF SPILL RESPONSE OPERATIONS

In the event that response activities are required, poorly planned or executed responses can result in:

- Disturbance to marine fauna and flora from increased vessel, aircraft and/or helicopter operations.
- Spreading of hydrocarbons further beyond the zone of contamination (e.g. secondary contamination due to hull contamination of response vessels).
- Inadequate surveillance leading to poor information and unforeseen impacts.

- Inappropriate response implemented and additional sensitive receptors impacted (e.g. shoreline clean-up for low loadings of highly weathered condensate).

Impacts associated with each of the selected response options are described next.

8.5.1 Vessel, Aircraft and Helicopter Operations

Most of the identified response strategies will be implemented primarily with the use of vessels and aircraft. The impacts and risks associated with vessel and aircraft operations have been assessed elsewhere in this EP for response options in the event of an unplanned hydrocarbon spill. but will generate a level of impact above that associated with the Activity. An increased level of impact could potentially occur during spill response from vessels and aircraft (due to the number required for a response, and the duration of the response) as described in:

- Disturbance to heritage values/sites (Section 6.3);
- Interference with other sea users (Section 0);
- Noise generation from vessels (Section 6.6);
- Emissions from exhaust gases from combustion (Section 6.7)
- Liquid discharges from vessels (Section 6.8);
- Solid waste from vessels (Section 6.9);
- Unplanned hydrocarbon spills from vessel collision, deck spills (Section 7.2);
- Vessel collisions, interaction and disturbance (to fauna) (Section 0); and
- Seabed disturbance due to dropped objects (Section 0).

The following activity is considered to not have material impacts:

- Light generation from vessels (Section 6.2).

8.5.2 Source Control

To control the source of hydrocarbons spilled to the marine environment, every effort will be taken. This will not result in further impact to the marine environment in the event of a Level 1 or 2 spill as the activities will be undertaken on board the vessel in the case of a tank rupture or deck leak. Oily wastes generated will be disposed of in accordance with this EP with wastes disposed of onshore.

8.5.3 Monitor and Evaluate

No additional impacts are associated with this activity as it will be satellite and desktop based or vessel/aircraft based, in which case the associated impacts are already described above. Additional activities may include vessel-based monitoring during the operational and scientific monitoring which

could lead to an increase in the possibility of behavioural and/or physiological impacts on marine fauna and other vessel related impacts as described in this EP.

8.5.4 Mechanical Dispersion

Vessels will be utilised for this activity which could result in impacts as described for generic vessels above.

8.6 PRIORITISATION OF SENSITIVE LOCATIONS

The potential impacts from a spill on sensitive receptors is assessed in Section 7.1 and summarised in Table 7-7. In line with response strategy priorities (detailed in the OPEP) sensitive receptors were prioritised in the following order:

- Environmentally sensitive locations (habitat, cultural, flora/fauna);
- Commercial/ industrial resources/ properties/ and assets; and
- Recreational and human amenity resources.

The most sensitive receptors are deemed to be:

- Mangroves
- Submerged and Intertidal reefs;
- Foraging/nesting seabirds/shorebirds;
- Sandy beaches;
- Breeding marine mammals; and
- Tourism and fisheries.

8.7 SUMMARY NEBA

Table 8-2 provides a summary of the sensitive receptors, including priority receptors, found at each location and recommendations for implementation of the oil spill response strategies considered operationally viable for any spill scenario identified in Section 8.

8.8 UNMITIGATED RISK

The consequence of adverse impacts of oil spill response strategies is moderate and the likelihood highly unlikely due to the known benefits and assessment of each potential response strategy, resulting in an overall assessment of low.

Table 8-2: Summary of sensitive receptors, their location and assessment of oil spill response strategies

Sensitive receptor	OPEP response				
	Operational Area	Level 2/3 Spill EMBA	Source control	Monitor & evaluate	Mechanical Dispersion
Cetaceans	✓	✓	R	R	C
Sirenians	-	-	R	R	C
Marine reptiles	✓	✓	R	R	C
Seabirds	✓	✓	R	R	C
Fish (Sharks)	✓	✓	R	R	N/A
Fish spawning areas	✓	✓	R	R	C
Marine invertebrates	✓	✓	R	R	NA
Sandy beaches	-	-	R	R	C
Submerged reefs	-	-	R	R	N/A
Seagrass meadows	-	-	R	R	N/A
Mangroves	-	-	R	R	C
Commonwealth Marine Parks	-	✓	R	R	C
National and World Heritage	-	✓	R	R	C
Key Ecological Features (KEF)	✓	✓	R	R	C
Fisheries	✓	✓	R	R	C
Tourism (Coastal)	-	-	R	R	C
Shipping	✓	✓	R	R	C

Key:

✓ = receptor present

- = receptor not present

R= recommended

C= considered

NR = not recommended

N/A = not applicable

8.8.1 Environmental Performance

Control measures, environmental performance outcomes, standards and measurement criteria for each response strategy identified are included in the OPEP. In addition, control measures, performance outcomes, standards and measurement criteria controlling many vessel and aircraft environmental impacts have been previously detailed within this EP. Environmental performance for the implementation of the overall response strategy is summarised below with environmental performance outcomes, standards and measurement criteria.

Environmental Performance Outcome	Minimise impact to the environment from spills through implementation of this EP's hydrocarbon emergency pollution response strategy Maintain communication with relevant stakeholders throughout response	
Control Measure	**Performance standard**	**Measurement criteria**
OPEP	Provide IMT with clear directions on response strategies	Post-desktop exercise report
NEBA	NEBA provides input to the IAP planning process to achieve the most effective response	IAP Operational NEBA
Consultation undertaken with stakeholders potentially impacted by spill response activities and spill	IMT through media officer provide daily updates on status of response efforts and spill impact with liaison through DPIRD - Fisheries for provision of appropriate advice to fishery licence holders in the area	Website updates, consultation evidence (emails)

8.8.2 Residual Risk

By implementing the control measures listed above, the consequence of the negative impacts of oil spill response strategies is **minor** and the likelihood **highly unlikely**. As such, the overall impact is considered **low**.

8.8.3 ALARP

In the event of a hydrocarbon spill to the marine environment, the operational NEBA is a key tool by which the response strategies are developed. The NEBA includes all practicable spill response strategies and by assessing these identification of those with the best net environmental benefit for the circumstances at the time is a primary tool to reduce the environmental risk to ALARP during a spill. A preliminary NEBA has been conducted on the basis of the predicted worst case hydrocarbon spill extent and knowledge of existing sensitive receptors. The most appropriate spill response strategies have been selected based on this assessment, but this NEBA will be updated with real-time information to ensure that impacts are continually reduced to ALARP during a spill response.

The selection of spill response strategies and implementation of spill response plans will be performed in collaboration with spill response providers and statutory authorities as outlined in the OPEP. Agreements have been reached with those who would have a role in the event of a spill through communications and arrangements to ensure all are familiar with their roles and responsibilities. Prior to commencing the monitoring survey, the measures that Western Gas will have in place will indicate response preparedness in the event of any tier hydrocarbon spill with the ability to reduce impacts to ALARP.

8.8.4 Acceptability

All practicable means to prevent releases of hydrocarbons into the marine environment are being undertaken, and the activities are typical of offshore activities undertaken elsewhere and in Australian waters. The spill response options selected are based on the likely hydrocarbon characterisations, consultation with oil spill response providers and the known sensitivities and values that could be impacted. Every effort has been made to identify suitable spill response options and to assess the impacts and benefits associated with each of these. Western Gas is satisfied that the oil spill response measures in place are acceptable given the low probability of occurrence and the potential receptors impacted.

During the Activity, given the control measures listed for this event, it is considered that all practical control and mitigation measures will be implemented to reduce the risk to an acceptable level.

Acceptability	
The level of residual environmental risk associated with the activity are low on the risk matrix	Yes
The level of residual environment risk was assessed as being ALARP	Yes
The activity (and associated potential risks and impacts) is compliant with relevant legislation, industry standards/guidelines and corporate policies, standards and procedures specific to the operational environment	Yes

9 IMPLEMENTATION STRATEGY

Division 2.3 - Contents of an Environment Plan

14(1) The environment plan must contain an implementation strategy for the activity in accordance with this regulation.

14(10) The implementation strategy must comply with the Act, the regulations and any other environmental legislation applying to the activity

As required by Regulations 14(1) and 14(10) of the OPGGS (Environment) Regulations, Western Gas has prepared this implementation strategy for the design and execution of the Activity under the framework of Western Gas' Health, Safety and Environment Policy (WG-HSE-001) (Appendix A) and Health, Safety and Environment Management System (WG-HSE-002). To ensure Western Gas' environmental performance outcomes are achieved, contractors will be required to comply with all relevant requirements of Western Gas' Health, Safety and Environment Policy Statements and the commitments made in this EP.

Western Gas retains full and ultimate responsibility as the Titleholder of the activity and is responsible for ensuring that the environmental performance outcomes and standards outlined throughout this EP are adequately implemented. Work instructions, procedures and plans will be used for the Activity; these will be documented within Western Gas' and the contractors' systems and manuals, as well as documents written specifically for the Activity and bridging documents between Western Gas and contractor documents.

9.1 ACTIVITY ORGANISATIONAL STRUCTURE

Division 2.3 - Contents of an Environment Plan

14(4) The implementation strategy must establish a clear chain of command, setting out the roles and responsibilities of personnel in relation to the implementation, management and review of the environment plan including during emergencies or potential emergencies.

Figure 9-1 provides an overview of the relationship between Western Gas and contractor personnel in relation to implementation, management and review of this EP.

The survey contractor (Lead Contractor) is responsible to Western Gas, who has overall responsibility for the management of the survey activity to ensure that:

- Design and execution of the activities is in accordance with industry best practice and legislated standards;
- All regulatory approvals are obtained prior to activity commencement;

- Contractor has appropriate resources and equipment to undertake the survey and has appropriate systems in place to ensure that these activities are undertaken in accordance with all legislative requirements;
- The environmental impacts and risks of the activity are minimised and reduced to ALARP and environmental performance is monitored; and
- The direction of work and the monitoring and auditing of work by the contractor is undertaken in accordance with the accepted EP (this document).

Specific environmental roles and responsibilities are outlined in Figure 9-1. These will be communicated to all personnel involved in the activity. Western Gas retains full and ultimate responsibility as the Titleholder and is responsible for ensuring that the activities associated with the project are implemented in accordance with the EPOs outlined in this EP. As the Titleholder, Western Gas will enter into an agreement with the survey/vessel contractor(s) to provide the following ongoing services through this phase:

- Integrated Management System (IMS) (i.e., health, safety and environment) and support (resource) services; and
- Incident management capabilities associated with this activity.

Western Gas, survey contractor and vessel/vessel contractor(s) will undertake the activity as follows:

- Western Gas is the Titleholder for the permit, and is the Permit Operator;
- The relationship between the parties is governed by a Project Execution Plan (PEP) or similar, however the working relationship between the parties, both internal to them and externally, is seamless except where legislation requires otherwise;
- The survey contractor has principal responsibility for the design of the survey, engagement of sub-contractors including vessel provider, management of the contracting services and execution of the survey;
- The survey contractor will provide Western Gas with full technical and project management services;
- The vessel contractor is responsible for operating the vessel while under direction from the Survey Contractor and interfacing with Survey contractor at the operations level on the vessel;
- The vessel contractor is responsible for ensuring the safety of all personnel on board their respective vessel;

- The Survey Contractor is responsible for implementation of this EP (with Western Gas supervision);
- The vessel contractor is responsible providing site-based support to manage and contain emergency incidents including oil spills from the vessel;
- The Western Gas Project Offshore Representative will be the designated Western Gas representative on the vessel and will have a direct interface with the Western Gas Project Survey Manager.
- The Western Gas Project Survey Manager is responsible for the onshore management and coordination of support of emergency incidents in conjunction with the Survey Contractor; and

9.1.1 Contractor Management Systems

The planning, execution and coordination of the survey will be conducted under the Survey Contractor integrated project and HSE Management Systems, consistent with the requirements of this EP and aligned with the Western Gas overarching HSE Management Systems.

The Vessel Master has ultimate responsibility for their vessel and persons on board, including compliance with legal requirements and in situ control of emergency situations or incidents. Roles and responsibilities relating to emergency situations are documented in various locations such as station bills, the project-specific Incident Response Plan, OPEP and the vessel Shipboard Oil Pollution Emergency Plan (SOPEP).

9.2 ROLES AND RESPONSIBILITIES

The organisational structure for the activity consists of survey and vessel contractor personnel. The organisational structure for the activity is illustrated in Figure 9-1 while the environmental roles and responsibilities of key project team members are summarised in Table 9-1 and Table 9-2..

Implementation of the EP will occur on the vessel under the leadership of the Western Gas Project Offshore Representative. The Western Gas Project Survey Manager will have oversight of the performance of the program against the EP and other project plans and will initiate reviews and audits as required.

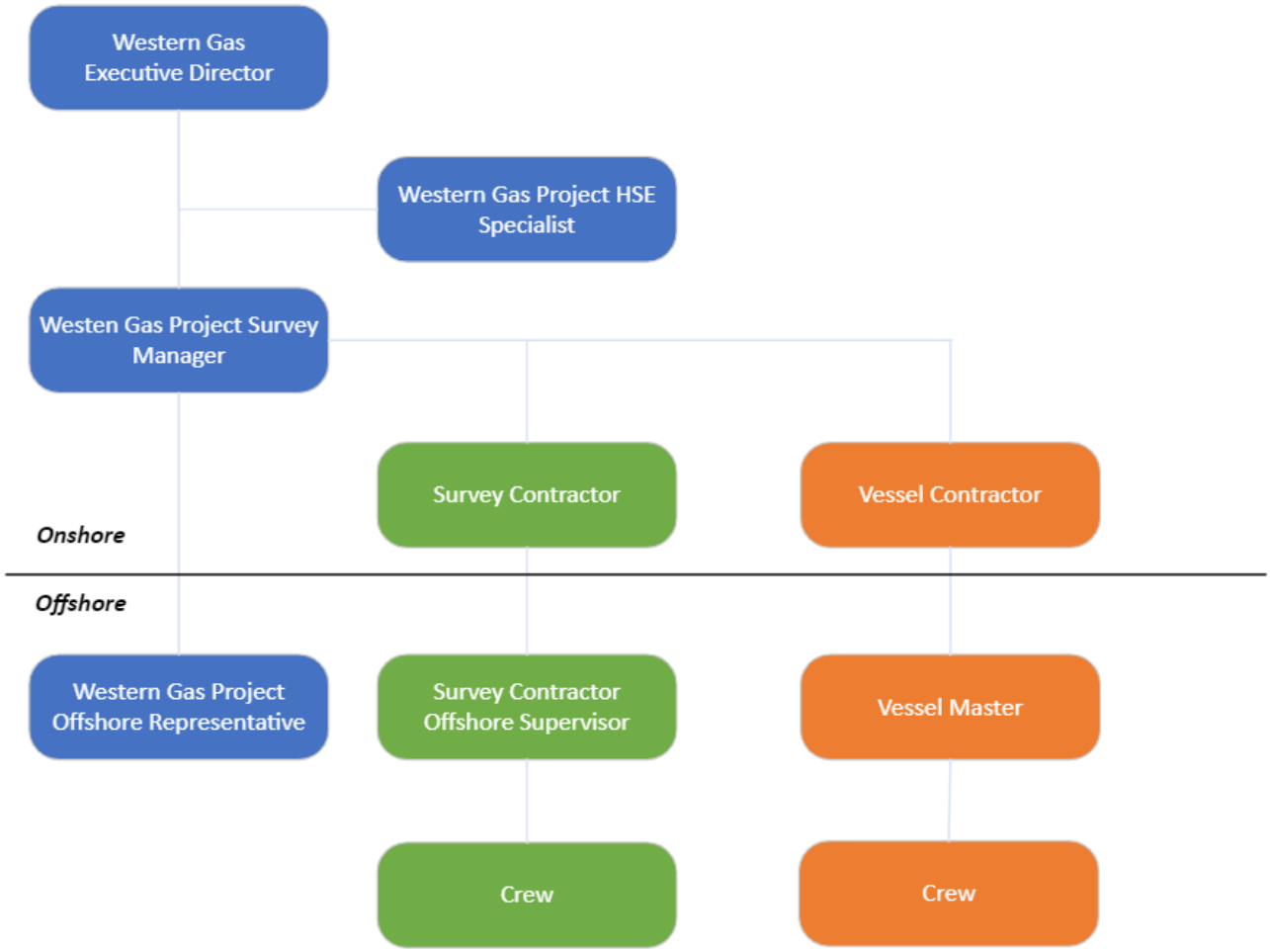

Figure 9-1: Key Western Gas and Contractor Personnel

The responsibilities of onshore personnel are outlined in Table 9-1 and Table 9-2.

Table 9-1: Onshore personnel roles and responsibilities

Role	Responsibility
Western Gas Executive Director	• Ensures Western Gas undertakes the Activity, provides resources e.g. offices and personnel, to ensure the Activity achieves the desired technical, commercial and HSE outcomes. • Performs routine liaison with NOPSEMA. • Owner of this EP and related WGC documents. • Maintains and manages revisions of the EP as necessary. • Maintains and manages revisions of the OPEP as necessary. • Ensures written records of assurance assessment for identified spill response contractors.
Western Gas Project Survey Manager	• Ensures that engaged contractors meet the requirements under the Western Gas HSE and Quality Management Systems. • Ensures personnel and resources are available for the survey to deliver the required technical, commercial and HSE outcomes. • Ensures that the survey is planned and executed in accordance with the Western Gas HSE Management System, accepted Environment Plan and regulatory requirements. • Responsible for ensuring that the commitments in this EP are implemented by Western Gas (e.g. through audit and inspection). • Liaises with Western Gas Executive Director on progress and performance of the survey. • Oversees the contractor selection and management and ensures contractors (vessel and survey operators) understand their HSE obligations and accepted EP controls. • Signs off reportable and recordable incident reports and end of activity report for NOPSEMA. • Forms part of the IMT.
Western Gas Project HSE Specialist	• Liaises with survey personnel and Western Gas Executive Director and Project Survey Manager on relevant matters detailed above, such as NOPSEMA reporting. • Provides HSE technical oversight. • Assists with revisions of the EP as necessary. • Supports preparation of environmental induction and vessel inspection information as required. • Assists with review, investigation and reporting of environmental incidents. • Supports stakeholder consultation undertaken as per the requirements of the EP. • Prepares and submits external regulatory reports required for the Activity, in line with environmental approval requirements and HSE incident reporting procedures. • Prepares and submits the Post-Survey Environmental Review Report.

Table 9-2: Offshore personnel roles and responsibilities

Role	Responsibility
Western Gas Project Offshore Representative	• Responsible on the vessel for ensuring that the commitments in this EP are implemented by contractors (e.g. through audit and inspection). • Offshore Western Gas focal point for communications between Western Gas and Survey Contractor Offshore Supervisor . • Review of Survey Contractors' initial inspection of the vessel (including evaluating compliance with EP commitments as documented in a commitment register, supported by Western Gas HSE Advisor (or delegate) as appropriate). • Participation in the crew project induction. • Daily oversight of operations in conjunction with the vessel management team. • Daily communications and reports back to the Western Gas Project Survey Manager. • Reports any potential or actual HSE incidents to the Western Gas Project Survey Manager. • Participates in the investigation of any HSE incidents.
Survey Contractor Offshore Supervisor	• Responsible for the delivery of the survey including instructing Vessel Master and other sub-contractors as to requirements to achieve the survey deliverables. • Implementation of Contractor HSE Management systems and controls relating to the Activity.
Vessel Master	• Ensures the safe execution of all vessel operations. • Overall responsibility for HSE management aboard the vessel. • Ensures that controls within the accepted environment plan to manage environment impacts and risks are implemented. • Reports (to Western Gas) any incidents/activities arising from vessel operations that are likely to have a negative impact on the performance outcomes detailed in this EP. Makes statutory incident reports as necessary. • Oversees offshore compliance with this EP, and any relevant statutory regulations. • Ensures that vessel procedures and systems comply with environmental performance outcomes, standards and measurement criteria, as outlined in this EP, and that contractor HSE management systems are observed. • Establish and maintain radio contact with other vessels in the Operational Area and adjacent waters.
Chief Engineer – Vessel	• Overall responsibility for operation and maintenance of engines, generators and other machinery aboard the vessel. • Ensure implementation of preventative maintenance systems (PMS) for all key machinery. • Responsibility for waste management systems dealing with sewage, grey water, putrescibles and bilge water.

9.2.1 Other Personnel

Other offshore and onshore Western Gas and contractors are required to:

- Fulfil any specific roles defined for them in the EP commitments register;
- Report any potential breach of EP commitments promptly to line management; and
- Form part of the IMT where appropriate; refer to OPEP for further detail on responsibilities in the event of an oil spill.

9.3 ENVIRONMENTAL MANAGEMENT SYSTEM

Division 2.3 - Contents of an Environment Plan

14 (3) The implementation strategy must contain a description of the environmental management system for the activity, including specific measures to be used to ensure that, for the duration of the activity:

- a the environmental impacts and risks of the activity continue to be identified and reduced to a level that is as low as reasonably practicable; and
- b control measures detailed in the environment plan are effective in reducing the environmental impacts and risks of the activity to as low as reasonably practicable and an acceptable level; and
- c environmental performance outcomes and standards set out in the environment plan are being met.

As required by Regulation 14(3) of the OPGGS (Environment) Regulations, Western Gas has prepared this implementation strategy for the design and execution of the Activity under the framework of Western Gas' Health, Safety and Environment Policy (WG-HSE-001) (Appendix A) and Health, Safety and Environment (HSE) Management System (WG-HSE-002). The Western Gas HSE Management System defines the principles by which Western Gas conducts its activities with regards to HSE.

9.3.1 Western Gas HSE Management System

The Western Gas Health, Safety and Environment (HSE) Management System (WGC-HSE-SYS_Corporate HSE Management_R0_220110.pdf) is comprised of a number of interrelated components (Table 9-3). The Western Gas HSE Management System is modelled on a continual improvement cycle comprised of five distinct phases (commit, plan, do, check, and review) to drive overall and ongoing improvements in HSE performance.

Table 9-3: Western Gas HSE Management System applicability to Activity

Phase	Component	Applicability/Contribution
Commit	Health and Safety Policy Statement Environmental Policy statement Risk Management Policy Statement	Leadership fostering an environment focused on establishing a culture which delivers HSE excellence.
Plan	Regulatory Requirements (Included in HSE Management system	Compliance with specific legal and other regulatory requirements, while achieving HSE objectives through effective identification, assessment and communication of requirements to relevant Western Gas staff and contractor personnel.

Phase	Component	Applicability/Contribution
	Risk Management Procedure (WGC-HSE-PRO_Risk Management)	Effective management of risk is recognised as an essential component of the HSE Management System to ensure that activities are performed safely and effectively. Risk assessments are performed for all activities.
Do	Organisational Competency and Training Procedure (WGC-HSE-PRO_Organisational Comptency and Training	Ensuring individuals have the training, qualifications and competencies appropriate with their roles and responsibilities and HSE expectations.
	Contractor Management (WGC-HSE-PLN_Contractor Engagement	Effective management of contractors is required to ensure HSE performance throughout the life cycle of a contract, from contractor selection through post-contract performance.
	Management of Change (WGC-QMS-PRO_Management of Change)	Changes to approved work programs (e.g.: Systems, Legislation, Procedures, Equipment, Products, Materials, Planning and Execution, etc.) are to be assessed to identify and manage internal and external implications and to be approved if acceptable, by the appropriate personnel.
	Emergency Response and Crisis Management Plan (WGC-HSE-PLN_Emergency Response and Crisis Management)	An effective emergency preparedness system shall be in place, in accordance with the Activity specific Emergency Response Plans (ERP) required prior to an activity commencing. The ERP shall provide identification, assessment and guidance in the management of potential adverse situations, including events such as medical emergencies, environmental incidents, fires, blowouts, security issues and natural disasters.
	Incident Reporting and Investigation (WGC-HSE-PRO_Incident Management)	Incident investigation systems that identify, evaluate, communicate and whenever possible eliminate potential hazards. Timely and thorough incident investigation helps provide prompt corrective action and a means for information sharing to help prevent similar events from occurring elsewhere.
	Document Control and Data Management (WGC-HSE-PRO_Document Control and Data Management)	Document and Equipment Number Procedure
Check	Performance Measurement and Monitoring (WG-HSE-11)	Assessment of HSE performance by gathering and analysing appropriate HSE data and reporting on performance. HSE information is effectively communicated as appropriate within Western Gas to ensure adjustments to priorities, updates to Management System and allocation of resources necessary to achieve HSE objectives.
	Audit and Verification (WGC-QMS-PRO_Audit and Review)	Audits and management reviews to verify the adequacy of the HSE controls for activities to evaluate their effectiveness and to identify improvement opportunities.

Phase	Component	Applicability/Contribution
		Audits shall be conducted on a regular basis as defined in the appropriate activity plans. Audit finding are recorded, and appropriate action is taken to assure closure and track findings, best practices and key lessons learned.
Review	Management Review (WGC-QMS-PRO_Audit and Review)	Management reviews are conducted in a consistent and visible way as means of reviewing HSE performance and effectiveness the HSE Management System.

9.3.2 Contractor Management Systems

The contractor(s) will be required to have an HSEMS that meets the requirements of the Western Gas HSE Policies.

Contractors have specific duties as outlined in the EP and OPEP, and their local management will be specifically briefed on these obligations, as well as being provided with copies of the EP, the OPEP, and extracts of the commitments register that highlight their obligations.

Contractors providing the vessel are required to be included in general induction processes. Where their work provides some additional environmental risk (beyond that covered by existing processes), they will be briefed on the applicability of the EP to their operations and any performance requirement obligations.

Western Gas will use the following processes to integrate responsibilities with contractors:

- Provision of copies of the OPEP and EP; and
- General contractor management (setting up contracts, scope of work, face to face meetings).
- HAZID and risk assessment reviews.
- Review of Emergency Response Incident Response plans and procedures.

Emergency response contractors are considered in the OPEP.

9.4 COMPETENCY, TRAINING AND AWARENESS

Division 2.3 - Contents of an Environment Plan

14(5) The implementation strategy must include measures to ensure that each employee or contractor working on, or in connection with, the activity is aware of his or her responsibilities in relation to the environment plan including during emergencies or potential emergencies, and has the appropriate competencies and training

9.4.1 Competency and Training

The Western Gas Contractor WMS Plan provides for effective identification, engagement and management of contractors to ensure Quality Assurance and HSE performance throughout the life cycle of the contract, from contractor selection through post-contract performance. Roles that require formal industry-recognised qualifications will be identified and the appropriate certificates verified through audit of training records prior to the commencement of the Activity. Certifications are recorded in Western Gas's and its contractor's records systems.

Environmental performance monitoring and audit (Section 5.2.7) will be used to assure compliance, including demonstration of competency. Where incidents or non-conformances are identified, corrective actions to prevent reoccurrence will address, where appropriate, competency issues such as the need for additional training and awareness.

Contractor Competency

During its contractor selection process, Western Gas will conduct a due diligence review to ensure that the chosen vessel/ survey contractor(s) have policies and procedures in place to ensure the correct selection, placement, training and ongoing assessment of employees, with position descriptions (including a description of HSE responsibilities) for key personnel being readily available.

9.4.2 Environmental Induction and Awareness

In accordance with Regulation 14 (5) of the OPGGS(E)R, each employee responsible for the implementation of task-specific control measures during operational activities shall be aware of their specific responsibilities detailed in this EP. People who hold responsibilities relating to the implementation of this EP are hired by Western Gas on the basis of their particular qualifications, experience, and competencies.

Contractor personnel involved in the monitoring survey will be made aware of the environmental requirements of this EP via a project-specific induction prior to commencing the survey. The Vessel Master will be responsible for ensuring vessel crews are aware of their requirements under the EP in lieu of all crew attending an environmental induction that will include:

- Awareness of Western Gas HS&E Policy Statements;
- Description of the environmental sensitivities, conservation and heritage values of the EMBA;
- An outline of the control measures in this EP to achieve the environmental performance outcomes;
- Importance of following procedures and using JSAs to identify environmental risks and mitigation measures;
- Procedures for responding to and reporting environmental hazards or incidents;
- Overview of emergency response and spill management procedures;
- Overview of the waste management requirements; and
- Roles and environmental responsibilities of key personnel aboard the and vessel.

Records of those attending the environmental induction will be retained.

The vessel to be contracted conducts regular vessel emergency response training (i.e. drills and exercises) will be conducted in line with International Maritime Organisation (IMO) (e.g. Safety of Life at Sea [SOLAS] and MARPOL) requirements. These drills include, but are not limited to, vessel oil spill response, collision, fire and explosion and man overboard.

An on-board vessel meeting (e.g. pre-start, job hazard analysis, toolbox meeting) will reinforce environmental awareness during the survey. Meeting records will be maintained.

Following NOPSEMA acceptance of this EP, a register of commitments will be generated from the commitments made throughout the document and will form the basis of the project induction.

9.4.3 Oil Spill Response Training

All roles in the OPEP will be undertaken by personnel appropriately trained in procedures to undertake their role. Classroom training and exercises will ensure that acquired competencies are maintained.

Vessel and aerial observers will be trained in oil spill observation and sourced from an appropriate training provider such as AMOSC or OSRL.

The IMT will contain suitably trained personnel supported by suitably qualified contractors in the event of an oil spill.

Where Western Gas assumes the role of IC, prior to sending any spill responders into the field for oil spill response operations they will be provided with awareness briefings. For personnel involved in ‘Immediate Actions’ in the event of a spill (Section 3 of the OPEP), briefings will be provided prior to the start of the stand-by periods.

The briefing will cover all aspects of their allocated role and will include a component on the potential environmental impact of their response activities. Potential impacts of response strategies have been identified and responders will be made aware of these. Monitoring of those impacts will be managed through daily reporting from site as well as progress inspections and final confirmation prior to termination of spill response activities.

9.5 ENVIRONMENTAL EMERGENCIES AND PREPAREDNESS

Division 2.3 - Contents of an Environment Plan

14(8) The implementation strategy must contain an oil pollution emergency plan (OPEP) and provide for the updating of the plan.

14(8A) The implementation strategy must include arrangements for testing the response arrangements in the oil pollution emergency plan that are appropriate to the response arrangements and to the nature and scale of the risk of oil pollution for the activity

14 (8AA) The oil pollution emergency plan must include adequate arrangements for responding and monitoring oil pollution, including the following:

a) the control measures necessary for timely response to an emergency that results or may result in oil pollution;

b) the arrangements and capability that will be in place, for the duration of the activity, to ensure timely implementation of the control measures, including arrangements for ongoing maintenance of response capability;

c) the arrangements and capability that will be in place for monitoring the effectiveness of the control measures and ensuring that the environmental performance standards for the control measures are met;

d) the arrangements and capability in place for monitoring oil pollution to inform response activities.

14(8B) The arrangements for testing the response arrangements must include:

a) a statement of the objectives of testing; and

b) a proposed schedule of tests; and

c) mechanisms to examine the effectiveness of response arrangements against the objectives of testing; and

d) mechanisms to address recommendations arising from tests.

14 (8C) The proposed schedule of tests must provide for the following:

a) testing the response arrangements when they are introduced;

b) testing the response arrangements when they are significantly amended;

c) testing the response arrangements not later than 12 months after the most recent test;

d) if a new location for the activity is added to the environment plan after the response arrangements have been tested, and before the next test is conducted—testing the response arrangements in relation to the new location as soon as practicable after it is added to the plan;

e) if a facility becomes operational after the response arrangements have been tested and before the next test is conducted—testing the response arrangements in relation to the facility when it becomes operational.

The Survey Contractor in conjunction with Vessel Master maintains primary responsibility for immediate onsite emergency response with emergency response support provided by Western Gas IMT as required (e.g. additional logistics support). Emergency response roles and responsibilities between Western Gas and the vessel contractor will be detailed further in the Survey Contractor's HSE

Management System and Vessel Safety Case (if relevant) and survey-specific Emergency Response Bridging Document.

The vessel will have equipment aboard for responding to emergencies, including but not limited to medical equipment, fire-fighting equipment and oil spill response equipment. It will also have a vessel emergency management plan in accordance with MARPOL requirements to deal with emergencies prior to implementation of the OPEP.

9.5.1 Adverse Weather Protocols

It is the duty of the Vessel Master to act as the focal point for all actions and communications with regards to any emergency, including response to adverse weather or sea state, to safeguard their vessel, all personnel onboard and environment.

During adverse weather, the Vessel Master is responsible for the following:

- Ensuring the safety of all personnel onboard;
- Monitoring all available weather forecasts and predictions;
- Initiating the safety management systems, HSE procedures and / or ERP;
- Keeping the Western Gas Project Offshore Representative fully informed of the prevailing situation and intended action to be taken;
- Assessing and maintaining security, watertight integrity and stability of vessel; and
- Proceeding to identified shelter location(s) as appropriate.

Other appropriate responsibilities shall be taken into consideration as dictated by the situation.

In addition to using Very High Frequency (VHF) Marine Radio Weather Services, the vessel contractor will obtain daily weather forecasting from the Bureau of Meteorology (BoM) to monitor weather within the activity area in the lead up to and for the duration of the activity.

9.5.2 Vessel Emergencies and Oil Spills

Activity-specific emergency response procedures will be included in the vessel contractor's ERPs. The ERPs will contain instructions for vessel emergency, medical emergency, search and rescue, reportable incidents, incident notification and emergency contact information.

Western Gas will ensure that the vessel contractors have appropriate emergency plans in place for all relevant environmental emergency events (including the assignment of emergency management roles for particular events). Environmental emergencies that will be considered will include (but not be limited to):

- Introduction of animal diseases into aquaculture (no aquaculture operations in or around activity area);
- IMS incursions (addressed in this EP);
- Cetacean vessel strike (addressed in this EP);
- Maritime casualties requiring salvage and intervention, emergency towage and requests for a place of refuge;
- Marine pollution from floating or sunken containers of hazardous materials;
- Debris originating from a maritime casualty;
- Physical damage caused by vessels;
- Fire or explosion on the vessel;
- Hijack/terrorism; and
- Adverse weather.

ERPs typically include vessel-specific procedures for the following:

- Fire and explosion;
- Incidents – collision, grounding, hull damage, man overboard, equipment failure, tank failure;
- Waste management;
- Bunkering spills;
- Hazardous materials and handling; and
- Hydrocarbon and chemical spills.

The vessel emergency management plan includes information about initial response, reporting requirements and arrangements for the involvement of third-parties having the appropriate skills and facilities necessary to respond effectively to oil spill issues. The vessel's emergency management plan will be the principal working document for the vessel crew in the event of a marine oil spill incident and requirements for regular drills of the plan and revision following drills or incidents.

These documents will supplement the NOPSEMA-accepted, survey-specific OPEP for WA-70-R, which will serve as a stand-alone interface between both companies' spill response plans and with relevant state (WA) and national plans. These relationships are set out in the OPEP.

If any liquid hydrocarbon spill occurs during the survey the actual and potential impacts associated with such a spill will be managed in accordance with the procedures set out in the OPEP. The selection of an appropriate response strategy for the control and treatment of a spill will depend on a number of factors, such as prevailing weather, size and type of spill.

Performance outcomes and standards have been developed and are included in the OPEP for each spill response strategy to provide the basis for the preparation, application, monitoring, termination and reporting of oil spill response arrangements.

The OPEP will be updated as and when required if new threats are identified or if there are significant changes to any of the spill response arrangements. This task is the responsibility of the Western Gas Project Director.

9.5.3 Emergency Response Training

The readiness and competency of Western Gas and Survey Contractor (and sub-contractors) to respond to incidents and emergencies will be tested by conducting a desktop emergency response exercise as detailed in Section 8.2 of the OPEP.

A scenario will be chosen that combines an emergency with risk to human life (such as fire) and risk to the environment (hydrocarbon spill). This way several plans (i.e., the ERP and OPEP) can be tested simultaneously.

9.5.4 Contractor Management of Spill Response Providers

In the event of an incident, information will be communicated through operations briefings in a similar manner to the daily operations call. Such calls review upcoming operations, discuss HSE issues, logistics, and additional matters. These processes are well established in normal operations and are readily translatable to response operation calls with the forward response sites.

In the event of an oil spill, a number of contractors may be mobilised to provide a range of required services. Some services are very routine (e.g. provision of PPE) while others are specialised (e.g. oil spill modelling). To manage different types of contractors, Western Gas will review criticality and assurance of spill responders.

9.5.4.1 *Criticality*

A responder is critical if they are:

- Involved in first strike response; and/or
- The only (practical/local) supplier of a piece of equipment or service.

Further detail on service providers is provided in the OPEP with an initial assessment of whether a provider is critical or non-critical. Critical service providers will have contracts in place prior to the commencement of the survey. A summary of critical and non-critical contractors is provided in Table 9-4.

Table 9-4: Critical and non-critical spill response providers

Critical	Non-critical
Oil spill trajectory modelling contractor	Response team resources (AMSA through the National Plan resources)
Trained spill observers	Aviation contractors (e.g. Bristow)
Trained marine fauna observers	Labour Providers (e.g. Manpower Services, Toll)
AMSA – access to National Plan resources.	Waste Management (e.g. ToxFree)
Oil spill scientific monitoring contractor	PPE and hand tools suppliers (e.g. PPS)
Satellite tracking buoy	Plant hire companies (e.g. PPS)
	Vessel Contractors (e.g. Farstad)
	Satellite imagery contractor

9.5.4.2 Assurance

It is not reasonable for Operators to assess the capability of government agencies who have response roles (e.g. AMSA). “Critical” vendors need to provide a “high” level of assurance that they will be able to respond as agreed and non-critical responders need to supply a satisfactory level of assurance to be included in Western Gas’ plans. Western Gas Project Director is responsible for holding written records of assessment for identified spill response contractors.

Factors assessed in determining “assurance” include:

- Previous experience/track record;
- Assessment of management systems (e.g. audit, inspection and review);
- Contractual arrangement in place;
- Involvement in exercises and drills; and
- Status of readiness.

9.5.5 Operational and Scientific Monitoring Plan

Division 2.3 - Contents of an Environment Plan

14(8)D The implementation strategy must provide for monitoring of impacts to the environment from oil pollution and response activities that:

a) is appropriate to the nature and scale of the risk of environmental impacts for the activity; and

b) is sufficient to inform any remediation activities.

9.5.5.1 *OSMP Overview*

In the event of a hydrocarbon spill incident, the Operational and Scientific Monitoring Plan (OSMP) located within the OPEP Section 4.4 will be implemented to:

- Determine whether environmental protection goals have been met during a response (scientific monitoring activities), and
- Inform the IMT to plan appropriate response measures and to evaluate whether response strategy environmental goals are being achieved (operational monitoring activities).

Operational monitoring activities and scientific monitoring studies will be undertaken in the event of a hydrocarbon spill incident (all Tiers) at an appropriate scale, whereby:

- Type I (operational) monitoring will be undertaken during the spill response to support planning and operations. This type of monitoring will be used to inform the IMT on the behaviour of the hydrocarbon spill and to track the effectiveness of the response measures. Operational monitoring will also inform scientific monitoring efforts of the temporal and spatial distributions of hydrocarbons to incorporate into planning and logistics, and
- Type II (scientific) monitoring will be used to characterise the short (impact) and long-term (recovery) environmental effects from a hydrocarbon release incident. Scientific monitoring will also be used to assess if oil spill response strategies have been effective in protecting and/or mitigating environmental sensitivities under threat from an incident.

9.6 MONITORING, RECORDING, AUDITING AND REVIEW

Division 2.3 - Contents of an Environment Plan

The implementation strategy must:

14(2)a state when the titleholder will report to the Regulator in relation to the titleholder's environmental performance for the activity; and

14(2)b provide that the interval between reports will not be more than 1 year

Division 2.3 - Contents of an Environment Plan

14(6) The implementation strategy must provide for sufficient monitoring, recording, audit, management of non-conformance and review of the titleholder's environmental performance and the implementation strategy to ensure that the environmental performance outcomes and standards in the environment plan are being met.

14(7) The implementation strategy must provide for sufficient monitoring of, and maintaining a quantitative record of, emissions and discharges (whether occurring during normal operations or otherwise), such that the record can be used to assess whether the environmental performance outcomes and standards in the environment plan are being met.

Division 2.3 - Contents of an Environment Plan

The environment plan must contain the following:

16(C) details of all reportable incidents in relation to the proposed activity.

Part 3 – Incidents, reports and records

Reporting recordable incidents:

26B(4) A written report under subregulation 26B(1):

must be given to the Regulator; and

a) must relate to a calendar month; and

b) must be given as soon as practicable, after the end of the calendar month, and in any case not later than 15 days after the end of the calendar month; and

c) must contain:

i. a record of all recordable incidents that occurred during the calendar month; and

ii. all material facts and circumstances concerning the recordable incidents that the titleholder knows or is able, by reasonable search or enquiry, to find out; and

iii. any action taken to avoid or mitigate any adverse environment impacts of the recordable incidents; and

iv. the corrective action that has been taken, or is proposed to be taken, to stop, control or remedy the recordable incident; and

v. The action that has been taken, or is proposed to be taken, to prevent a similar incident occurring in the future.

Part 3 – Incidents, reports and records

26C(1) A titleholder undertaking an activity must submit a report to the Regulator in relation to the titleholder's environmental performance for the activity, at the intervals provided for in the environment plan

Part 3 – Incidents, reports and records

Notifying Reportable Incidents:

26(4) A notification under subregulation 26(1):
- a) must be given to the Regulator; and
- b) must be given as soon as practicable, and in any case not later than 2 hours after:
  - i. the first occurrence of the reportable incident; or
  - ii. if the reportable incident was not detected by the titleholder at the time of the first occurrence — the time the titleholder becomes aware of the reportable incident; and
- c) may be oral; and
- d) must contain:
  - i. all material facts and circumstances concerning the reportable incident that the titleholder knows or is able, by reasonable search or enquiry, to find out; and
  - ii. any action taken to avoid or mitigate any adverse environment impacts of the reportable incident; and
  - iii. the corrective action that has been taken, or is proposed to be taken, to stop, control or remedy the reportable incident.

26(5) As soon as practicable after the titleholder notifies a reportable incident, the titleholder must give a written record of notification to:
- a) the Regulator; and
- b) the Titles Administrator; and
- c) the Department of the responsible State Minister, or the responsible Northern territory minister

26A(4) A written report under subregulation 26A(1):
- a) must be given to the Regulator; and
- b) must be given as soon as practicable, and in any case:
  - i. not later than 3 days after the first occurrence of the reportable incident; or
  - ii. if the Regulator specifies, within 3 days after the first occurrence of the reportable incident, another period within which the report must be provided — within that period; and
- c) must contain:
  - i. all material facts and circumstances concerning the reportable incident that the titleholder knows or is able, by reasonable search or enquiry, to find out; and
  - ii. any action taken to avoid or mitigate any adverse environment impacts of the reportable incident; and
  - iii. the corrective action that has been taken, or is proposed to be taken, to stop, control or remedy the reportable incident; and
  - iv. the action that has been taken, or is proposed to be taken, to prevent a similar incident occurring in the future.

26A(5) Within 7 days after giving a written report of a reportable incident to the Regulator, the titleholder must give a copy of the report to:
- (a) the Titles Administrator; and
- (b) the Department of the responsible State Minister, or the responsible Northern Territory Minister

Part 3 – Incidents, reports and records

27 – Storage of records

(6) For subregulation 27(4), the documents or other records are the following:

- (a) Written reports (including monitoring, audit and review reports) about environmental performance, or about the implementation strategy, under an environment plan
- (b) Records of emissions and discharges into the marine environment made in accordance with an environment plan;
- (c) Records of calibration and maintenance of monitoring devices used in accordance with an environment plan
- (d) Records and copies of reports mentioned in:
  - (i) Regulations 26, 26A and 26AA, relating to reportable incidents; and
  - (ii) Regulation 26B, relating to recordable incidents; and
  - (iii) Regulation 26C, relating to the titleholder's environmental performance for an activity

28 – Making records available

(1) A titleholder must make available, in accordance with this regulation, copies of the records mentioned in regulation 27.

Part 4 – Miscellaneous

Division 4.1 – Information requirements

29 Notifying start and end date of activity

1) A titleholder must notify the Regulator that an activity is to commence at least 10 days before the activity commences
2) A titleholder must notify the Regulator that an activity is completed within 10 days after the completion

Division 2.4 - Revision of an Environment Plan

New or increased environmental impact or risk

17(6) A titleholder must submit a proposed revision of the environment plan for an activity before, or as soon as practicable after:

- (a) The occurrence of any significant new environmental impact or risk, or significant increase in an existing environmental impact or risk, not provided for in the environment plan in force for the activity; or
- (b) The occurrence of a series of new environmental impacts or risks, or a series of increases in existing environmental impacts or risks, which, taken together, amount to the occurrence of:
  - (i) a significant new environmental impact or risk; or
  - (ii) a significant increase in an existing environmental impact or risk;

that is not provided for in the environment plan in force for the activity.

9.6.1 Internal Recording and Reporting

Routine internal recording and reporting of activity HSE matters will encompass the following:

- Teleconference – held between the Survey Contractor, Vessel Master and Western Gas personnel the morning for the survey to forward plan.
- Operations report – the Survey Contractor Supervisor will prepare a report, including data on activities conducted for the day of the survey and any HSE issues arising and distribute to the extended project team.
- HSE report – the Western Gas Project Survey Project Manager will collate key HSE performance statistics of the day and report to the wider project team within a teleconference.
- Environmental report – Western Gas will prepare and submit an environmental report not later than 15 days after the end of the calendar month that details all recordable incidents (in accordance with OPGGS(E) Regulation 26B(4)).
- Completion performance report – Western Gas will prepare an end-of-activity performance report that details the outcomes of each EPS in the EP (in accordance with OPGGS(E) Regulation 26C(1)). This will be submitted to NOPSEMA within 3 months of completion of the activity.

9.6.2 External Recording and Reporting

Regulation 11A of the OPGGS(E) specifies that consultation with relevant authorities, persons and organisations must take place. This consultation includes an implicit obligation to report on the progress of the activity. Table 9-5 outlines the routine reporting obligations that Western Gas will undertake with external organisations.

Table 9-5: External routine reporting obligations

Requirement	Timing	Contact Details	OPGGS(E)
Pre-activity			
Notify AMSA JRCC in order to issue daily AusCoast warnings.	24-48 hours prior to the activity starting.	rccaus@amsa.gov.au	Reg 11A
Notify NOPSEMA with the activity start date.	At least 10 days prior to the activity starting.	submissions@nopsema.gov.au	Reg 29
Notify the AHO of the activity start date and duration to enable Notices to Mariners to be issued.	Four weeks prior to the activity starting.	datacentre@hydro.gov.au	Reg 11A
Notify all other stakeholders in the stakeholder register with the activity start date.	Two weeks prior to the activity starting.	Notify all other stakeholders in the stakeholder register with the activity start date.	Two weeks prior to the activity starting.
Activity completion			
Notify AMSA in order to cease daily AusCoast warnings.	Within 24 hours of activity completion.	rccaus@amsa.gov.au	Reg 11A
Notify all stakeholders in the stakeholder register.	Within 2 days of activity completion.	Via email addresses recorded in Stakeholder Consultation Register.	Reg 11A
Notify the AHO in order to cease the issuing of Notices to Mariners.	Within 2 days of activity completion.	datacentre@hydro.gov.au	
Notify NOPSEMA of the activity end date.	Within 10 days of activity completion.	submissions@nopsema.gov.au	Reg 29
Performance reporting			
Submit an end-of- program EP Performance Report.	Within 3 months of activity completion.	Submit to NOPSEMA within 3 months of activity completion.	Reg 26C
Notify NOPSEMA of the end of the operation of the EP.	Within 1 month of submitting the EP Performance Report.	submissions@nopsema.gov.au	Reg 25A
Provide marine fauna observation data to the DCCEEW.	Within 3 months of activity completion.	Upload information via the online Cetacean Sightings Application (https://data.marinemammals.gov.au/csa).	EPBC Act

Within 90 days of the end of the Activity a performance report will be submitted to NOPSEMA in accordance with Regulation 14(2) of the OPGGS (Environment) Regulations. The report will contain the following in accordance with Regulation 26(C) of the OPGGS (Environment) Regulations:

- A summary of performance against outcomes and performance standards;
- A report summarising records maintained during the activity for recording emissions and discharges (as required by Regulation 14(7) of the OPGGS (Environment) Regulations);
- A review of all records listed in Section 9.2;
- An assessment of adherence to requirements of the EP, including the environmental performance outcomes, standards and measurement criteria (Section 6 and Section 7);
- A review of any environmental incidents;
- Any observations of marine fauna interactions and impacts; and
- A review of any interactions with (or complaints from) commercial shipping, fishing vessels, and military vessels/aircraft or the community.

Information will be maintained and collated by Western Gas during the Activity with the Commitments Register as the basis for recording performance and compliance. An annual report will be submitted within 12 months of NOPSEMA acceptance of the current revision of this EP.

Notifications

Western Gas will provide a notification to NOPSEMA in accordance with Regulation 29 of the OPGGS (Environment) Regulations before the Activity commences and after its completion. The Activity will commence once the vessel arrives at the first well location and begins positioning. The Activity will be considered complete when the vessel departs the last well location.

9.6.3 Incident Recording and Reporting

Regulation 4 of the OPGGS(E) defines the following incident types:

- Recordable incident – a breach of an EPO or EPS in the EP that is not a reportable incident.
- Reportable incident – an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage.

Western Gas interprets ‘moderate to significant’ environmental damage as being those hazards identified through the impact and risk assessment process (see Chapter 5) as having an inherent or residual impact consequence of ‘medium’, ‘significant’ or ‘high’, or an inherent or residual risk ranking of ‘significant’ or ‘high.’ Impacts and risks with these ratings (as outlined throughout Section 5 and 6) are:

- Diesel spill from fuel tank rupture

- Spills from environmentally hazardous chemicals
- Interference with marine fauna
- Dropped objects; and
- Interaction with other marine users (wellheads in-situ).

As such, incidents relating to these matters are defined as reportable incidents.

Western Gas holds an internal notification database (WGC-HSE-REG_OPEP Stakeholder Database_R0_221212) for relevant persons and organisations in the event of an emergency hydrocarbon spill. This database will be updated on a six-monthly or needs basis to hold relevant contact information.

Part 3 of the OPGGS(E) describes the requirements for verbal notifications and written reporting of recordable and reportable incidents. Table 9-6 outlines the incident reporting obligations that Western Gas will undertake with external organisations.

Table 9-6: Incident Reporting

Recordable Incident Reporting – Regulation 26B	
Legislative definition of 'recordable incident': *'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'* Recordable incidents are breaches of environmental performance outcomes and standards.	
Reporting Requirements	**Report to / Timing**
Written notification to NOPSEMA by the 15th of the month As a minimum, the written incident report must describe: • The incidents and all material facts and circumstances concerning the incidents. • Any actions taken to avoid or mitigate any adverse environmental impacts. • Any corrective actions already taken, or that may be taken, to prevent a repeat of similar incidents. • If no recordable incidents occurred during the reporting month, a 'nil report' will be submitted.	Submit written report to NOPSEMA by the 15th of the month.

<table>
<tr><th colspan="2">Reportable Incident Reporting – Regulation 26, 26A and 26AA</th></tr>
<tr><td colspan="2">Legislative definition of ‘reportable incident’:
‘Reportable incident, for an activity means an incident relating to an activity that has caused or has the potential to cause an adverse environmental impact; and under the environmental risk assessment process the environmental impact is categorised as moderate to significant environmental damage.’
Therefore, reportable incidents under this EP are those unplanned events that have a severe or greater impact severity or medium or greater risk level. In accordance with this definition, the reportable incidents identified under this EP are:
Diesel spill from fuel tank rupture
Spills from environmentally hazardous chemicals
Interference with marine fauna
Dropped objects; and
Interaction with other marine users (wellheads in-situ).</td></tr>
<tr><th>Reporting Requirements</th><th>Report to / Timing</th></tr>
<tr><td>Verbal or written notification must be undertaken within two hours of the incident or as soon as practicable.
This information is required:
The incident and all material facts and circumstances known at the time,
Any actions taken to avoid or mitigate any adverse environmental impacts.</td><td>Report verbally to NOPSEMA within two hours or as soon as practicable and provide written record of notification by email.
Phone: (08) 6461 7090
Email: submissions@nopsema.gov.au</td></tr>
<tr><td>Verbal notifications must be followed by a written report as soon as practicable, and not later than 3 days following the incident.
At a minimum, the written incident report will include:
The incident and all material facts and circumstances,
Actions taken to avoid or mitigate any adverse environmental impacts,
Any corrective actions already taken, or that may be taken, to prevent a recurrence.
If the initial notification of the reportable incident was verbal, this information must be included in the written report.</td><td>Written report to be provided to NOPSEMA, the National Offshore Petroleum Titles Authority, and the WA Department of Mines, Industry Regulation and Safety.
Email: submissions@nopsema.gov.au
Email: info@nopta.gov.au
Email: petroleum.environment@dmp.wa.gov.au</td></tr>
<tr><th colspan="2">Additional Reporting Requirements</th></tr>
<tr><th>Reporting Requirements</th><th>Report to</th></tr>
</table>

Death or injury to individual(s) from an EPBC Act Listed Species as a result of the petroleum activities	Report injury to or mortality of EPBC Act Listed Threatened or Migratory species within seven business days of observation to DCCEEW or equivalent: Phone: +61 2 6274 1111 Email: EPBC.Permits@environment.gov.au
Vessel collision with marine mammals (whales)	Reported as soon as practicable.
Presence of any suspected marine pest or disease within 24 hours	https://data.marinemammals.gov.au/report/shipstrike
Identification of any historic shipwrecks or relics	DPIRD by email (mailto:biosecurity@fish.wa.gov.au) or phone via the FishWatch 24-hour hotline on 1800 815 507.

Recordable Incidents

Under the OPGGS (Environment) Regulations a recordable incident for an activity is defined as:

“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.”

Environmental performance outcomes and standards developed for this Activity are detailed in Section 6 and 7. Any breach of these objectives or performance standards will be considered a recordable incident and reported to NOPSEMA in accordance with Regulation 26B of the OPGGS (Environment) Regulations. The reporting format (FM0928) for recordable incidents can be found at http://www.nopsema.gov.au/environmental-management/notification-and-reporting.

If no recordable incidents occur in any calendar month, a ‘nil incident’ report will be submitted using the same form. It is the responsibility of the Western Gas HSE Specialist (or delegate) to collate and submit the recordable incident form(s).

All environmental near-misses and incidents, including non-compliances with the EP EPO and EPS, must be communicated immediately to Survey Contractor Supervisor (if survey related) or Vessel Master (if vessel related) who will report to the Western Gas Project Survey Manager who will further report to the Western Gas Project HSE Specialist. This expectation will be reinforced at induction, toolbox meeting and HSE meeting.

All environmental near-misses and incidents will be recorded by the Western Gas Project HSE Specialist within eight hours of being notified of the incident. The Vessel Master will lead an investigation into the cause, effects and learnings of the incident as per the contractor’s investigation procedures. Where circumstances warrant it, this investigation will be conducted jointly with the appropriate contractor representative. Following an investigation, the vessel contractor (with input from Western

Gas as required) will develop remedial actions and communicate these to personnel (and wider organisations, as appropriate) to prevent recurrence.

Reportable Incidents

Under the OPGGS (Environment) Regulations a reportable incident for an activity is defined as:

"an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage"

In the context of the Activity, a reportable incident is the occurrence of an incident which, on the basis of the environmental effect and risk assessment that has been undertaken in this EP, has a moderate or higher level of consequence (severity). These events are identified in Table 5-2 and Table 5-3. The circumstances of any incident may dictate that the actual or potential consequence is more or less than that indicated in the consequence assessment, and advice should be sought by offshore personnel from Western Gas' Project HSE Specialist and management (in particular, the Western Gas Project Survey Manager and Western Gas Project Director), where practicable, prior to issuing report.

Other Incident Reporting Requirements

Other incident reporting requirements and who they should be reported to are provided below.

- Any oil pollution incidents in Commonwealth waters reported to AMSA as per Article 8 and Protocol I of MARPOL;
- Any spills greater than 10 tonnes in Commonwealth waters reported to AMSA within one hour, via the national 24 hour emergency notification contacts; and
- If the ship is at sea, reports are to be made to:
  Rescue Co-ordination Centre Australia (RCC Australia)

Phone:	02 6230 6811
Facsimile:	02 6230 6868
Telex:	62349
Free call:	1 800 641 792
AFTN:	YSARYCYX

  If the ship is within a port or harbour, reports are to be made to the relevant port authority;

  Additionally, the following pollution activity should be reported to AMSA via the RCC Australia;

  - Any quantity of oil. If oil can be seen then it is likely to be an illegal discharge. Oil includes waste oil, fuel oil, sludge, lube oil and additives etc.;
  - Any discharge from a ship involving washings of chemical or dry cargoes;
  - Any plastic material; and

- Garbage disposed of in the sea within 12 nautical miles (2.2 km) of territorial baseline (garbage includes food, paper, bottles etc.).

Any spills predicted to impact State waters reported to DMP and DoT.

Any spill within or the potential to impact a Marine Park. Notification should be made to the Marine Reserve Compliance Duty Officer, Telephone: 0419 293 465. Notification to include:

- Titleholder details
- Time and location of the incident
- Proposed response strategies as per OPEP
- Contact details for the response.

9.7 RECORD KEEPING

All records relevant to the EP will be stored and made available in accordance with Regulation 27 and 28 of the OPGGS (Environment) Regulations. Western Gas will generate and store records for a period of five years upon completion of the Activity including the items detailed in Regulation 27 of the OPGGS (Environment) Regulations.

9.8 MANAGEMENT OF CHANGE

9.8.1 Changes to EP Scope

Identification and potential approval of changes to scope (e.g., timing or operational details described in this EP) is the responsibility of Western Gas Project Survey Manager, in conjunction with the Western Gas Executive Director. A risk assessment will be undertaken for any change in scope in order to assess potential impacts of the change. If the change represents a significant modification that is not provided for in the accepted EP in force for the Activity, a revision of the EP will be conducted in accordance with Regulation 17(6) of the OPGGS (Environment) Regulations.

Western Gas' Management of Change (MoC) (WGC-QMS-PRO_Management of Change) provides direction for Management of Change for Western Gas activities. It shall be used to ensure changes to approved work programs (e.g., systems, legislation, procedures, equipment, products, materials and planning etc.) are properly considered, and approved if acceptable, by the appropriate personnel. Where appropriate the Survey Contractor will initiate changes to survey documentation under their MoC procedures.

9.8.2 Western Gas MoC Process

Changes to management systems, approved work programs and any related information (including details of the environment, legislative requirements etc) are to be routinely reviewed and assessed to identify and manage internal and external implications and to be approved if acceptable. Relevant changes are required to be assessed to ensure that new or increased company or HSE impacts and risk are identified and managed. Relevant changes include:

- new activities, assets, equipment, processes or procedures proposed to be undertaken or implemented that have company or HSE impacts or risks and have not been:
  - Previously assessed, in accordance with the requirements of the WHMS; and
  - Authorised in the WGMS or existing approvals, management plans, procedures, work instructions, or other plans.
- proposed changes to activities, assets, equipment, processes or procedures that have potential to impact on the company, people, the environment, community or stakeholders.
- changes to requirements of an existing external approval (e.g., WOMP, Environment Plan).
- new information or changes of information from research, stakeholders, legal and other requirements, and any other sources used to inform internal processes, procedures or decision and external approvals.

Relevant changes are to be assessed using the Request for Change Form (included in MoC Procedure

Minor Change

A minor change is a change to an approved plan, work programme (or a procedure referenced in it) that has no safety, environmental or well integrity implication, adds less than AUD$100,000 to the cost of the operation and has no impact on the operation's objectives.

Minor changes to the activity will be discussed and agreed at the daily operations meeting. All activity changes will be confirmed by email from the Western Gas Project Offshore Representative, or designate, to the Vessel Master and Survey Contractor Supervisor.

When operations are being conducted, the Western Gas Project Survey Manager must provide approval. All minor changes must be confirmed via email and approved by the Western Gas Project Survey Manager.

Significant Change

A significant change is defined as a change to an approved plan or work programme that does not impact the operation's objectives but could have a direct safety, environmental implication (i.e., increase

in risk profile above that of the originally planned program) and/or increase the cost of the operation by more than AUD$100,000 but less than AUD$250,000.

Significant changes to the plan or programme, or significant operations not included in the programme, will be discussed, risk assessed and agreed by the onshore and offshore teams and confirmed in writing with an approved Programme Supplement or Amendment. This will be issued prior to commencing the change in programme. The Western Gas Project Survey Manager will discuss the proposed change with the Western Gas Project Offshore Representative and the Vessel Master. The Supplement or Amendment is developed by the relevant engineer and approved by the Western Gas Project Survey Manager, or their delegate and issued to the team.

All changes are assessed to ensure any new impacts or risks, or significant change in risk level, are identified.

In the event that the change influences environmental aspects of the activity, the Western Gas Project Survey Manager the Western Gas Project HSE Specialist must be consulted to determine whether an EP revision is triggered and to follow Western Gas's process for environmental change.

Following this MoC process, Western Gas will assess and undertake the necessary revision/resubmission of the EP as described in Section 9.8.1 and assisted by the project team as required.

Major Change

A major deviation from plan is one that results in a deviation from the survey activity, Western Gas policies and standards, has a direct safety or environmental implication (i.e., an increase in risk profile above that of the originally planned program), an EP revision being triggered, the design of the survey program changing and/or will result in the Authority for Expenditure being exceeded.

Changes affecting the approved activity require an approved Program Supplement or Amendment to be issued. The Western Gas Survey Project Manager will discuss the proposed change with the Western Gas Project Offshore Representative and the Survey Contractor. The Supplement or Amendment is developed by the relevant engineer and approved by the Western Gas Project Survey Manager, or their delegate.

Exceptionally, if conditions demand an immediate response to safeguard the vessel, then the Western Gas Project Offshore Supervisor is authorised to implement any necessary changes to the program with the agreement of the Survey Contractor and Vessel Master. Contact with the Western Gas Project Survey Manager or their delegate should be made as soon as reasonably practicable. A Programme Supplement or Amendment should be prepared the next working day.

All changes are assessed to ensure any new impacts or risks, or significant change in risk level are identified.

In the event the change influences environmental aspect of the activity, the Western Gas Survey Project Manager must be consulted to determine whether an EP revision is triggered.

Following this MoC process, Western Gas will assess and undertake the necessary revision and resubmission of the EP as described in Section 9.8.1.

9.9 MONITORING

This section describes the environmental monitoring requirements of the survey activity.

9.9.1 Field Environmental Monitoring

Western Gas will maintain a quantitative record of emissions and discharges, and other environmental matters generated on location during the activity, as required under Regulation 14(7) of the OPGGS(E).

The vessel contractor is responsible for collecting this data and reporting it to the Western Gas Project Offshore Representative. This is facilitated, in part, by completing a daily environmental monitoring register that will be provided by Western Gas to the contractor, which captures the commitments made in Sections 6 and 7. These results will be reported in the end-of-program EP performance report submitted to NOPSEMA.

Table 9-7: Monitoring and recording requirements for the Activity

Activity	Monitoring	Record keeping
Training	Details of crew environmental inductions.	Induction Record Sheets.
Waste management	Quantities of waste landfilled, recycled and discharged.	Vessel Waste Log, Rubbish record book, Spill response operations – waste transfer logs, ODS Record Book.
Fauna interactions	Cetacean and turtle sightings. Any interactions between marine fauna and vessels.	DCCEW cetacean sightings report forms and records of transmittal to DCCEEW and NOPSEMA. Turtle sighting records. Vessel-marine fauna interaction records.
Incident reporting	Number and details of environmental incidents.	HSE incident reports.
Compliance reporting	Compliance with EP performance outcomes.	Completed environmental inspection / audit check sheet.
Maintenance	Maintenance schedule for applicable equipment.	PMS records.
On-going Consultation	Records of consultation with stakeholders.	Transmittals to stakeholders and responses.

Table 9-8: Emissions and discharges to be recorded and reported to NOPSEMA at end of Activity

Emission or discharge	Information recorded	By whom and when	Records and reporting
Oil in water discharged overboard from vessels >400 tonnes	Volume and concentration of oil discharged.	Chief Engineer, after each batch discharge or daily for ongoing.	Oil record book. Data provided at end of activity.
Waste from vessels	Quantities and types of waste backloaded to shore.	Chief Engineer, after each backload	Waste records maintained on vessels. Data provided at end of activity.
Dropped objects	Type, location, quantity.	Vessel Master, as required.	Incident reports completed and copied to Western Gas Project Survey Manager.
Fuel use and associated atmospheric emissions	Volume of fuel used.	Vessel Master, Daily records	Data provided at end of activity. Emissions calculated using emissions factors by Western Gas Project HSE Specialist.
Sewage from vessels >400 tonnes	Volumes discharged overboard.	Chief Engineer estimates at end of Activity.	Data provided at end of Activity.
Bilge water	Volume, location and vessel speed	Vessel Master, as required.	Oil Record Book
Ballast Water discharges	Volume, location	Vessel Master, as required.	Ballast Water Record System.
Chemical discharges to marine environment	Chemical name, type, use and volume	Drilling Contractor, after each batch discharge or daily for ongoing.	Daily Report
Accidental release or losses overboard	Nature of the discharge material, and volume / amount	Vessel Master / OIM, as required.	Daily Report Incident Report

9.9.2 Auditing, Assurance and Inspections

Western Gas conducts reviews and audits of contractors at various stages including pre-award of contract, and prior to and during the Activity in accordance with its HSE and Quality Management Systems.

The following arrangements will be established to ensure environmental performance of the vessel will be undertaken to ensure the survey is being undertaken in accordance with this EP, and relevant legislation.

Pre-activity HSE Due Diligence Inspection

Western Gas will undertake pre-activity (and post- award) inspections of the vessel to ensure that procedures and equipment for managing routine discharges and emissions are in place to enable compliance with the EP. This will be undertaken in accordance with Western Gas's Contractor Engagement Plan (WGC-HSE-PLN_Contractor Engagement)

Onboard Environmental Audit

Western Gas will undertake an environmental compliance audit onboard the vessel during survey operations to assess compliance with this EP. This will be undertaken by appropriately qualified and experienced personnel familiar with vessel operations and environmental management.

A Western Gas representative will undertake an audit on the vessel while in dock, or if logistics do not allow for this, the Vessel Master will complete an EP commitments checklist during the activity.

Onboard Inspection

The Western Gas Project Offshore Representative will continuously supervise the activity, ensuring adherence to the environmental controls specified in this EP. This will be facilitated by completing an environmental inspection checklist developed by the Western Gas Project HSE Specialist. The completed checklist will ensure that environmental compliance is continuously monitored. This provides assurance that the EP commitments are met.

Any non-compliance with the EPS outlined in this EP will be internally and externally reported and subject to investigation and follow-up action as detailed in Section 9.6 and Section 9.7.

The findings and recommendations of inspections and audits will be documented and distributed to relevant personnel for comments. Any non-compliances or opportunities for improvement will be communicated to the Vessel Master at the time of the inspection or audit to ensure there is adequate time to implement corrective actions. Results will be summarised in the EP performance report submitted to NOPSEMA after the completion of the activity.

The audits will be documented and corrective actions will be tracked to completion in accordance with the Western Gas Audit and Verification Standard (WGC-HSE-PRO_Audit and Review).

Each contractor's internal environmental performance monitoring and auditing commitments are detailed in its HSE Management System, including identification and management of non-conformance. These processes will ensure that continual monitoring and improvement occurs so that HSE performance meets the requirements of the organisation's HSE policies and Vessel Safety Case (if relevant), as well as applicable requirements from the EP (as documented in the Commitments Register).

Environmental performance assurance of the activity will be undertaken in a number of ways. Performance assurance is undertaken to ensure that:

- EPS to achieve the EPO are being implemented;
- Potential non-compliances and opportunities for improvement are identified; and
- All environmental monitoring requirements have been met before completing the activity.

9.9.3 Contractor Monitoring and Review

The vessel contractor will have specific contractual compliance obligations associated with implementing the EP, OPEP and other applicable plans. Western Gas will monitor the contractors against these obligations both in terms of deliverables and quality.

9.9.4 Management of Non-Conformance

Non-conformances comprise incidents, audit findings, failures to meet defined outcomes and objectives, and deviations from standards and procedures. Other potential improvements may be identified via observations of potential reductions to risk(s) or improved performance. Mechanisms for identifying and managing non-conformances associated with the Activity include:

- Audits and inspections (e.g., those conducted prior to or during the Activity);
- Incident reports;
- Reports from personnel (e.g., hazard observations); and
- Incidents such as spills.

A key mechanism to resolve potential non-conformances is the daily meeting (‘Morning Call’), whereby the Western Gas Project Offshore Representative will communicate these items to Western Gas onshore management. Depending on the nature and level of non-conformance, the issue may be recorded in the vessel contractor’s and/or Western Gas’ non-conformance process (Corrective Actions Register). For example, a low risk observation around waste segregation identified offshore by a Vessel Contractor may only be recorded in the contractor’s non-conformance process. A spill of oil to sea will be of greater concern (risk) and benefit in Western Gas following up and recording through its own systems. It is the responsibility of the Western Gas Project Offshore Representative and Western Gas Survey Project Manager to determine the appropriate recording of the incident with regard to Western Gas’ HSE Management System.

9.10 OIL POLLUTION EMERGENCY PLAN

Regulation 14(8) of the OPGGS (E) Regulations 2009 requires the implementation strategy to contain an OPEP and the provision for the OPEP to be updated. A summary of the regulatory requirements and a reference to where the obligations are met is provided below.

9.10.1 Review of OPEP

The OPEP should be reviewed internally at least annually, in addition, the OPEP will be reviewed under the following circumstances:

- Prior to undertaking a new activity not currently provided for, and prior to the submission or re-submission of a new Environment Plan for activities, in accordance with the MoC process.
- Following any exercises or other means of testing of the arrangements, as required, to capture learnings.
- Following activation, to capture lessons learned.

Changes to the OPEP or the OSMP resulting from exercise outcomes, altered contractual arrangements, corrective actions, routine information updates (i.e., contact details change), or other items will be managed as per the MoC process.

9.10.2 Testing Arrangements

In accordance with Regulation 14 (8A) & (8C) of the OPGGS(E)R, the response arrangements will be tested:

- When they are introduced;
- When they are significantly amended;
- Not later than 12 months after the most recent test; 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 arrangement in relation to the new location as soon as practicable after it is added to the plan.

As required by the Environment Regulation 14(8A), the testing must relate to the nature and scale of the risk of oil pollution relevant to this exploration drilling activity.

Testing arrangements and objectives appropriate to the nature and scale of Western Gas's activities are detailed in Section 9.2 of the OPEP. The exercise will be facilitated by an experienced facilitator.

Western Gas' spill response testing arrangements for the OPEP include the following:

OPEP Exercise: Western Gas will conduct a desk-based emergency response exercise that will be facilitated by an independent consultant attended by IMT members. The objective of the exercise will be to assess:

- Adequacy of the IMT to facilitate a credible spill response.
- Adequacy of the OPEP and associated linkages.
- Notification and communication arrangements.
- Engagement of external parties identified to support the response.
- Media and/or external affairs management.

Observations during this exercise will be noted and reported (formally) by the facilitator to improve the response in an actual event. A written report, with improvement opportunities, will be provided to the Western Gas Executive Director following the exercise, and will be actioned as appropriate.

At the completion of the exercise, the facilitator will hold a debrief session during which the exercise is reviewed, and lessons learned and areas for improvement are identified. All personnel involved in the exercise will attend the post-exercise de-briefing and receive the formal report.

Findings from the exercise will be recorded and tracked to closure to ensure continual improvement.

Any lessons learned from the OPEP Desk-Based Exercise will be applied and the OPEP revised, if required, via the Western Gas Corrective Actions Register. Should such changes be significant, a review of the overall EP may be necessary, as discussed in Section 9.8. Through these exercises, personnel will be made aware of their obligations, contracts with third parties (e.g. critical service providers) will be understood and agreements in place (AMSA) for support will be confirmed including timeframes for implementation as detailed throughout the OPEP. This will aid in the maintenance of a state of readiness and oil spill preparedness.

Although the survey comprises a very short duration (up to seven days, including contingencies), any significant changes to the Activity, the environmental risks posed, or new information that arises in respect of the OPEP desk-based exercise, will trigger a review of the EP and OPEP, which will be modified accordingly. If significantly changed, the OPEP may be re-tested by way of a further OPEP Desk-Based Exercise.

In addition, regular incident response drills as outlined in the contractor's management systems will be completed on the vessel to aid in refreshing crew members in the use of emergency procedures and equipment.

Regular SOPEP drills and exercises will be carried out on all vessels in line with IMO and SOPEP requirements. The aim of these drills and exercises is to maintain the crew's knowledge, skills and proficiency, to increase emergency response efficiency and effectiveness of procedures and to detect faulty equipment. These drills and exercises include, but are not limited to, spill response, collision, fire and explosion. The Vessel Master is responsible for maintaining records of these drills.

The testing schedule for the OPEP is provided in Table 9-9.

Table 9-9: Testing arrangements for the OPEP

Test	Objective	Schedule	Mechanisms to assess effectiveness	Mechanisms to address recommendations arising from the test
OPEP Desk-Based Exercise	Scenario will include Level 2/3 oil spill. Adequacy of the IMT to facilitate a credible spill response. Adequacy of the OPEP and associated linkages. Notification and communication arrangements. Engagement of external parties identified to support the response. Media and/or external affairs management.	At least fourteen (14) days prior to the survey.	Assessment by external parties against requirements of the activity OPEP Feedback from external observers. Feedback from exercise participants. Written report incorporating feedback by exercise facilitator.	Tracking through Western Gas Corrective Action Register. Document updates as required. Additional training if required.
General Equipment Availability	Test that suppliers identified in the OPEP who provide critical equipment have the equipment available for immediate response.	At least ten (10) days prior to survey.	Email confirmation from suppliers of their current stock levels along with details of time to mobilise.	Tracking through Western Gas Corrective Action Register.
EP Audit	Ensure that the commitments relevant to spill response made in the EP and OPEP are being carried out as planned. Test understanding of those accountable for Performance Standards.	Onshore – at least one (1) week prior to vessel departure Offshore within one (1) day of vessel departure	Review of commitments made in EP & OPEP. Written report.	Tracking through Western Gas Corrective Action Register. Document updates as required. Additional training if required.

9.10.3 Equipment Maintenance and Inspection

The day-to-day storage, inspection and maintenance of response equipment is managed in accordance with manufacturer requirements by the equipment owner through contractual agreement. Information about the equipment's location, quantity and readiness for use is provided regularly to Western Gas.

10 RELVANT PERSONS AND ORGANISATIONS CONSULTATION

Section 280 of the OPGGS Act

(2) A person (the first person) carrying on activities in an offshore area under the permit, lease, licence, authority or consent must carry on those activities in a manner that does not interfere with:

(a) navigation; or

(b) fishing; or

(c) the conservation of the resources of the sea and seabed; or

(d) any activities of another person being lawfully carried on by way of:

(i) exploration for, recovery of or conveyance of a mineral (whether petroleum or not); or

(ii) construction or operation of a pipeline; or

(iii) offshore infrastructure activities (within the meaning of the *Offshore Electricity Infrastructure Act 2021*); or

Regulation 9(8) of the Environment Regulations

All sensitive information (if any) in an environment plan, and the full text of any response by a Relevant Person to consultation under regulation 11A in the course of preparation of the plan, must be contained in the sensitive information part of the plan and not anywhere else in the plan.

Regulation 10(A) of the Environment Regulations

For regulation 10, the criteria for acceptance of an environment plan are that the plan:

…

(g) demonstrates that:

(i) the titleholder has carried out the consultations required by Division 2.2A; and

(ii) the measures (if any) that the titleholder has adopted, or proposes to adopt, because of the consultations are appropriate;

Division 2.2A - Consultation

11(A) Consultation with relevant authorities, persons and organisations etc.

(1) In the course of preparing an environment plan, or a revision of an environment plan, a titleholder must consult each of the following (a Relevant Person):

a. Each department or agency of the commonwealth to which the activities to be carried out under the environment plan, or the revision of the environment plan may be relevant;

b. Each department or agency of the 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

(2) For the purpose of consultation, the titleholder must give each Relevant Person sufficient information to allow the Relevant Person to make an informed assessment of the possible consequences of the activity on the functions, interests or activities of the Relevant Person

(3) The titleholder must allow a Relevant Person a reasonable period for the consultation

Regulation 11A (2) of the Environment Regulations

2) For the purpose of the consultation, the titleholder must give each Relevant Person sufficient information to allow the Relevant Person to make an informed assessment of the possible consequences of the activity on the functions, interests or activities of the Relevant Person.

Regulation 11A (3) of the Environment Regulations

(3) The titleholder must allow a Relevant Person a reasonable period for the consultation.

Regulation 11A (4) of the Environment Regulations

(4) The titleholder must tell each Relevant Person the titleholder consults that:

(a) the Relevant Person may request that particular information the Relevant Person provides in the consultation not be published; and

(b) information subject to such a request is not to be published under this Part.

Regulation 13 of the Environment Regulations

Description of the environment

(2) The environment plan must:

(a) describe the existing environment that may be affected by the activity; and
(b) include details of the particular relevant values and sensitivities (if any) of that environment.

Note: The definition of environment in regulation 4 includes its social, economic and cultural features.

(3) Without limiting paragraph (2)(b), particular relevant values and sensitivities may include any of the following:

(a) the world heritage values of a declared World Heritage property within the meaning of the EPBC Act;
(b) the national heritage values of a National Heritage place within the meaning of that Act;
(c) the ecological character of a declared Ramsar wetland within the meaning of that Act;
(d) the presence of a listed threatened species or listed threatened ecological community within the meaning of that Act;
(e) the presence of a listed migratory species within the meaning of that Act;
(f) any values and sensitivities that exist in, or in relation to, part or all of:

Division 2.3 - Contents of an Environment Plan

14(9) The implementation strategy must provide for appropriate consultation with:
a) relevant authorities of the Commonwealth, a State or Territory; and
b) other relevant interested person or organisations.

Division 2.3 - Contents of an Environment Plan

The environment plan must contain the following:

16(b) a report on all consultations between the titleholder and any Relevant Person, for regulation 11A, that contains:

i. a summary of each response made by a Relevant Person; and

ii. an assessment of the merits of any objection or claim about the adverse impact of each activity to which the environment plan relates; and

iii. a statement of the operator's response, or proposed response, if any, to each objection or claim; and

iv. a copy of the full text of any response by a Relevant Person;

10.1 RELEVANT PERSON AND ORGANISATION IDENTIFICATION

Western Gas has followed the requirements of Regulation 11A (1) of the Environment Regulations to identify and consult Relevant Persons, these being:

- Each Department or agency of the Commonwealth to which the activities to be carried out under the EP, or the revision of the environment plan, may be relevant.
- 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.
- The Department of the responsible State Minister, or the responsible Northern Territory Minister.
- 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.
- Any other person or organisation that the titleholder considers relevant.

Western Gas has also considered the following guidance:

- NOPSEMA:
  - GL2086 – Consultation in the course of preparing an environment plan guideline – December 2022
  - GL1721 - Environment plan decision making - December 2022
  - GN1847 - Responding to public comment on environment plans - July 2022
  - GN1344 - Environment plan content requirements - September 2020
  - GN1488 - Oil pollution risk management - July 2021
  - GN1785 – Petroleum activities and Australian Marine Parks – June 2020
  - GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area – January 2023

- Australian Fisheries Management Authority:
  - Petroleum industry consultation with the commercial fishing industry
  - Driving better relations between the commercial fishing and offshore petroleum industries
- Australian Heritage Commission
  - Ask First - A guide to respecting Indigenous heritage places and values
- Commonwealth Department of Agriculture, Fisheries and Forestry
  - Fisheries and the Environment – Offshore Petroleum and Greenhouse Gas Act 2006
  - Offshore Installations Biosecurity Guide
- Commonwealth Department of Climate Change, Energy, the Environment and Water
  - Interim Engaging with First Nations People and Communities on Assessments and Approvals under the Environment Protection and Biodiversity Conservation Act 1999
- WA Department of Primary Industries and Regional Development:
  - Guidance statement for oil and gas industry consultation with the Department of Fisheries
- WA Department of Transport:
  - Offshore Petroleum Industry Guidance Note - Marine Oil Pollution: Response and Consultation Arrangements
- Western Australian Fishing Industry Council:
  - Consultation approach for unplanned events

10.2 APPLICABLE CASE LAW

In December 2022 NOPSEMA issued the Guideline Consultation in the course of preparing an environment plan guideline to assist Titleholders comply with their obligations to consult Relevant Persons.

This Guideline followed the decision of Justice Bromberg in *Tipakalippa v National Offshore Petroleum Safety and Environmental Management Authority (No. 2) [2022] FCA 1121* and the Full Federal Court in *Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 (Appeal Decision)*.

Western Gas has considered the implications of the Appeal Decision and NOPSEMA's subsequent guidance, including the following definitions for "Functions, Activities and Interests" referenced in Regulation 11A(1)(d), these being:

Functions Refers to "a power or duty to do something".

Activities To be read broadly and is broader than the definition of 'activity' in regulation 4 of the Environmental Regulations and is likely directed to what the Relevant Person is already doing.

Interests To be construed as conforming with the accepted concept of "interest" in other areas of public administrative law. Includes "any interest possessed by an individual whether or not the interest amounts to a legal right or is a proprietary or financial interest or relates to reputation".

10.3 WESTERN GAS STAKEHOLDER CONSULTATION APPROACH

Western Gas is committed to early and open engagement with authorities, persons or organisations (Relevant Persons) whose Functions, Interests and Activities are potentially affected by planned activities.

Consultation with Relevant Persons for this EP builds on Western Gas' ongoing stakeholder engagement approach in the region, which seeks to:

- Build on historic EP consultation activities relating to the development of Western Gas' Equus Gas Project and regional exploration activities.
- Provide opportunities for potentially Relevant Persons not identified by Western Gas to have a say about the proposed Activity.
- Ensure consultation is targeted and in a way that is appropriate to the interests and information needs of Relevant Persons, as well as providing sufficient time for Relevant Persons to provide a response.
- Maintain open communications and incorporate feedback from Relevant Persons into activity planning considerations.
- Follow up Relevant Persons whose Functions, Interests or Activities are likely to be affected where a response has not been received.
- Respond to Relevant Persons, including advice on how their feedback has been considered in Activity planning and where controls measures have been considered.
- Establish Relevant Person expectations for ongoing consultation during the life of the EP, including where requested/agreed:
    - Provision of pre and post activity notifications.
    - Development of on-water communications protocols to ensure safe on-water interactions during activities.
    - Development of planning arrangements to support timely and efficient emergency response.

10.4 RELEVANT PERSON IDENFITICATION AND CONSULTATION OVERVIEW

Western Gas has a six-step process for the identification and consultation of Relevant Persons, as reflected in Figure 10-1.

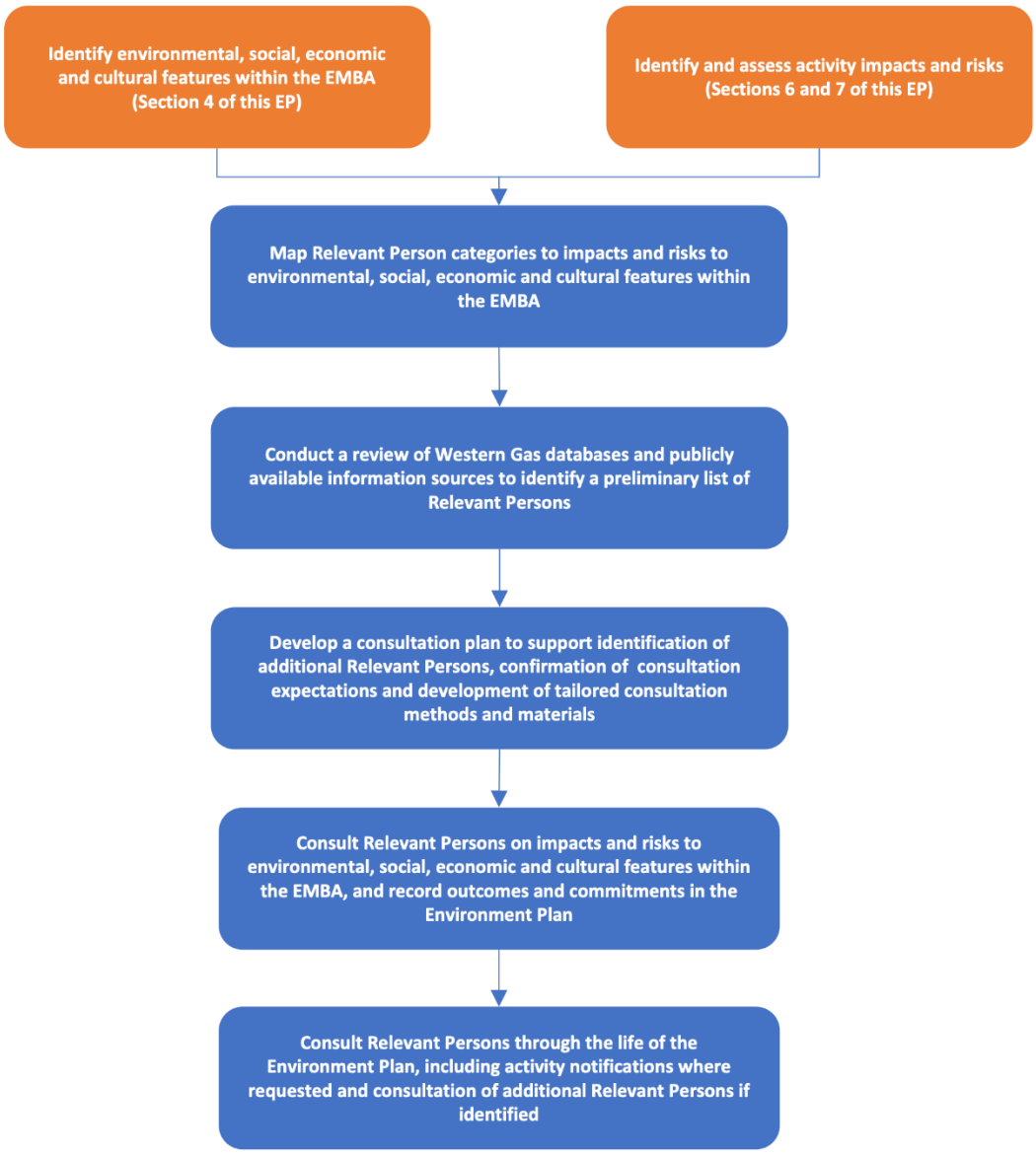

Figure 10-1 Western Gas Environment Plan Consultation Approach

10.5 RELEVANT PERSON IDENTIFICATION

10.5.1 Relevant Person mapping

Table 10-1 shows the mapping of Relevant Person category groups to values and sensitivities in the EMBA, as described in Section 4 of this EP.

Table 10-1: Map Relevant Person category groups to values and sensitivities.

Values and sensitivities	EP Reference	Relevant Person Category Group
Australian Marine Parks	Section 4.4.2	• Government agencies – Commonwealth and State
Key ecological features	Section 4.4.3	• Government agencies – Commonwealth and State
Fisheries	Section 4.4.4	• Commercial fishing licence holders • Government agencies – Commonwealth and State • Industry associations – commercial fishing
Tourism	Section 4.4.5	• Tourism operators • Industry associations – marine tourism
Oil and Gas industry	Section 4.4.6	• Petroleum industry titleholders
Commercial shipping	Section 4.4.7	• Commercial shipping operators • Government agencies – Commonwealth and State
Defence	Section 4.4.8	• Government agencies – Commonwealth
Cultural Heritage	Section 4.4.9	• First Nations people • Government agencies – Commonwealth and State
World Heritage	Section 4.4.10	• Environmental conservation organisations • First Nations people • Government agencies – Commonwealth and State
National Heritage	Section 4.4.11	• Environmental conservation organisations • First Nations people • Government agencies – Commonwealth and State
Ramsar wetlands	Section 4.4.12	• Not applicable - no Ramsar wetlands occur within the EMBA
Listed Threatened Species or Ecological Communities and BIAs	Section 4.4.13	• Environmental conservation organisations • First Nations people • Government agencies – Commonwealth and State
Environmentally Sensitive Windows	Section 4.4.14	• Environmental conservation organisations • First Nations people • Government agencies – Commonwealth and State

Table 10-2 to Table 10-4 shows the mapping of Relevant Person category groups to impacts and risks in the EMBA, as described in Sections 6 and 7 of this EP.

Table 10-2: Map Relevant Person category groups to activity impacts arising from the ongoing presence of the wellheads.

Activity	Potential impacts	Relevant Person Category Group
Ongoing presence of the wellheads	**Physical**	
	Physical presence of the wellheads may cause interference.	• Commercial fishing licence holders • Government agencies – Commonwealth and State • Industry associations – commercial fishing
	Physical presence of the wellheads may cause snagging risks to trawl fisheries.	• Commercial fishing licence holders • Government agencies – Commonwealth and State • Industry associations – commercial fishing
	Ecological	
	Ecological values that may be impacted include: • Plankton • Fish • Marine mammals • Commonwealth Protect marine values • State Protected marine values	• Commercial fishing licence holders • Environmental conservation organisations • First Nations people • Government agencies – Commonwealth and State • Industry associations – commercial fishing
	Social, Economic and Cultural	
	Impacts to the functions, activities and interests of stakeholders relevant to: • Commercial fishing activities • Defence activities • Indigenous values • Petroleum activities • Shipping activities	• Commercial fishing licence holders • Environmental conservation organisations • First Nations people • Government agencies – Commonwealth and State • Industry associations – commercial fishing, petroleum industry • Adjacent titleholders

Table 10-3: Map Relevant Person category groups to activity impacts arising from the vessel-based surveys.

Activity	Potential impacts	Relevant Person Category Group
Vessel-based surveys	**Physical**	
	Physical presence of the wellheads may cause interference or displacement.	• Commercial fishing licence holders • Government agencies – Commonwealth and State • Industry associations – commercial fishing
	Ecological	
	Ecological values that may be impacted include: • Plankton • Fish • Marine mammals • State Protected Marine Values	• Commercial fishing licence holders • Government agencies – Commonwealth and State • Industry associations – commercial fishing

	Social, Economic and Cultural	
	Impacts to the functions, activities and interests of stakeholders relevant to: • Commercial fishing activities • Defence activities • Indigenous values • Petroleum activities • Shipping activities	• Commercial fishing licence holders • Environmental conservation organisations • First Nations people • Government agencies – Commonwealth and State • Industry associations – commercial fishing, petroleum industry • Adjacent titleholders

Table 10-4: Map Relevant Person category groups to activity risks.

Activity	Unplanned risks	Relevant Person Category Group
Vessel-based surveys	Accidental introduction of invasive marine species.	• Commercial fishing licence holders • Government agencies – Commonwealth and State • Industry associations – commercial fishing
	Oil spill resulting from a worst-case credible oil spill.	• Commercial fishing licence holders • Communities • Environmental conservation organisations • First Nations people • Government agencies – Commonwealth and State • Industry associations – commercial fishing, petroleum industry, marine tourism, local business • Local Government Authorities • Petroleum industry • Recreational fishers • Tourism operators

10.5.2 Review of Western Gas databases and public information

Western Gas researched Relevant Person category groups using information sources described in Table 10-5 to identify a preliminary list of authorities, persons and organisations (Relevant Persons) whose functions, interests or activities may be affected by potential impacts and unplanned risks.

Table 10-5: Relevant Person category group review.

Relevant Person category	Information sources
All Relevant Person categories	• Review Relevant Person feedback from historic Western Gas consultation activities for its Equus Gas Project and regional exploration activities. • Review Regulator accepted EPs (other Operators) for similar regional activities to those planned by Western Gas. • Review of media coverage and organisation web sites to identify persons and organisations with demonstrated functions, interests and activities relevant to activities to those planned by Western Gas.

Academic and Research Organisations	• Review of academic and research organisations with demonstrated interests in activities similar to those planned by Western Gas.
Commercial Fishing	• Review of Commonwealth and WA State Government commercial fishing catch and effort data to assess fisheries with a fishing history in the Operational Area and those that are entitled to fish in the EMBA.
Communities	• Review of EMBA overlap with boundaries of Local Government Areas to identify potentially affected local communities.
Environmental conservation organisations	• Review of environmental conservation organisations to identify those with an interest in similar petroleum activities to those planned by Western Gas.
First Nations people	• Review of EMBA overlap with Native Title determined areas and claims. • Search of public cultural heritage databases relative to the Activity Area and the EMBA, including: o Australasian Underwater Cultural Heritage Database. o WA Aboriginal Heritage Inquiry System.
Governments – Commonwealth and State	• Review of government agency websites and directories to understand agency roles and functions. • Review of NOPSEMA and government agency guidance on consultation expectations.
Governments – Foreign	• Review of EMBA overlap with foreign territorial boundaries.
Industry Associations	• Review of EMBA overlap with boundaries of Local Government Areas to identify potentially affected local businesses.
Infrastructure owners	• Review of EMBA overlap with offshore and onshore infrastructure, such as submarine telecommunications cables, ports.
Local Government Authorities	• Review of EMBA overlap with boundaries of Local Government Areas.
Petroleum industry	• Review of petroleum titles adjacent to Western Gas titles where activities are planned. • Review of EMBA overlap with other petroleum titles.
Recreational fishers	• Review of EMBA overlap with areas of interest to recreational fishers.
Tourism operators	• Review of EMBA overlap with areas of interest to tourism operators.

10.6 ACTIVITY CONSULTATION PLAN

Western Gas developed a plan to consult Relevant Persons identified through mapping and research activities, as well as to identify additional potentially Relevant Persons. In summary, these activities included:

- Publication of public notices in the following media outlets inviting feedback from potentially Relevant Persons:
  - The West Australian newspaper – WA State-wide readership
  - The Geraldton Guardian newspaper – Exmouth region readership
  - Pilbara News newspaper – Onslow region readership

- Development of an explanatory cover email explaining to Relevant Persons why they were being consulted, how they could provide feedback and how their feedback would be used in the EP.
- Development of a consultation information sheet, summarising proposed activities, as well as key Activity impacts and risks.
- Development of maps for some Relevant Persons where functions, activities or interests were likely to be affected.
- Provision of a 30-day consultation timeframe for review of consultation information and response.
- Publication of the consultation information sheet on the Western Gas web site.
- Development of a register to track and record consultation activities related to this EP.

Table 10-6 outlines a list of Relevant Persons identified through the category group mapping and research activities.

No additional Relevant Persons were identified through the provision of public notices in metropolitan and regional media.

Table 10-6 also outlines consultation methods tailored to the functions, interests, and activities for specific Relevant Persons.

Table 10-6: Relevant Person Identification and Assessment

Relevant Person	Relevant Person function, interest or activity	Assessment of how the Relevant Person may be affected by Activity impacts or risks	Consultation plan activities
Each Department or agency of the Commonwealth to which the activities to be carried out under the environment plan, or the revision of the environment plan, may be relevant.			
Australian Border Force (ABF)	ABF is responsible for the security of Australia's maritime waters.	The proposed vessel-based survey has the potential to impact maritime security activities. A marine pollution event has the potential to impact maritime security activities.	Send ABF an activity email and consultation information sheet. Consult AMSA and AHO on roles to manage the interest of all marine users in the event of a marine pollution event.
Australian Fisheries Management Authority (AFMA)	AFMA is responsible for managing Commonwealth fisheries and is a relevant agency where the activity has the potential to impact on fisheries resources in Commonwealth-managed fisheries.	The Western Deepwater Trawl Fishery is potentially impacted by proposed activities (Refer Section 6.4.1), though on-water interactions are unlikely given the week-long duration of the annual vessel-based surveys (Refer Section 2.4). The ongoing presence of the abandoned wellheads is unlikely to present a hazard to trawl fishers entitled to fish at the well locations given the water depths and current fishing industry capabilities (Refer Section 1.1). The ongoing presence of the abandoned wellheads is unlikely to present a risk to the health of target fish species of the Western Deepwater Trawl Fishery (Refer Section 6.3.1). The following Commonwealth fisheries are within the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.4.4): • Australian Southern Bluefin Tuna • North West Slope Trawl Fishery • Western Deepwater Trawl Fishery • Western Skipjack and Tuna • Western Tuna and Billfish Fishery	Send AFMA an activity email, consultation information sheet and a map showing the Western Deepwater Trawl Fishery relevant to the well locations. Advise AFMA that licence holders in the Western Deepwater Trawl Fishery and the fishery's representative organisations - Commonwealth Fisheries Association and Western Australia Fishing Industry Council - are being consulted. Confirm communications expectations to support effective and efficient emergency response arrangements.

Relevant Person	Relevant Person function, interest or activity	Assessment of how the Relevant Person may be affected by Activity impacts or risks	Consultation plan activities
Australian Hydrographic Office	AHO is responsible for maintaining and disseminating nautical charts, including the distribution of Notice to Mariners.	AHO's services will be required to manage communications to mariners prior to the start and upon completion of the vessel-based surveys. AHO's services will be required to ensure the locations of the abandoned and suspended wells remain on nautical charts. AHO's services may be required to support communications to mariners in the event of a marine pollution event.	Send AHO an activity email, consultation information sheet and a map showing marine shipping fairways relevant to the well locations. Confirm communications expectations to support effective and efficient emergency response arrangements.
Australian Maritime Safety Authority (AMSA) - Search and Rescue (SAR) Operations, Emergency Response Division	AMSA is the statutory and control agency for maritime safety and vessel emergencies in Commonwealth Waters. AMSA is a relevant agency when proposed offshore activities may impact on the safe navigation of commercial shipping in Australian waters.	AMSA's services may be required to support emergency response arrangements should they be required. AMSA has requested for previous Western Gas activities that its SAR Operations be advised no less than 48 hours prior to the commencement and upon completion of activities.	Send AMSA an activity email, consultation information sheet and a map showing marine shipping fairways relevant to the well locations. Confirm communications expectations to support effective and efficient emergency response arrangements.
Australian Maritime Safety Authority (AMSA) - Marine Pollution	AMSA is the statutory and control agency for marine pollution in Commonwealth Waters.	AMSA's services may be required to support marine pollution response in the event of a marine diesel oil spill.	Send AMSA an activity email and consultation information sheet. Send AMSA a copy of the OPEP.
Department of Agriculture, Fisheries and Forestry (DAFF) - Fisheries	DAFF (fisheries) has primary policy responsibility for promoting the biological, economic and social sustainability of Australian fisheries. The Department is a relevant agency for consultation where the activity has the potential to negatively impact fishing operations and/or fishing habitats in Commonwealth waters.	The Western Deepwater Trawl Fishery is potentially impacted by proposed activities (Refer Section 6.4.1), though on-water interactions are unlikely given the week-long duration of the annual vessel-based surveys (Refer Section 2.4). The ongoing presence of the abandoned wellheads is unlikely to present a hazard to trawl fishers entitled to fish at the well locations given the water depths and current fishing industry capabilities (Refer Section 1.1).	Send DAFF an activity email, consultation information sheet and a map showing the Western Deepwater Trawl Fishery relevant to the well locations. Advise DAFF that licence holders in the Western Deepwater Trawl Fishery and the fishery's representative organisations - Commonwealth Fisheries Association and Western Australia Fishing Industry Council - are being consulted.

Relevant Person	Relevant Person function, interest or activity	Assessment of how the Relevant Person may be affected by Activity impacts or risks	Consultation plan activities
		The ongoing presence of the abandoned wellheads is unlikely to present a risk to the health of target fish species of the Western Deepwater Trawl Fishery (Refer Section 6.3.1). The following Commonwealth fisheries are within the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.4.4): • Australian Southern Bluefin Tuna • North West Slope Trawl Fishery • Western Deepwater Trawl Fishery • Western Skipjack and Tuna • Western Tuna and Billfish Fishery	Confirm communications expectations to support effective and efficient emergency response arrangements.
Department of Agriculture, Fisheries and Forestry (DAFF) – IMS/Biosecurity	DAFF (fisheries) has primary policy responsibility for the management biosecurity matters in Australia.	The risk of IMS being introduced and causing impacts in the Operational Area was not considered to be credible (Refer Section 7).	Send DAFF an activity email and consultation information sheet.
Department of Climate Change, Energy, the Environment and Water (DCCEEW) – Sea Dumping	DCCEEW administers the Environment Protection (Sea Dumping) Act 1981. The Sea Dumping Act regulates the loading and dumping of waste at sea and the creation of artificial reefs in Australian waters.	The proposed vessel-based survey and ongoing presence of the wellheads do not impact DCCEEW's functions, activities or interests. The proposed ongoing presence of the abandoned wellheads impacts will require permitting by DCCEEW.	Send DCCEEW an activity email and consultation information sheet. Commence discussions with DCCEEW on applications for sea dumping permits.
Department of Defence (DoD)	DoD is responsible for defending Australia and its national interests.	The proposed vessel-based survey location is within DoD's North West Exercise Area (NWXA) and has the potential to impact DoD training activities. A marine pollution event has the potential to impact DoD training activities.	Send DoD an activity email, consultation information sheet and a map showing the NWXA relevant to the well locations. Confirm communications expectations to support effective and efficient emergency response arrangements.
Department of Foreign Affairs and Trade (DFAT)	DFAT promotes and protects Australia's international interests to support our security and prosperity.	The proposed vessel-based survey and ongoing presence of the wellheads do not impact DFAT's functions, activities or interests.	Send DFAT an activity email and consultation information sheet.

Relevant Person	Relevant Person function, interest or activity	Assessment of how the Relevant Person may be affected by Activity impacts or risks	Consultation plan activities
		DFAT's functions, activities or interests may be impacted in the event of a marine pollution event as the modelled widest extent of possible oil dispersion extends beyond the Exclusive Economic Zone (Refer Section 7.1). The widest extent of possible oil dispersion in the event of a marine diesel oil spill is not predicted to enter the territorial sea of a foreign country.	Confirm communications expectations to support effective and efficient emergency response arrangements.
Director of National Parks (DNP)	DNP is the statutory authority responsible for administration, management and control of Commonwealth marine reserves (CMRs). The Director of National Parks is a Relevant Person for consultation where: • The activity or part of the activity is within the boundaries of a proclaimed Commonwealth marine reserve. • Activities proposed to occur outside a reserve may impact on the values within a Commonwealth marine reserve; and / or • An environmental incident occurs in Commonwealth waters surrounding a Commonwealth marine reserve and may impact on the values within the reserve.	The proposed vessel-based survey and the ongoing presence of the abandoned wellheads do not impact the values of any Commonwealth marine reserves (Refer Section 4.4). The following Australian Marine Parks are within the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.4.2): • Gascoyne Marine Park • Ningaloo Marine Park • Carnarvon Canyon Marine Park	Send DNP an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.
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.			
Department of Biodiversity and Conservation Attractions (DBCA)	DBCA is responsible for the management of Western Australian marine and terrestrial parks and reserves and protected marine fauna and flora.	The proposed vessel-based survey and the ongoing presence of the abandoned wellheads do not impact the values of any Western Australian marine or terrestrial parks and reserves (Refer Section 4.4.1). The following Western Australian marine parks and reserves are outside but within proximity of	Send DBCA an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.

Relevant Person	Relevant Person function, interest or activity	Assessment of how the Relevant Person may be affected by Activity impacts or risks	Consultation plan activities
		the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.4.2): • Ningaloo Marine Park • Muiron Islands Marine Management Area	
Department of Primary Industries & Regional Development (DPIRD)	DPIRD is responsible for the management and sustainable use of Western Australian fisheries resources.	The proposed vessel-based survey and the ongoing presence of the abandoned wellheads are unlikely to impact the functions, activities or interests of any Western Australian State-managed fisheries (Refer Section 4.4.4). The following Western Australian State-managed fisheries are within the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.4.4): • Abalone • Gascoyne Demersal Scalefish • Mackerel Fishery (Areas 2 and 3) • Marine Aquarium • Onslow Prawn • Pearl Oyster • Pilbara Crab Fishery • Pilbara Fish Trawl • Pilbara Line Fishery • Pilbara Trap • Shark Bay Prawn • Shark Bay Scallop • South West Coast Salmon • Specimen Shell • West Coast Deep Sea Crustacean • West Coast Rock Lobster	Send DPIRD an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.
Department of Transport (DoT) - marine pollution	DoT is responsible for marine pollution response in State Waters.	The modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill	Send DoT an activity email and consultation information sheet.

Relevant Person	Relevant Person function, interest or activity	Assessment of how the Relevant Person may be affected by Activity impacts or risks	Consultation plan activities
		is outside but within proximity of State waters (Refer Section 4.2.1). DoT's functions will be activated if marine pollution enters State waters.	Send DoT a copy of the OPEP.
Ningaloo Coast World Heritage Advisory Committee (NCWHAC)	The NCWHAC provides advice to the Commonwealth and State Environment Ministers on the protection, conservation and management of the Outstanding Universal Values of the Ningaloo Coast World Heritage Area.	The Ningaloo Coast World Heritage Area is within the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.4.2).	Send NCWHAC an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.
Pilbara Development Commission (PDC)	The PDC works across government, with public and private sector organisations to support the economic growth, internationalisation, and diversification of the Pilbara economy.	Vessel-based activities are likely to depart from a Pilbara based port.	Send PDC an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.
Pilbara Ports Authority (PPA)	PPA is encompasses the ports of Ashburton, Dampier, Port Hedland and Varanus Island.	Vessel-based activities are likely to depart from a Pilbara based port. DoT's functions will be activated if marine pollution enters State waters.	Send PPA an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.
The Department of the responsible State Minister, or the responsible Northern Territory Minister			
Department of Industry, Science and Resources (DISR)	DISR is the Department of the relevant Commonwealth Government Minister.	DISR is required to be consulted under Subregulation 11A(1) (c) of the Environment Regulations.	Send DISR an activity email and consultation information sheet.
Department of Mines, Industry Regulation and Safety (DMIRS)	DMIRS is the Department of the relevant Western Australian Government Minister.	DMIRS is required to be consulted under Subregulation 11A(1) (c) of the Environment Regulations. The modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill is outside but within proximity of State waters (Refer Section 7.1.4).	Send DMIRS an activity email and consultation information sheet.

Relevant Person	Relevant Person function, interest or activity	Assessment of how the Relevant Person may be affected by Activity impacts or risks	Consultation plan activities
Persons or organisations 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.			
Academic and Research Organisations			
No academic and research organisations were considered Relevant Persons given the remote, deep-water location of the wellheads and the short duration and physical presence of the vessel-based annual surveys.	NA	NA	NA
Commercial Fishing - Commonwealth			
Western Deepwater Trawl Fishery	The Western Deepwater Trawl Fishery operates in Commonwealth waters off the coast of Western Australia.	Effort in recent years has been localised in the area offshore and slightly south of Shark Bay. ABARES fishery status reports show that between 2011-2021 no fishing occurred int he Operational Area (Refer Section 7.5.1.1).	Send licence holders an activity email, consultation information sheet and a map showing the Western Deepwater Trawl Fishery relevant to the well locations. Send representative organisations - Commonwealth Fisheries Association and Western Australia Fishing Industry Council - an activity email, consultation information sheet and a map showing the Western Deepwater Trawl Fishery relevant to the well locations. Confirm communications expectations to support effective and efficient emergency response arrangements.
Communities			
Exmouth	Exmouth is a regional coastal town within the Shire of Exmouth.	Proposed activities are 150 km north of Exmouth. The modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill is outside but within proximity of the Shire of Exmouth.	Send Shire of Exmouth an activity email and consultation information sheet. Place advertisement in the Geraldton Guardian newspaper seeking feedback from potentially Relevant Persons.
Onslow	Onslow is a regional coastal town within the Shire of Ashburton.	Proposed activities are 180 km northwest of Onslow.	Send Shire of Ashburton an activity email and consultation information sheet.

Relevant Person	Relevant Person function, interest or activity	Assessment of how the Relevant Person may be affected by Activity impacts or risks	Consultation plan activities
		The modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill is outside but within proximity of the Shire of Ashburton.	Place advertisement in the Pilbara News newspaper seeking feedback from potentially Relevant Persons.
Environmental Conservation Organisations			
Conservation Council of Western Australia (CCWA)	CCWA is Western Australia's peak not-for-profit, non-government conservation and environment organisation.	CCWA has a demonstrated interest in regional petroleum activities.	Send CCWA an activity email and consultation information sheet.
Cape Conservation Group (CCG)	CCG is a volunteer, not-for-profit organisation that is involved in protecting the terrestrial and marine environment of the North West Cape.	CCG has a demonstrated interest in regional petroleum activities.	Send DNP an activity email and consultation information sheet.
Protect Ningaloo (PN)	The PN campaign aims to protect Exmouth Gulf from the threat of industrialisation, and conserve its outstanding natural, cultural and social values.	PN has a demonstrated interest in regional petroleum activities.	Send DNP an activity email and consultation information sheet.
First Nations Peoples			
Yamatji Marlpa Aboriginal Corporation	YMAC is the Native Title Representative Body for the Yamatji and Pilbara regions of Western Australia. YMAC exists to assist native title claimants and holders and provides some services to the NTGAC at its request. YMAC is identified in the North-west Marine Parks Network Management Plan 2018 (DNP, 2018) as the Native Title Representative Body for six marine parks (Refer Section 4.4.2).	The proposed vessel-based survey and ongoing presence of the wellheads are outside of any determined Native Title Determination areas (Refer Section 4.4.9). There are no Indigenous heritage or protected areas in proximity of the well locations (Refer Section 4.4.9). The modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill is outside but within proximity of the determined NTGAC Native Title Determination area (Refer Section 4.2). It is unclear whether cultural values and sensitivities may be impacted by activities or	Send YMAC an activity email and consultation information sheet. Seek feedback on potential impacts to cultural values and sensitivities by activities or risks on behalf of NTGAC. Seek input from YMAC on consultation expectations for First Nations people, in addition to consultation of BTAC and NTGAC. Confirm communications expectations to support effective and efficient emergency response arrangements.

Relevant Person	Relevant Person function, interest or activity	Assessment of how the Relevant Person may be affected by Activity impacts or risks	Consultation plan activities
		risks, or whether additional organisations should be consulted.	
Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC)	NTGAC is the Registered Native Title Body Corporate for the Baiyungu and/or Thalanyji People. NTGAC assumed responsibility for native title matters in 2019 following determination of the Gnulli Native Title claim over the land and waters of North West Cape. NTGAC is responsible for native title matters in the north of the Determination area.	The proposed vessel-based survey and ongoing presence of the wellheads are outside of the determined Native Title Determination area (Refer Section 4.2). There are no Indigenous heritage or protected areas in proximity of the well locations (Refer Section 4.4.9). The modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill is outside but within proximity of the determined Native Title Determination area (Refer Section 4.2). It is unclear whether cultural values and sensitivities may be impacted by activities or risks.	Send NTGAC an activity email and consultation information sheet. Seek input from NTGAC on whether cultural values and sensitivities may be impacted by activities or risks. Confirm communications expectations to support effective and efficient emergency response arrangements.
Buurabalayji Thalanyji Aboriginal Corporation (BTAC)	BTAC is the Registered Native Title Body Corporate for the Thalanyji People. BTAC was formed in 2008 as a governing body, after the Thalanyji People received native title determination over 11,120 km^2 of land in the West Pilbara.	The proposed vessel-based survey and ongoing presence of the wellheads are outside of the determined Native Title Determination area (Refer Section 4.2). There are no Indigenous heritage or protected areas in proximity of the well locations (Refer Section 4.4.9). The modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill is outside of the determined Native Title Determination area (Refer Section 4.2). It is unclear whether cultural values and sensitivities may be impacted by activities or risks.	Send BTAC an activity email and consultation information sheet. Seek input from BTAC on whether cultural values and sensitivities may be impacted by activities or risks. Confirm communications expectations to support effective and efficient emergency response arrangements.

Relevant Person	Relevant Person function, interest or activity	Assessment of how the Relevant Person may be affected by Activity impacts or risks	Consultation plan activities
Industry Associations			
Australian Petroleum Production & Exploration Association (APPEA)	APPEA represents the interests of oil and gas explorers and producers in Australia.	The proposed vessel-based survey and the ongoing presence of the abandoned wellheads do not impact the activities of other Operators as all activities are to take place within WA-70-R and WA-474-P (Refer Section 4.4.6). A number of Titles are within the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.4.6).	Send APPEA an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.
Australian Southern Bluefin Tuna Industry Association (ASBTIA)	ASBTIA represents the Australian Southern Bluefin Tuna Fishery ASBTIA is listed on the AFMA website as a contact for petroleum operators to use when consultation with the Australian Southern Bluefin Tuna and Skipjack Tuna Fisheries is required.	The proposed vessel-based survey and the ongoing presence of the abandoned wellheads are not expected to impact the activities or interests of licence holders represented by ASBTIA (Refer Section 4.4.4). The Australian Southern Bluefin Tuna and Skipjack Tuna Fisheries are within the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.4.4).	Send ASBTIA an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.
Commonwealth Fisheries Association (CFA)	The CFA is the peak organisation representing Commonwealth fishers. The CFA is listed on the AFMA website as a contact for petroleum operators to use when consultation with the Northern Prawn, North West Slope Trawl, Western Deepwater Trawl, Skipjack Tuna and the Western Tuna and Billfish Fisheries is required.	The proposed vessel-based survey and the ongoing presence of the abandoned wellheads are not expected to impact the activities or interests of licence holders represented by CFA (Refer Section 4.4.4). The North West Slope Trawl, Western Deepwater Trawl, Skipjack Tuna and the Western Tuna and Billfish Fisheries are within the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.4.4).	Send CFA an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.

Relevant Person	Relevant Person function, interest or activity	Assessment of how the Relevant Person may be affected by Activity impacts or risks	Consultation plan activities
Marine Tourism Association of Western Australia (MTWA)	MTWA represents the charter sector in WA.	The proposed vessel-based survey and the ongoing presence of the abandoned wellheads are not expected to impact the activities or interests of operators represented by MTWA (Refer Section 4.4.5). Marine tourism activities take place within the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.4.5).	Send MTWA an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.
Pearl Producers Association (PPA)	PPA is the peak representative organisation of The Australian South Sea Pearling Industry, with members in Western Australia and the Northern Territory.	The proposed vessel-based survey and the ongoing presence of the abandoned wellheads are not expected to impact the activities or interests of licence holders represented by PPA (Refer Section 4.4.4). The Pearl Oyster Fishery is within the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.4.4).	Send PPA an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.
Recfishwest	Recfishwest is the peak body representing recreational fishers in WA.	The proposed vessel-based survey and the ongoing presence of the abandoned wellheads are not expected to impact the activities or interests of recfishers represented by Recfishwest (Refer Section 4.4.4). Recreational fishing takes place within the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.4.4).	Send Recfishwest an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.
Tuna Australia (TA)	Tuna Australia represents the interests of the Eastern and Western Tuna and Billfish Fisheries of Australia.	The proposed vessel-based survey and the ongoing presence of the abandoned wellheads are not expected to impact the activities or	Send TA an activity email and consultation information sheet.

Relevant Person	Relevant Person function, interest or activity	Assessment of how the Relevant Person may be affected by Activity impacts or risks	Consultation plan activities
	Tuna Australia is listed on the AFMA website as a contact for petroleum operators to use when consultation with the Eastern and Western Tuna and Billfish Fisheries is required.	interests of licence holders represented by TA (Refer Section 4.4.4). The Western Tuna and Billfish Fishery is within the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.4.4).	Confirm communications expectations to support effective and efficient emergency response arrangements.
Western Australian Fishing Industry Council (WAFIC)	WAFIC is the peak industry body representing the interests of the WA commercial fishing, pearling and aquaculture sectors.	The proposed vessel-based survey and the ongoing presence of the abandoned wellheads are not expected to impact the activities or interests of licence holders represented by WAFIC (Refer Section 4.4.4). The following Western Australian State-managed fisheries are within the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.4.4): • Abalone • Gascoyne Demersal Scalefish • Mackerel Fishery (Areas 2 and 3) • Marine Aquarium • Onslow Prawn • Pearl Oyster • Pilbara Crab Fishery • Pilbara Fish Trawl • Pilbara Line Fishery • Pilbara Trap • Shark Bay Prawn • Shark Bay Scallop • South West Coast Salmon • Specimen Shell • West Coast Deep Sea Crustacean • West Coast Rock Lobster	Send WAFIC an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.

Relevant Person	Relevant Person function, interest or activity	Assessment of how the Relevant Person may be affected by Activity impacts or risks	Consultation plan activities
WA Game Fishing Association (WAGFA)	WAGFA co-ordinates the activities of game fishing throughout Western Australia and has a major role in advocacy on behalf of its member clubs and game fishing in general.	The proposed vessel-based survey and the ongoing presence of the abandoned wellheads are not expected to impact the activities or interests of game fishing operators represented by WAGFA (Refer Section 4.4.4). Game fishing activities take place within the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.4.4).	Send WAGFA an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.
Local Government Authorities			
Shire of Ashburton (SoA)	The Shire of Ashburton is one of the four local government areas in the Pilbara region of Western Australia, covering an area of 105,647 km^2.	The proposed vessel-based survey and the ongoing presence of the abandoned wellheads are not expected to impact the functions, activities or interests of the residents, businesses and community groups represented by SoA (Refer Section 4.2). The Local Government Area administered by the SoA is outside but within proximity of the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.2).	Send SoA an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.
Shire of Exmouth (SoE)	The Shire of Exmouth is a local government area in the Gascoyne region of Western Australia, covering an area of 6,503 km^2.	The proposed vessel-based survey and the ongoing presence of the abandoned wellheads are not expected to impact the functions, activities or interests of the residents, businesses and community groups represented by SoE (Refer Section 4.2). The Local Government Area administered by the SoE is outside but within proximity of the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.2).	Send SoE an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.

Relevant Person	Relevant Person function, interest or activity	Assessment of how the Relevant Person may be affected by Activity impacts or risks	Consultation plan activities
Petroleum Industry			
Chevron (adjacent titleholder)	Chevron holds title to the following Petroleum Permits, which are adjacent to WA-70-R • WA-100-R • WA-99-R • WA-392-P	The proposed vessel-based survey and the ongoing presence of the abandoned wellheads do not impact Chevron's activities as all activities are to take place within WA-70-R (Refer Section 4.4.6). Chevron Titles are within the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.4.6).	Send Chevron an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.
Chevron (adjacent titleholder)	Chevron holds title to the following Petroleum Permits, which are adjacent to WA-474-P • WA-99-R – Chevron • WA-60-R - Chevron	The proposed vessel-based survey and the ongoing presence of the abandoned wellheads do not impact Chevron's activities as all activities are to take place within WA-474-P (Refer Section 4.4.6). Chevron Titles are within the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.4.6).	Send Chevron an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.
Other titleholders • Beagle No. 1 • BP Developments Australia • Carnarvon Energy • Eni Australia • Finder No 16 • Jadestone Energy • Kato Energy • Kufpec • Mobil Australia • Santos Limited • SapuraOMV • TGS – NOPEC • Vermilion Oil & Gas	A number of Operators hold title within the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill.	The proposed vessel-based survey and the ongoing presence of the abandoned wellheads do not impact activities the activities of other titleholders, as all activities are to take place within WA-474-P (Refer Section 4.4.6). Other Operator Titles are within the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill (Refer Section 4.4.6).	Send all other titleholders an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.

Relevant Person	Relevant Person function, interest or activity	Assessment of how the Relevant Person may be affected by Activity impacts or risks	Consultation plan activities
• Woodside Energy			
Recreational Fishers			
Individual recreational fishers	The Department of Primary Industries and Regional Development estimates that 620,000 people fish recreationally in Western Australia.	The proposed vessel-based survey and the ongoing presence of the abandoned wellheads do not impact the interests or activities of recreational fishers given the remote location and water depth. The interests or activities of recreational fishers may be affected in the unlikely event of a marine diesel oil spill.	Send Recfishwest an activity email and consultation information sheet. Confirm communications expectations to support effective and efficient emergency response arrangements.
Other persons or organisations that Western Gas considers relevant			
Nil	NA	NA	NA

10.6.1 Communal Interest

Where there is an inherent challenge in consulting significant volumes of individual Relevant Persons or whereabouts of Relevant Persons are unknown or uncontactable, Western Gas has communally consulted those organisations that are most likely to represent the interests of those that might be affected by impacts or risks (Table 10-7).

Table 10-7: Consultation where communal interests exist

Relevant Person category	Context	Consultation approach
Commercial shipping operators	The Pilbara Ports Authority estimates that there were more than 17,000 vessel movements through ports under the Authority's management in 2021/22. These vessel movements may include transit of commercial vessels through the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill.	Western Gas has consulted Australian Hydrographic Office (AHO), Australian Maritime Safety Authority (AMSA) and Pilbara Ports Authority on behalf of individual shipping companies. Western Gas will liaise with the AHO prior to the start of activities to promulgate Notices to Mariners. Western Gas has committed to AMSA to develop communications arrangements for the notification of commercial shippers and other marine users if needed in the event of an unplanned emergency, e.g. oil spill.
Communities	The communities of Exmouth (population approx. 3000 people in 2022) and Onslow (population approx.850 people in 2022) have been identified as the nearest coastal communities to the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill.	Western Gas has consulted respective Local Government Authorities on behalf of individual community members. Western Gas has proposed communications protocols with Local Government Authorities for the notification of community members if needed in the event of an unplanned emergency, e.g. oil spill. Western Gas published public notices in metropolitan and regional newspapers, as well as the consultation information sheet on Western Gas' web site.
Recreational fishers	The Department of Primary Industries and Regional Development estimates that 620,000 people fish recreationally in Western Australia. These fishers may fish in the modelled widest extent of possible oil dispersion in the event of a marine diesel oil spill. Contact details for all fishers are not available in the public domain.	Western Gas has consulted Recfishwest on behalf of individual recreational fishers. Western Gas has agreed with Recfishwest communications protocols for the notification of recreational fishers if needed in the event of an unplanned emergency, e.g. oil spill. Western Gas published public notices in metropolitan and regional newspapers, as well as the consultation information sheet on Western Gas' web site.

10.7 RELEVANT PERSON CONSULTATION REPORT

Consultation activities for this EP commenced on 4 November 2022 in line with the consultation strategy developed for this EP.

Reasonable attempts were made to obtain feedback from Relevant Persons when no response was received.

Overall, there have been no objections by Relevant Persons about the proposed Activity at the time of EP submission.

Table 10-8 provides a summary of all claims made by Relevant Persons and Western Gas' assessments and responses, as well as Relevant Person requests for information or activity notifications.

Western Gas considers it has undertaken best endeavours to understand and address matters raised, acknowledging the scale, nature and duration of the proposed Activity.

No authorities, persons or organisations made themselves known to Western Gas as a result of public notices placed in State-wide and regional media.

Samples of Activity information provided to Relevant Persons is provided in Appendix E: Relevant Person Assessment and Consultation.

A full text copy of correspondence with Relevant Persons is provided in Addendum A: Sensitive Information Report.

Table 10-8: Summary of Relevant Person and organisation responses received to date, response and follow-up

Each Department or agency of the Commonwealth to which the activities to be carried out under the environment plan, or the revision of the environment plan, may be relevant.			
Australian Border Force (ABF)			
Summary of consultation responses: On 4 November 2022 Western Gas sent an email to ABF and provided a consultation information sheet. On 11 November 2022 Western Gas sent an email to ABF and provided a clarification on oil spill modelling. On 2 December 2022 Western Gas sent a reminder email to ABF and outlined proposed notification details that would be provided in the event of a marine pollution incident. No feedback has been received from the ABF at the time of EP submission.			
Summary of Objection or Claim	**Assessment of Merits**	**Western Gas Response**	**Environment Plan Controls**
No objections or claims have been received about activity impacts or risks.	Not applicable.	ABF contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.
Australian Fisheries Management Authority (AFMA)			
Summary of consultation responses: On 4 November 2022 Western Gas sent an email to AFMA and provided a consultation information sheet and a map showing the well locations relative to the Western Deepwater Trawl Fishery. On 11 November 2022 Western Gas sent an email to AFMA and provided a clarification on oil spill modelling. On 23 November 2022 AFMA sent an email to Western Gas and provided contact details for its duty manager. On 2 December 2022 Western Gas sent an email to AFMA and outlined proposed notification details that would be provided in the event of a marine pollution incident.			
Summary of Objection or Claim	**Assessment of Merits**	**Western Gas Response**	**Environment Plan Controls**
No objections or claims have been received about activity impacts or risks.	Not applicable.	Western Gas has emailed AFMA acknowledging its feedback and advised that AFMA contact details are to be included in the Western Gas emergency response database.	No additional EP controls are required.
Australian Hydrographic Office (AHO)			
Summary of consultation responses: On 4 November 2022 Western Gas sent an email to AHO and provided a consultation information sheet and a marine shipping fairway map.			

On 7 November 2022 AHO sent an auto generated email acknowledging that Western Gas' information had been received and would be assessed in preparation for updating our Navigational Charting products.

On 11 November 2022 Western Gas sent an email to AHO and provided a clarification on oil spill modelling.

On 14 November 2022 AHO sent an auto generated email acknowledging that Western Gas' information had been received and would be assessed in preparation for updating our Navigational Charting products.

On 2 December 2022 Western Gas sent a reminder email to AHO and outlined what details would be provided in the event of a marine pollution incident.

No feedback has been received from the AHO at the time of Environment Plan submission.

Summary of Objection or Claim	Assessment of Merits	Western Gas Response	Environment Plan Controls
No objections or claims have been received about activity impacts or risks.	Not applicable.	No response required.	Upon advice from AMSA, AHO is to be contacted no less than four weeks before the start of operations to promulgate a Notice to Mariners (refer Section 10.8).

Australian Maritime Safety Authority (AMSA) - Search and Rescue (SAR) Operations, Emergency Response Division

Summary of consultation responses:

On 4 November 2022 Western Gas sent an email to AMSA and provided a consultation information sheet and a marine shipping fairway map.

On 11 November 2022 Western Gas sent an email to AMSA and provided a clarification on oil spill modelling.

On 15 November 2022 AMSA sent an email to Western Gas requesting Western Gas:

Maritime safety information

- Contact the AHO no less than four weeks before the start of operations to promulgate a Notice to Mariners.
- Notify AMSA's Joint Rescue Coordination Centre (JRCC) at least 24-48 hours before the start of operations to promulgate radio-navigation warnings.
- Provide updates to the AHO and AMSA's JRCC on progress and any changes to intended operations.
- Ensure vessel compliance with the International Rules for Preventing Collisions at Sea (COLREGs), in particular, the use of appropriate lights and shapes to reflect the nature of operations (e.g. restricted in the ability to manoeuvre).
- Ensure vessel navigation status is set correctly in the ship's AIS unit.

AMSA also provided details on obtaining a vessel traffic plot showing Automatic Identification System (AIS) traffic data for Western Gas' area of interest.

On 23 November 2022 Western Gas sent an email to AMSA acknowledging its requests on maritime safety. Western Gas also requested a meeting to discuss AMSA's maritime safety role if marine traffic is potentially affected by a marine pollution event, including the management of vessel traffic if marine pollution response is required in or adjacent to a marine shipping fairway.

On 2 December 2022 Western Gas sent a follow up email to AMSA requesting a meeting to discuss implications for maritime safety arrangements if vessel traffic is impacted by marine pollution response.

On 8 December 2022 AMSA sent an email response to Western Gas that a meeting request had been sent to the relevant team for response.

On 16 January 2023 Western Gas sent a follow up email to AMSA requesting a meeting to discuss implications for maritime safety arrangements if vessel traffic is impacted by marine pollution response.

On 18 January 2023 AMSA sent an email to Western Gas advising that the meeting request had been re-escalated.

On 18 January 2023 Western Gas send an email to AMSA acknowledging its response.

On 25 January 2023 AMSA sent a meeting invitation to Western Gas.

On 30 January 2023 Western Gas met with AMSA navigational safety team and sent a follow up email on 14 March 2023 outline confirming consultation expectations, including those for shipping companies operating in Commonwealth waters. A follow-up email was sent on 21 March 2023.

On 14 March 2023 Western Gas sent an email to AMSA confirming consultation expectations, including those for shipping companies operating in Commonwealth waters. A follow-up email was sent on 21 March 2023.

On 22 March 2023 AMSA confirmed by email that a response was being considered.

On 24 May 2023 AMSA replied to provide the following answers to questions raised in the email from Western Gas:

- Maritime Safety Information, via the notifications to AHO and JNCC, ensure safe conduct of marine activities within Commonwealth waters
- For ship source pollution events in Commonwealth waters, AMSA may be the control agency.
- AMSA will advise vessels operating outside Australia's EEZ if required during a ship source pollution event.

No updates to the EP or OPEP are required to reflect these clarifications.

Summary of Objection or Claim	Assessment of Merits	Western Gas Response	Environment Plan Controls
No objections or claims have been received about activity impacts or risks.	Western Gas acknowledges AMSA's notification and requests on maritime safety, which have been incorporated in the EP.	Western Gas has emailed AMSA acknowledging its feedback.	• AMSA JRCC to be contacted at least 24-48 hours before the start of operations to promulgate radio-navigation warnings (refer Section 10.8). • COLREGs • Vessel navigation and AIS unit.

Australian Maritime Safety Authority (AMSA) - Marine Pollution

Summary of consultation responses:

On 4 November 2022 Western Gas sent an email to AMSA and provided a consultation information sheet.

On 6 December 2022 Western Gas sent an email to AMSA seeking feedback on marine pollution arrangements for proposed activities.

No feedback has been received from the AMSA at the time of Environment Plan submission.

Summary of Objection or Claim	Assessment of Merits	Western Gas Response	Environment Plan Controls

No objections or claims have been received about activity impacts or risks.	Not applicable.	No response required.	The Oil Pollution Emergency Plan (WG-EHS-PLN-002) will be in place prior to the start of the annual vessel-based survey. AMSA contact details and communications requirements are included in OPEP.
Department of Agriculture, Fisheries and Forestry (DAFF) - Fisheries			
Summary of consultation responses: On 27 January 2023 Western Gas sent an email to DAFF and provided a consultation information sheet and a map showing the well locations relative to the Western Deepwater Trawl Fishery. On 2 December 2022 Western Gas sent a reminder email to DAFF and outlined proposed notification details that would be provided in the event of a marine pollution incident. No feedback has been received from DAFF at the time of Environment Plan submission.			
Summary of Objection or Claim	**Assessment of Merits**	**Western Gas Response**	**Environment Plan Controls**
No objections or claims have been received about activity impacts or risks.	Not applicable.	DAFF contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.
Department of Agriculture, Fisheries and Forestry (DAFF) – IMS/Biosecurity			
Summary of consultation responses: On 27 November 2022 Western Gas sent an email to DAFF and provided a consultation information sheet and a map showing the well locations relative to the Western Deepwater Trawl Fishery. On 13 March 2023 Western Gas sent a follow up email to DAFF. No feedback has been received from DAFF at the time of Environment Plan submission.			
Summary of Objection or Claim	**Assessment of Merits**	**Western Gas Response**	**Environment Plan Controls**
No objections or claims have been received about activity impacts or risks.	Not applicable.	DAFF contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.
Department of Climate Change, Energy, the Environment and Water (DCCEEW)			
Summary of consultation responses:			

On 4 November 2022 Western Gas sent an email to DCCEEW and provided a consultation information sheet and sought a meeting with DCCEEW to discuss sea dumping permissions.

On 7 November 2022 DCCEEW sent an email to Western Gas and provided a suggested meeting date and time. DCCEEW sought details on the abandonment dates of the wells.

On 11 November 2022 Western Gas confirmed meeting arrangements and provided additional details on oil spill modelling.

On 14 November 2022 DCCEEW confirmed meeting arrangements and attendees.

On 17 November 2022 Western Gas provided dates of well abandonments.

On 17 November 2022 Western Gas met with DCCEEW to gain information on how to commence the sea dumping application process

- DCCEEW provided its draft guidance on Australian offshore oil and gas sea dumping permits.
- Western Gas committed to ongoing consultation with DCCEEW sea dumping section on the abandoned wells.

Summary of Objection or Claim	Assessment of Merits	Western Gas Response	Environment Plan Controls
No objections or claims have been received about activity impacts or risks.	Not applicable.	No response required.	No additional EP controls are required.

Department of Defence (DoD)

Summary of consultation responses:

On 4 November 2022 Western Gas sent an email to DoD and provided a consultation information sheet and a map showing the well locations relative to the DoD North West Exercise Area (NWXA).

On 11 November 2022 Western Gas sent an email to DoD and provided a clarification on oil spill modelling.

On 28 November 2022 DoD sent an email to Western Gas and provided the following response:

- The proposed area is located within the NWXA and restricted airspace.
- Unexploded ordnance (UXO) may be present on and in the sea floor within the NWXA and Western Gas must inform itself as to the risks associated with conducting activities in the area.
- All activities in the area are conducted at Western Gas' own risk
- The Commonwealth of Australia, represented by the Department of Defence, takes no responsibility for:
  - reporting the location and type of UXO that may be in the areas
  - identifying or removing any UXO from these areas
  - any loss or damage suffered or incurred by Western Gas or any third party arising out of, or directly related to, UXO in the area
- Defence requires a minimum of five weeks notification prior to the commencement of activities.
- Liaison with Defence and the airspace controlling agency should be undertaken if restricted airspace is activated and Notice to Airmen (NOTAM) restrictions are in force.
- Some projects may also be required to promulgate a NOTAM for any temporary structure or need to establish a Danger Area to encompass any permanent rig.
- The Australian Hydrographic Service (AHS) should be notified three weeks prior to the start of activities to promulgate Notices to Mariners (NOTMAR).

On 2 December 2022 Western Gas sent an email to DoD and provided the following response on activity impacts:

- Western Gas noted the location area and the presence of the North West Exercise Area (NWXA) and restricted airspace.
- Western gas noted DoD's advice on the location, identification, removal, or damage to equipment from unexploded ordinances (UXOs).
- Western Gas confirmed it will notify DoD at least five weeks prior to the start of activities for the annual vessel survey.
- Western Gas noted the requirement and contact details provided to engage with Airservices Australia if the restricted airspace is activated. Western Gas will confirm restricted air space status with Defence as part of its pre-start activity notifications.
- Western Gas confirmed that the AHO had been engaged and has been included in our activity notification protocols. At AMSA's request, AHO will be notified four weeks prior to the start of activities.
- With respect to activity risks, Western Gas provided DoD with proposed notification details that would be issued in the event of a marine pollution incident.

Summary of Objection or Claim	Assessment of Merits	Western Gas Response	Environment Plan Controls
DoD claimed that UXOs may be present in the area.	There are no credible risks for impacting UXOs from the proposed vessel-based well inspection survey.	Western Gas has emailed DoD acknowledging its feedback and confirmed its activity notification requests. Western Gas confirmed that DoD contact details are to be included in the Western Gas emergency response database.	Activity updates to be provided for DoD, the airspace controlling agency and the AHS (refer Section 10.8).
DoD claimed that all activities in the area are conducted at Western Gas' own risk.	Western Gas acknowledges DoD's position on activity liability.		

Department of Foreign Affairs and Trade (DFAT)

Summary of consultation responses:

On 4 November 2022 Western Gas sent an email to DFAT and provided a consultation information sheet.

On 11 November 2022 Western Gas sent an email to DFAT and provided a clarification on oil spill modelling.

On 2 December 2022 Western Gas sent a reminder email to DFAT and outlined what details would be provided in the event of a marine pollution incident.

No feedback has been received from the DFAT at the time of Environment Plan submission.

Summary of Objection or Claim	Assessment of Merits	Western Gas Response	Environment Plan Controls
No objections or claims have been received about activity impacts or risks.	Not applicable.	DFAT contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.

Director of National Parks (DNP)

Summary of consultation responses:

On 4 November 2022 Western Gas sent an email to DNP and provided a consultation information sheet, as well as implications for Australian marine parks within the widest extent of possible extent of oil dispersion.

On 11 November 2022 Western Gas sent an email to DNP and provided a clarification on oil spill modelling.

On 28 November 2022 DNP emailed Western Gas and provided the following response:

Activity impacts

- No authorisations were required from the DNP as there are no planned activities overlapping an Australian Marine Park.
- Western Gas in developing the Environment Plan should consider Australian marine parks and their representativeness.
- In the context of marine park management plan objectives and values Western Gas has should:
  - Identify all impacts and risks on Australian marine park values (including ecosystem values) and manage them to an acceptable level, including consideration of 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.
- DNP provided references to public information on marine park management plans and values, including details on the Gascoyne Marine Park, which is the nearest to the proposed activity.
- DNP requested to be updated if details regarding the activity change and result in an overlap with or new impact to a marine park, or for emergency responses

Activity impacts

- The DNP should be made aware of oil/gas pollution incidences which occur within a marine park or are likely to impact on a marine park as soon as possible. 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.
- The DNP may request daily or weekly Situation Reports, depending on the scale and severity of the pollution incident.

On 5 December 2022 Western Gas emailed the DNP and provided the following response:

- Western Gas noted that no authorisations were required from the DNP as there are no planned activities overlapping an Australian Marine Park.
- Western Gas in developing the Environment Plan has considered Australian marine parks and their representativeness. In the context of the management plan objectives and values, Western Gas has:
  - Identified all impacts and risks on Australian marine park values (including ecosystem values) and believes they can be managed to an acceptable level, including consideration of options to avoid or reduce them to as low as reasonably practicable.
  - Demonstrated that the activity will not be inconsistent with the management plan.
- Western Gas noted references provided by the DNP on the North-west Marine Parks Network Management Plan 2018 and the Australian Marine Parks Science Atlas to support assessment of potential impacts to Australian Marine Parks.
- Western Gas will update the DNP should any change in activity result in an overlap with or new impact to a marine park.
- With respect to activity risks, Western Gas notes DNP's communications expectations should an oil/gas pollution incident occur within a marine park or is likely to impact on a marine park.

Summary of Objection or Claim	Assessment of Merits	Western Gas Response	Environment Plan Controls

No objections or claims have been received about activity impacts or risks.	Western Gas acknowledges: • No authorisations are required from the DNP. • Australian marine parks and their representativeness should be considered in developing the EP. • All impacts and risks on Australian marine park values (including ecosystem values) should be identified and managed to an acceptable level. • Public information sources provided by the DNP on marine park management plans and values. • DNP's request to be updated if details regarding the activity change and result in an overlap with or new impact to a marine park, or for emergency responses • DNP's request to be notified should a marine pollution incident occur within a marine park or is likely to impact on a marine park.	Western Gas has emailed the DNP confirming Western Gas has in developing the EP: • Considered Australian marine parks and their representativeness. • Identified all impacts and risks on Australian marine park values (including ecosystem values) and believes they can be managed to an acceptable level • Considered the North-west Marine Parks Network Management Plan 2018 and the Australian Marine Parks Science Atlas in assessing potential impacts to Australian Marine Parks. Western Gas advised that it will: • Update the DNP should any change in activity result in an overlap with or new impact to a marine park. • Notify the DNP should a marine pollution incident occur within a marine park or is likely to impact on a marine park.	• DNP to be consulted should any change in activity result in an overlap with or new impact to a marine park (refer Section 10.8). • DNP to be notified should a marine pollution incident occur within an Australian marine park or is likely to impact on a marine park.

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.

Department of Biodiversity and Conservation Attractions (DBCA)

Summary of consultation responses:

On 4 November 2022 Western Gas sent an email to AMSA and provided a consultation information sheet, as well as implications for Western Australian marine parks within the widest extent of possible of oil dispersion.

On 8 November 2022 DBCA sent an email to Western Gas and provided the following response:

- DBCA had reviewed the documentation provided and other readily available information relevant to DBCA's Conservation and Land Management Act 1984 and Biodiversity Conservation Act 2016 related responsibilities.
- DBCA noted that there were a number of ecologically important areas located in the vicinity of the proposed operations, including the Ningaloo Marine Park (M2) and Muiron Islands Marine Management Area (M12). Based on the information provided, it appears that there is potential for these areas to be affected by Western Gas's operations if there is a substantial hydrocarbon release and subject to particular weather or other environmental conditions.
- DBCA requested that Western Gas notify DNCA;s Pilbara regional office as soon as practicable in the event of marine pollution incident.

- DBCA advised it 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.
- DBCA requested that Western Gas commit to the monitoring and clean-up of any DBCA interests affected by an oil spill in consultation with DBCA.
- DBCA recommended Western Gas refer to DoT's web content regarding marine pollution and the Offshore Petroleum Industry Guidance Note of September 2018 titled *Marine Oil Pollution: Response and Consultation Arrangements,* which provide information on the Western Australian emergency management 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.

On 6 December 2022 Western Gas emailed DBCA and provided the following response:

- Western Gas acknowledged the presence of State-managed ecologically important areas that could be impacted by a worst-case marine pollution incident, including the Ningaloo Marine Park (M2) and Muiron Islands Marine Management Area (M12).
- Western Gas noted DBCA contact details and outlined proposed notification details that would be provided in the event of a marine pollution incident.
- Western Gas acknowledged 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.
- Western Gas recognised its responsibilities for monitoring and clean-up of any DBCA interests affected by an oil spill in consultation with DBCA.
- Western Gas was familiar with marine pollution response arrangements in WA State waters under the State Hazard Plan – Marine Environmental Emergencies and DoT's expectation for consultation under these arrangements.

Summary of Objection or Claim	Assessment of Merits	Western Gas Response	Environment Plan Controls
DBCA claimed that there were a number of ecologically important areas that could be affected if there was a substantial hydrocarbon release, subject to particular weather or other environmental conditions.	Western Gas acknowledges that the Ningaloo Marine Park (M2) and Muiron Islands Marine Management Area (M12) are within proximity of the widest extent of possible oil dispersion in the event of a credible worst-case spill.	Western Gas has emailed DBCA and confirmed/acknowledged that: • DBCA contact details are to be included in the Western Gas emergency response database. • 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. • Western Gas recognised its responsibilities for monitoring and clean-up of any DBCA interests affected by an oil spill in consultation with DBCA. • Western Gas was familiar with marine pollution response arrangements in WA State waters under the State Hazard Plan – Marine Environmental	DNP to be notified should a marine pollution incident occur within a State marine park or is likely to impact on a marine park.

		Emergencies and DoT's expectation for consultation under these arrangements.	
Department of Primary Industries & Regional Development (DPIRD)			
Summary of consultation responses: On 4 November 2022 Western Gas sent an email to DPIRD and provided a consultation information sheet. On 11 November 2022 Western Gas sent an email to DPIRD and provided a clarification on oil spill modelling. On 2 December 2022 Western Gas sent a reminder email to DPIRD and outlined what details would be provided in the event of a marine pollution incident. No feedback has been received from the DPIRD at the time of Environment Plan submission.			
Summary of Objection or Claim	**Assessment of Merits**	**Western Gas Response**	**Environment Plan Controls**
No objections or claims have been received about activity impacts or risks.	Not applicable.	DPIRD contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.
Department of Transport (DoT) - marine pollution			
Summary of consultation responses: On 6 November 2022 Western Gas sent an email to DPIRD and provided a consultation information sheet. On 6 November 2022 DoT sent an auto generated email acknowledging that Western Gas' email had been received and would be actioned as soon as possible by the relevant officer. On 16 November 2022 DoT sent an email acknowledging receipt of Western Gas' consultation information and awaited a copy of the OPEP for review. On 21 December 2022 Western Gas sent a copy of the OPEP to DoT for feedback. On 5 January 2023 DoT acknowledged it had received the OPEP and would revert if it had any comments. On 14 February 2023 DoT sent an email to Western Gas acknowledging that predictive oil spill modelling indicated a very low risk to State waters and WA shorelines and as a result a full review of the OPEP by DoT was not deemed necessary. DoT requested a full copy of the OPEP following acceptance by NOPSEMA. On 8 March 2023 Western Gas sent an email to DoT thanking them for its feedback and committed to providing a final copy of the OPEP.			
Summary of Objection or Claim	**Assessment of Merits**	**Western Gas Response**	**Environment Plan Controls**
No objections or claims have been received about activity impacts or risks.	Not applicable.	Western Gas will provide DoT a final version of the OPEP following acceptance by NOPSEMA.	DoT contact details and communications requirements are included in OPEP.
Ningaloo Coast World Heritage Advisory Committee (NCWHAC)			
Summary of consultation responses:			

On 30 January 2023 Western Gas sent an email to NCWHAC and provided a consultation information sheet.

On 8 March 203 Western Gas sent a reminder email to NCWHAC and outlined what details would be provided in the event of a marine pollution incident.

No feedback has been received from the NCWHAC at the time of Environment Plan submission.

Summary of Objection or Claim	Assessment of Merits	Western Gas Response	Environment Plan Controls
No objections or claims have been received about activity impacts or risks.	Not applicable.	DPIRD contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.

Pilbara Development Commission (PDC)

Summary of consultation responses:

On 27 January 2023 Western Gas sent an email to PDC and provided a consultation information sheet.

On 8 March 203 Western Gas sent a reminder email to PDC and outlined what details would be provided in the event of a marine pollution incident.

No feedback has been received from the PDC at the time of Environment Plan submission.

Summary of Objection or Claim	Assessment of Merits	Western Gas Response	Environment Plan Controls
No objections or claims have been received about activity impacts or risks.	Not applicable.	DPIRD contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.

Pilbara Ports Authority (PPA)

Summary of consultation responses:

On 27 January 2023 Western Gas sent an email to PPA and provided a consultation information sheet.

On 8 March 203 Western Gas sent a reminder email to PPA and outlined what details would be provided in the event of a marine pollution incident.

No feedback has been received from the PPA at the time of Environment Plan submission.

Summary of Objection or Claim	Assessment of Merits	Western Gas Response	Environment Plan Controls
No objections or claims have been received about activity impacts or risks.	Not applicable.	DPIRD contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.

The Department of the responsible State Minister, or the responsible Northern Territory Minister

Department of Industry, Science and Resources (DISR)

Summary of consultation responses:

On 4 November 2022 Western Gas sent an email to DISR and provided a consultation information sheet.

On 11 November 2022 Western Gas sent an email to DISR and provided a clarification on oil spill modelling.

On 2 December 2022 Western Gas sent a reminder email to DISR and outlined what details would be provided in the event of a marine pollution incident.

No feedback has been received from the DISR at the time of Environment Plan submission.

Summary of Objection or Claim	Summary of Objection or Claim	Summary of Objection or Claim	Summary of Objection or Claim
No objections or claims have been received about activity impacts or risks.	Not applicable.	DISR contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.

Department of Mines, Industry Regulation and Safety (DMIRS)

Summary of consultation responses:

On 4 November 2022 Western Gas sent an email to DMIRS and provided a consultation information sheet.

On 11 November 2022 Western Gas sent an email to DMIRS and provided a clarification on oil spill modelling.

On 2 December 2022 Western Gas sent a reminder email to DMIRS and outlined what details would be provided in the event of a marine pollution incident.

No feedback has been received from the DMIRS at the time of Environment Plan submission.

Summary of Objection or Claim	Assessment of Merits	Western Gas Response	Environment Plan Controls
No objections or claims have been received about activity impacts or risks.	Not applicable.	DMIRS contact details to be included in the Western Gas emergency response database. Western Gas has previously provided pre-start and activity completion notifications and will undertake these for this EP.	DMIRS is to be contacted no less than four weeks before the start of operations and upon activity completion (refer Section 10.8).

Persons or organisations 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.

Commercial Fishing - Commonwealth

- **Western Deepwater Trawl Fishery**

Summary of consultation responses:

On 11 November 2022 Western Gas sent an email to licence holders and provided a consultation information sheet and a map showing the well locations relative to the Western Deepwater Trawl Fishery. Western Gas also sought feedback from licence holders on how they should be notified in the event of a marine pollution event.

On 2 December 2022 Western Gas sent a reminder email to licence holders and outlined what details would be provided in the event of a marine pollution incident. Western Gas also sought feedback from licence holders on how they should be notified in the event of a marine pollution event.

No feedback has been received from licence holders at the time of Environment Plan submission.			
Summary of Objection or Claim	**Assessment of Merits**	**Western Gas Response**	**Environment Plan Controls**
No objections or claims have been received about activity impacts or risks.	Not applicable.	Licence holder contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.
Communities • **Exmouth**			
See Local Government Area – Shire of Exmouth (this table)			
Communities • **Onslow**			
See Local Government Area – Shire of Ashburton (this table)			
Environmental Conservation Organisations • **Conservation Council of Western Australia (CCWA)**			
Summary of consultation responses: On 27 January 2023 Western Gas sent an email to CCWA and provided a consultation information sheet. On 8 March 203 Western Gas sent a reminder email to CCWA and outlined what details would be provided in the event of a marine pollution incident. No feedback has been received from the CCWA at the time of Environment Plan submission.			
Summary of Objection or Claim	**Summary of Objection or Claim**	**Summary of Objection or Claim**	**Summary of Objection or Claim**
No objections or claims have been received about activity impacts or risks.	Not applicable.	DISR contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.
Environmental Conservation Organisations • **Cape Conservation Group (CCG)**			
Summary of consultation responses: On 27 January 2023 Western Gas sent an email to CCG and provided a consultation information sheet. On 8 March 203 Western Gas sent a reminder email to CCG and outlined what details would be provided in the event of a marine pollution incident. No feedback has been received from the CCG at the time of Environment Plan submission.			

Summary of Objection or Claim	Summary of Objection or Claim	Summary of Objection or Claim	Summary of Objection or Claim
No objections or claims have been received about activity impacts or risks.	Not applicable.	DISR contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.

Environmental Conservation Organisations

- **Protect Ningaloo (PN)**

Summary of consultation responses:

On 27 January 2023 Western Gas sent an email to PN and provided a consultation information sheet.

On 8 March 203 Western Gas sent a reminder email to PN and outlined what details would be provided in the event of a marine pollution incident.

No feedback has been received from the PN at the time of Environment Plan submission.

Summary of Objection or Claim	Summary of Objection or Claim	Summary of Objection or Claim	Summary of Objection or Claim
No objections or claims have been received about activity impacts or risks.	Not applicable.	DISR contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.

First Nations people

- **Yamatji Marlpa Aboriginal Corporation (in its capacity as a Native Title Representative Body)**

Summary of consultation responses:

On 4 November 2022 Western Gas sent an email to YMAC and provided a consultation information sheet, seeking feedback on behalf of Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC), the Native Title Prescribed Body Corporate for the land and adjacent waters of North West Cape, which is the nearest landfall to the activity location. Western Gas also sought guidance from YMAC on how best to undertake consultation on activity impacts and risks, and advised it was also consulting directly with Buurabalayji Thalanyji Aboriginal Corporation (BTAC).

On 7 November 2022 YMAC sent Western Gas an email providing a summary of the outcomes of the determined Gnulli claim, including the establishment of Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC) and its responsibility for native title matters in the north of the Determination area. YMAC advised it provided some services to the NTGAC at NTGAC's request and advised Western Gas to contact NTGAC directly to arrange to attend an NTGAC Board meeting and present a full and proper explanation of activities, providing the Board with an opportunity to ask questions and raise their concerns.

On 7 November 2022 Western Gas sent an email to YMAC acknowledging its feedback and would contact NTGAC direct.

On 22 November 2022 YMAC sent an email to Western Gas and provided the following response:

- **Regulatory requirements to consult**
  YMAC sought clarity from Western Gas on its rationale for consultation, as the definition of a "Relevant Person" under the Environment Regulations was extremely wide, including:
  - Prescribed Body Corporates (PBCs)
  - Claim groups
  - YMAC, as a representative body for the region of interest; and

- Indigenous persons who are knowledge holders for an area, without being a member of the PBCs

- **Free, prior and informed consent (FPIC)**
  YMAC provided details on FPIC and expected the principle of FPIC to apply to any consultation with YMAC, as an Aboriginal corporation and representative body, and its constituents, which includes PBCs and claim groups.

- **Materials provided by Western Gas**
  YMAC claimed that consultation information provided by Western Gas did not meet the principles of FPIC and was not 'objective, accurate and presented in a manner and form that is understandable to Indigenous people', noting the very technical nature of the content.

  YMAC claimed that limited time had been provided to frame an appropriate response, including considerations for YMAC's own decision-making processes, which may include a presentation to the YMAC board of directors, followed by an opportunity to raise questions and, if necessary, the provision of independent expert advice.

  YMAC also sought clarity on:

  - The process by which YMAC's feedback would be 'summarised' for inclusion in the EP and whether YMAC can have input to this process,
  - Whether YMAC could review the proposed Environment Plan before it is submitted to NOPSEMA
  - How the response to the marine spill query will be documented and used by Western Gas.

- **Conclusion**
  YMAC advised it was not appropriate to provide feedback on Western Gas' consultation request.

  YMAC advised it welcomed the opportunity to engage with Western Gas in accordance with the principles of FPIC, requesting a response to YMAC's feedback and recognition that the consultation deadline was not appropriate.

On 25 November 2022 Western Gas sent an email to YMAC and provided the following response:

- **Regulatory requirements to consult**
  Western Gas confirmed it was consulting YMAC in its capacity as a representative body to understand which PBCs should be consulted for proposed activities, as well as initially on behalf of NTGAC. Western Gas' assumption that YMAC represented NTGAC was based on information published on the AITSIS web site.

  Western Gas advised that it been provided feedback from YMAC (acting for NTGAC) and had commenced a consultation process in good faith (see consultation summary for NTGAC).

  Western Gas advised in its initial correspondence that Buurabalayji Thalanyji Aboriginal Corporation (BTAC) was also being provided information about proposed activities given its regional interest in Western Gas activities and welcomed advice on whether other PBCs that should be consulted.

- **Free, prior and informed consent**
  Western Gas confirmed it had a guiding consultation principle of seeking feedback from stakeholders on the extent to which their functions, activities or interests may be impacted by its planned activities, particularly where this extent is unclear based on publicly available information.

  Western Gas confirmed it was familiar with and acknowledged the United Nations Convention of Free, prior and informed consent, and the need for meaningful consultation with Indigenous peoples on activities that affect them and the lands on which they live.

- **Materials provided by Western Gas**

Consultation materials

Western Gas acknowledged feedback on the consultation materials provided.

Western Gas confirmed it had invited input from YMAC representatives acting for NTGAC how best to present information on planned activities to the NTGAC Board to ensure specific concerns or interests are addressed.

Consultation timeframes

Western Gas noted feedback on consultation timeframes and confirmed that NTGAC had been advised that the Environment Plan to manage these activities was required to be submitted in December 2022 to ensure regulatory compliance. Western Gas added it was committed to ongoing consultation with NTGAC and that this commitment applied across the life of the Environment Plan, including Environment Plan development, assessment by the Regulator and activity execution.

Western Gas noted that there was a challenge in meeting regulatory and stakeholder consultation timeframes and will at the NTGAC Board meeting next year seek feedback on how best to undertake engagements for future activities.

Environment Plan content

Western Gas advised it was a regulatory requirement for Western Gas to include a consultation report in the Environment Plan, including a summary of consultation with all relevant stakeholders. Western Gas advised it would share draft text summarising engagements with YMAC and NTGAC for input prior to Environment Plan submission to NOPSEMA. Western Gas also advised that a full transcript of all correspondence was required to be provided to NOPSEMA but this information would remain confidential to NOPSEMA.

Western Gas advised it was not normal practice for Western Gas to provide a copy of the Environment Plan in advance of submission to NOPSEMA. However, the Plan would be published on the NOPSEMA website during assessment.

Western Gas advised that it was compiling a database of government, industry and community contacts that may need to be contacted in the unlikely event of a marine pollution incident. Western gas added that stakeholder contact details were proposed to remain confidential to Western Gas, unless specified by stakeholders for inclusion in the Oil Pollution Emergency Plan, which typically occurred for organisations that have a function with respect to physical marine pollution response.

- **Conclusion**
  Western Gas confirmed that it would explore opportunities with NTGAC on how best to engage going forwards and extended this same offer to YMAC in its representative role.

On 29 November 2022 YMAC sent an email to Western Gas thanking it for its response.

On 6 December 2023 Western Gas sent an email to YMAC providing an opportunity for YMAC to review the consultation summary for the engagements to date for proposed petroleum activities in WA-70-R and WA-474-P, including feedback provided by YMAC in its capacity as a rep body and as acting for NTGAC (see NTGAC consultation this table).

Summary of Objection or Claim	Assessment of Merits	Western Gas Response	Environment Plan Controls
YMAC claimed that Western Gas' rationale for consulting was not clear.	Western Gas acknowledges that the consultation rationale may not have been clear to YMAC.	Western Gas has emailed YMAC confirming its rationale for consulting YMAC as a representative organisation and, initially, on behalf of NTGAC based on publicly available information.	No additional EP controls are required.

YMAC claimed that consultation information provided by Western Gas did not meet the principles of FPIC, noting the technical nature of the content.	Western Gas prepares consultation information to meet the information needs of a wide range of stakeholder groups. This information is typically presented as a starting point for consultation, with information tailored to meet specific needs where the values and sensitivities of Relevant Persons are known. For this EP, Indigenous values and sensitivities outside of those documented for the Determined Native Title Area or Commonwealth and State Government Management Plans were not known. As a result, Western Gas took an inclusive consultation approach to establish those values and sensitivities, including a commitment to meet with NTGAC Board and seeking feedback from YMAC and NTGAC on the presentation of the information to the NTGAC Board to ensure it adequality addresses concerns or interests.	Western Gas has emailed YMAC confirming direct consultation with NTGAC and Western Gas' willingness to meet with the NTGAC Bard and develop consultation information materials to meet the needs of NTGAC Board members.	No additional EP controls are required.
YMAC claimed that limited time had been provided to frame an appropriate response.	Western Gas acknowledges feedback from YMAC on consultation timeframes, noting Western Gas' requirement for EP submission to ensure regulatory compliance. Western Gas is committed to ongoing consultation with NTGAC across the life of the EP, including EP development, assessment by the Regulator and activity execution.	Western Gas has emailed YMAC confirming / acknowledging: • Its commitment to ongoing consultation through the life of the EP, including meeting the NTGAC Board at its planned meeting in Q1 2023. • The challenge in meeting regulatory and stakeholder consultation timeframes and will at the NTGAC Board meeting seek feedback on how best to undertake engagements for future activities.	Western Gas to meet with the NTGAC Board in Q1 2023 (refer Section 10.8).
	Western Gas has also considered feedback from YMAC seeking clarity on:	Western Gas has emailed YMAC confirming / acknowledging:	No additional EP controls are required.

	• The process by which YMAC's feedback would 'summarised' for inclusion in the EP and whether YMAC can have input to this process, • Whether YMAC could review the proposed Environment Plan before it is submitted to NOPSEMA. • How the response to the marine spill query will be documented and used by Western Gas.	• Regulatory requirements for consultation report to be included in the EP, inclusive of a summary of Relevant Person feedback and Western Gas responses. • Western Gas would allow YMAC the review the summary of its feedback prior to EP submission to NOPSEMA. • Stakeholder contact details would remain confidential to Western Gas, unless specified by stakeholders for inclusion in the Oil Pollution Emergency Plan. This typically occurs for organisations that have a function with respect to physical marine pollution response.	

First Nations people

- **Yamatji Marlpa Aboriginal Corporation (in its capacity as acting for Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC))**

Summary of consultation responses:

On 10 November 2022 YMAC sent an email to Western Gas advising it acted for NTGAC, which is the Registered Native Title Body Corporate that holds the native title rights and interest on trust for the Baiyungu and/or Thalanyji common law holders in the Exmouth area. YMAC provided the following response:

- YMAC claimed that the potential impacts of the decommissioning of the exploration wells on the Exmouth Gulf and Ningaloo Marine Park over which Baiyungu people hold native title were significant.
- YMAC requested that given the highly technical nature of the planned activities and the significance of the area it would be appropriate for Western Gas to present its plans at a NTGAC Board meeting, providing an opportunity for the Board to ask questions and raise their concerns. YMAC noted this opportunity followed the principles of Free, Prior and Informed Consent. YMAC provided NTGAC contact details to arrange attendance at the Board meeting.
- YMAC advised that the Board was not able to provide a response to Western Gas on proposed activities the next Board meeting, which was likely to be in February/March 2023.
- YMAC asked whether Western Gas was willing to fund NTGAC engaging a relevant expert to independently review the EP to inform NTGAC's response to proposed activities as NTGAC did not have access to the environmental science and marine science expertise required to identify and assess the environmental risks to the Exmouth Gulf and Ningaloo Marine Park.
- YMAC requested confirmation by return email that Western Gas was willing to engage with the Board in good faith before requiring a response from NTGAC.

On 22 November 2022 Western Gas sent an email to YMAC and provided the following response:

- Western Gas was willing to engage with the NTGAC Board in good faith and committed to meeting Board members at its next meeting, which is likely to take place in February or March of 2023.
- Western Gas requested a meeting with YMAC or NTGAC staff in advance of the Board meeting to gain a better understanding of interests or concerns regarding any potential impacts from the proposed activities, which were to:

    - Leave in situ four existing abandoned wellheads that have remained in place since the drilling of the wells in 2011 and 2016. Western Gas advised that the wells were made safe at the time and have been accepted by NOPSEMA as permanently abandoned. No drilling or other intervention activities were required at these wells.
    - Conduct an annual week-long vessel-based inspection survey of a well that has been suspended and will be permanently abandoned at a later date.
- Western Gas advised that all wells were approximately 150 km north of Exmouth and at water depths of greater than 1,100 m.
- At the meetings Western Gas would present the technical and environmental aspects of these activities with support from Western Gas' expert contractors and invited YMAC input on the presentation of the information to ensure it adequality addresses any concerns or interests.
- Western Gas advised that as is normal industry practice, the EP was being prepared by Western Gas and its expert contractors and for independent assessment by the regulator NOMSEMA. Western Gas advised it did not fund additional third-party assessments.

Western Gas advised that the EP was required to be submitted in December 2022 to ensure regulatory compliance and if meeting with NTGAC or YMAC was not possible in the short term, Western Gas will note in the EP that consultation with NTGAC was ongoing, as well as making every effort for NTGAC's feedback to be included in the final Environment Plan should it still be under assessment by NOPSEMA at the time of the Board meeting in 2023.

On 14 December 2022 YMAC sent an email to Western Gas advising that YMAC did not consider that NTGAC had been consulted or been given the opportunity to provide input into the Environmental Plan as the plan had not yet been presented to them. Further, YMAC noted:

- Western Gas had stated that the deadline to submit the EP is December 2022 and will be going ahead with submitting the EP even though the plan has not been presented to the traditional owners.
- NTGAC nor YMAC have the technical expertise to provide feedback on the EP without independent specialist advice, which Western Gas has declined to fund. The principles of free, prior and informed consent have not met.
- We appreciate that you will be presenting to the NTGAC board at a meeting early next year but that does not provide them with the opportunity to comment in time before the plan is submitted.
- We again request that you allow time and funding for proper consultation and feedback with traditional owners before submitting your EP.

On 15 December 2022 Western Gas emailed YMAC and advised that:

- Western Gas acknowledged issues raised in its email on consultation and confirmed that Western Gas was required by NOPSEMA to submit the EP by 17 December 2022.
- Western Gas committed to requesting an extension to this submission date to consider the issues raised in your email, noting that any decision on the submission date was at NOPSEMA's discretion. We will update you following feedback from NOPSEMA.

On 16 January 2023 Western Gas emailed YMAC and advised the EP was submitted on 16 December 2022, a day prior to NOPSEMA's 17 December 2022 deadline for submission, and advised that:

- On 22 December 2022 NOPSEMA advised Western Gas that additional content was required in the EP on the consultation of Relevant Persons, drawing Western Gas' attention in particular to its consultation guidance issued on 15 December 2022 - 'Consultation in the course of preparing an environment plan' (GL2086), which outlined consultation requirements in accordance with the appeal decision made by the Federal Court in Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 on 2 December 2022.
- NOPSEMA advised that additional time had been provided for Western Gas to undertake and complete consultation.
- It sought from YMAC feedback on how best to present information to the NTGAC Board for consideration

On 16 January 2023 Western Gas sent an email to YMAC nominated representatives in the absence of key YMAC contacts.

On 24 January 2023 Western Gas sent a follow-up email to YMAC for response.

On 1 February 2023 Western Gas sent a follow-up email and left a voice message for response.

On 8 February 2023 YMAC emailed Western Gas and apologised for not responding sooner and advised that it had been inundated with requests from oil and gas companies seeking to consult with traditional owners on their activities. YMAC advised it would respond in a few days on way forward and requested the EP submission deadline.

On 9 February 2023 Western Gas emailed YMAC provided a date for the planned EP re-submission.

On 20 February 2023 YMAC advised that the Chairperson has requested the following information from Western Gas prior to engaging in any consultation:

- Could you please advise if Western Gas plans on transporting any materials through the Exmouth Gulf?
- Could you also please send through the EMBA for the activities and advise what scenario brought NTGAC's determination area within the EMBA?

On 22 February 2023 Western Gas emailed YMAC and confirmed:

- Western Gas had no plans for using Exmouth Gulf to support the well inspection activities.
- The location of the Western Gas permits, which are approximately 150 km to the north of Exmouth and provided a map showing the EMBA for the planned activity, noting the following points:
    - The EMBA presented a very conservative possible consequence of a marine diesel spill.
    - The modelled EMBA was based on the loss of marine diesel from a fuel tank on a typical vessel to do the well inspection. The fuel tank volume for a typical vessel would be less than 250 cubic metres.
    - On this occasion Western Gas had used a spill model for a much larger vessel with a fuel tank size of more than 1000 cubic metres.
    - This choice had been made to provide operational flexibility, allowing Western Gas to take advantage of the presence of such a vessel should it be undertaking activities at the Western Gas permits under the management of a different Environment Plan.
    - The EMBA did not intersect any Native Title Determined Areas but at its closest point was adjacent to the Native Title determined lands and waters of North West Cape.
    - Western Gas had taken an inclusive approach to the consultation of all NTGAC as a potential Relevant Person for consultation.

On 8 March 2023 YMAC confirmed that:

- The NTGAC Board had identified their most significant concerns as being environmental impacts from a marine diesel spill from the vessels conducting the operations, particularly any impacts on the Exmouth Gulf and the Ningaloo Marine Park.
- The Board noted that the EMBA does not overlap the marine park or the Exmouth Gulf and that Western Gas does not intend to use the Exmouth Gulf to support its proposed activities.
- Given that the EMBA did not overlap NTGAC's determination area the Board was content not to consult in detail about this particular activity.

On 8 March 2023 Western Gas thanked YMAC for passing on the feedback from the NTGAC Board and that no consultation detail was required for this activity.

Summary of Objection or Claim	Assessment of Merits	Western Gas Response	Environment Plan Controls
YMAC claimed that the potential impacts of the decommissioning of the exploration wells on the Exmouth Gulf and Ningaloo Marine Park over which Baiyungu people hold native title were significant.	Western Gas anticipates that there will little to no ecological, social, economic or cultural impacts associated with leaving the wellheads in-situ as there are no activities associated with this process. However, Western Gas acknowledges there may be additional interests or concerns held by Relevant Persons and	Western Gas has emailed YMAC confirming its commitment to ongoing consultation through the life of the EP, including meeting the NTGAC Board at its planned meeting in Q1 2023. Western Gas requested a meeting with YMAC or NTGAC staff in advance of the Board meeting to gain a better understanding	No additional EP controls are required.

	has committed to meeting the NTGAC Board to address any questions or concerns. Western Gas acknowledges the activity risk of marine pollution. However, risks associated with the proposed vessel survey do not pose significant additional risk to that already present in the region due to the ongoing presence off the west and northwest coasts of recreational vessels, commercial fishing activities and commercial marine traffic via AMSA shipping fairways. An Oil Pollution Emergency Plan will be in place prior to the start of the annual vessel-based survey. Western Gas also acknowledges formal response arrangements in the National Plan for Maritime Environmental Emergencies for marine pollution in Commonwealth waters. Western Gas also acknowledges formal response arrangements in the State Hazard Plan – Marine Environmental Emergencies for marine pollution in WA State waters.	of interests or concerns regarding any potential impacts from the proposed activities.	
YMAC claimed that insufficient time had been provided for consultation prior to EP submission to NOPSEMA for assessment.	Western Gas acknowledged YMAC's concerns.	Western Gas confirmed that it was required by NOPSEMA to submit the EP by 17 December 2022. Western Gas committed to requesting an extension to this submission date to consider the issues raised in your email, noting that any decision on the submission date was at NOPSEMA's discretion. We will update you following feedback from NOPSEMA.	

YMAC sought additional information from Western Gas, specifically: • Confirmation if Western Gas planned on transporting any materials through the Exmouth Gulf. • Confirmation of the EMBA for the activities. • Confirmation of what scenario brought NTGAC's determination area within the EMBA.	Western Gas acknowledged YMAC's concerns.	Western Gas confirmed it had no plans to use Exmouth Gulf for supporting planned activities. Western Gas provided a location map showing the EMBA being adjacent to the Native Title determined lands and waters of North West Cape. Western Gas had taken an inclusive approach to the consultation of all NTGAC as a potential Relevant Person for consultation.	
YMAC confirmed that the NTGAC Board advised it was content not consulted in detail about this particular activity as the EMBA did not overlap NTGAC's determination area.	Western Gas acknowledged YMAC's feedback.	No action required.	
First Nations people • **Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC)**			
Summary of consultation responses: See above for YMAC in its capacity as acting for NTGAC. The Board of NTGAC was not required to be consulted for the Activity.			
Summary of Objection or Claim	**Summary of Objection or Claim**	**Summary of Objection or Claim**	**Summary of Objection or Claim**
No objections or claims have been received about activity impacts or risks.	Not applicable.	Not applicable.	Not applicable.
First Nations people • **Buurabalayji Thalanyji Aboriginal Corporation (BTAC)**			
Summary of consultation responses: On 2 November 2022 Western Gas sent an email to BTAC and provided a consultation information sheet. On 11 November 2022 Western Gas sent an email to BTAC and provided a clarification on oil spill modelling. On 2 December 2022 Western Gas sent a reminder email to BTAC and outlined what details would be provided in the event of a marine pollution incident.			

No feedback has been received from the DISR at the time of Environment Plan submission.			
Summary of Objection or Claim	**Assessment of Merits**	**Western Gas Response**	**Environment Plan Controls**
No objections or claims have been received about activity impacts or risks.	Not applicable.	ABF contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.
Industry Association • **Australian Petroleum Production & Exploration Association (APPEA)**			
Summary of consultation responses: On 6 November 2022 Western Gas sent an email to APPEA and provided a consultation information sheet. On 11 November 2022 Western Gas sent an email to APPEA and provided a clarification on oil spill modelling. On 2 December 2022 Western Gas sent a reminder email to APPEA and outlined what details would be provided in the event of a marine pollution incident. No feedback has been received from the APPEA at the time of Environment Plan submission.			
Summary of Objection or Claim	**Assessment of Merits**	**Western Gas Response**	**Environment Plan Controls**
No objections or claims have been received about activity impacts or risks.	Not applicable.	APPEA contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.
Industry Association • **Commonwealth Fisheries Association (CFA)**			
Summary of consultation responses: On 11 November 2022 Western Gas sent an email to CFA and provided a consultation information sheet and a map showing the well locations relative to the Western Deepwater Trawl Fishery. On 6 December 2022 Western Gas sent a reminder email to CFA and outlined what details would be provided in the event of a marine pollution incident. On 7 December 2022 CFA sent an email to Western Gas advising that the CFA was not resourced to be able to provide comments on individual projects/activities on behalf of members. CFA encouraged Western Gas to deal directly with the relevant sector bodies and associations as well as individual fishers as necessary. On 7 December 2022 Western Gas sent an email to CFA advising that licence holders in the Western Deepwater Trawl Fishery had been consulted by way of email advice at the commencement of the consultation period, as well as sending a reminder email, seeking feedback on both activity impacts and risks.			
Summary of Objection or Claim	**Summary of Objection or Claim**	**Summary of Objection or Claim**	**Summary of Objection or Claim**
No objections or claims have been received about activity impacts or risks.	Not applicable.	Licence holder and CFA contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.

Industry Association • **Marine Tourism Association of Western Australia (MTWA)**			
Summary of consultation responses: On 6 November 2022 Western Gas sent an email to MTWA and provided a consultation information sheet. On 11 November 2022 Western Gas sent an email to MTWA and provided a clarification on oil spill modelling. On 2 December 2022 Western Gas sent a reminder email to MTWA and outlined what details would be provided in the event of a marine pollution incident. No feedback has been received from the MTWA at the time of Environment Plan submission.			
Summary of Objection or Claim	**Summary of Objection or Claim**	**Summary of Objection or Claim**	**Summary of Objection or Claim**
No objections or claims have been received about activity impacts or risks.	Not applicable.	MTWA contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.
Industry Association • **Pearl Producers Association (PPA)**			
Summary of consultation responses: On 11 November 2022 Western Gas sent an email to PPA and provided a consultation information sheet. On 6 December 2022 Western Gas sent a reminder email to PPA and outlined what details would be provided in the event of a marine pollution incident. No feedback has been received from the PPA at the time of Environment Plan submission.			
Summary of Objection or Claim	**Assessment of Merits**	**Western Gas Response**	**Environment Plan Controls**
No objections or claims have been received about activity impacts or risks.	Not applicable.	PPA contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.
Industry Association • **Recfishwest**			
Summary of consultation responses: On 6 November 2022 Western Gas sent an email to Recfishwest and provided a consultation information sheet. On 11 November 2022 Western Gas sent an email to Recfishwest and provided a clarification on oil spill modelling. On 1 December 2022 Recfishwest sent an email to Western Gas and provided the following response: • Recfishwest acknowledged consultation information provided by Western Gas			

- Recreational fishing was likely to be very limited in the wellhead location area.
- Recfishwest acknowledged that subsea structures such as wellheads develop productive fish habitats that can be beneficial to recreational fishing experiences. Therefore, Recfishwest supported the activity to leave the four wellheads in situ.
- In relation to vessel-based surveys and communications in the event of an oil spill, it was agreed that consultation with Recfishwest on behalf of WA recreational fishers was appropriate. While it is also acknowledged that it is unlikely that all recreational fishers would be impacted in such an event, it is difficult to tell the extent of dispersion in the event of a 1000m^3 oil spill. Therefore, Recfishwest considers it appropriate to be informed of any oil spill incident, particularly if it spreads towards the Montebello Island/Exmouth regions where recreational fishing is more frequent. In such an event, email communications would be sufficient.

On 4 December 2022 Western Gas sent an email to Recfishwest and provided the following response:

- Western Gas acknowledged the low likelihood of recreational fishing at the well location area.
- The ongoing presence and Recfishwest support for leaving the wellheads in situ.
- Western Gas thanked Recfishwest for its support to be a point of contact for Western Gas' emergency response communications on behalf of Western Australian recreational fishers.
- Western Gas advised it will include Recfishwest in a database of government, industry and community contacts that may need to be contacted in the unlikely event of a marine pollution incident. Stakeholder contact details are proposed to remain confidential to Western Gas, unless specified by stakeholders for inclusion in the Oil Pollution Emergency Plan, which typically occurred for organisations that have a function with respect to physical response.
- Western Gas acknowledged that email notification would be sufficient.

Summary of Objection or Claim	Assessment of Merits	Western Gas Response	Environment Plan Controls
No objections or claims have been received about activity impacts or risks.	Not applicable.	Recfishwest contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.

Industry Association

- **Tuna Australia (TA)**

Summary of consultation responses:

On 11 November 2022 Western Gas sent an email to TA and provided a consultation information sheet and a map showing the well locations relative to the Western Deepwater Trawl Fishery.

On 14 November 2022 TA sent an email to Western Gas and provided the following response:

- TA advised that the number of proposals requesting engagement is rapidly increasing in the marine space. Tuna Australia confirmed it was prepared to review proposals, consult with concession holders, and provide responses to proposals (submissions).
- TA advised it had been providing this service free of charge for many years, either direct or through a third party. As a result, TA was now offering a service agreement to assist with environment plan proposals.
- TA provided a service agreement for consideration and execution to commence the consultation process.

On 21 November 2022 Western Gas sent an email to TA and provided the following response:

- The service agreement had been provided to Western Gas management for review.

Management of impacts

- To support the management review, Western Gas sought confirmation that the values and sensitivities of Western Tuna and Billfish Fishery were likely to be impacted by the ongoing presence of the four existing abandoned wellheads.
- Western Gas also sought feedback on whether licence holders were likely to be impacted by the presence of the vessel for the annual wellhead survey. Western Gas advised it would be happy to discuss on water communications protocols if this was the case.

Management of risks

- Western Gas advised it was developing a communications document setting out consultation expectations of representative bodies (timeliness, content, preferred contacts and approach, etc) to support the efficient provision of timely information to licence holders, noting that government fishing regulators in conjunction with other regulatory bodies will ultimately provide direction to fishers on continued access to fisheries.

Consultation

- Western Gas advised it was mindful of the increasing consultation requests made by energy proponents of the commercial fishing sector and its representative organisations, as well as ongoing fishing regulatory challenges.

On 21 November 2022 TA sent an email to Western Gas and provided the following response:

- TA thanked Western Gas for its detailed response and looked forward to receiving Western Gas' review of TA's service agreement.

On 23 November 2022 Western Gas sent an email to TA and provided the following response:

- As is normal industry practice, the Environment Plan (EP) is being prepared by Western Gas and its expert contractors and will be independently assessed by the Regulator NOMSEMA.
- Based on our engagements to date, it is unclear to Western Gas what services are required from Tuna Australia as no indication has been provided on expected activity impacts or risks to the Western Tuna and Billfish Fishery. Therefore, Western Gas was not in a position to consider the Consulting Service Agreement.
- Western Gas welcomed further discussion to understand possible consequences from proposed activities and offers to meet with you to further explain the proposed activities, as well as learn more about the extent of your fishery's interests relative to Western Gas activities.

On 23 November 2022 TA sent an email to Western Gas and provided the following response:

- TA advised that it had nothing more to contribute to Western Gas' environment plan if Western Gas was not able to discuss or support a services agreement.
- TA acknowledged that NOPSEMA would make a decision based on the quality of Western Gas' submission and whether activities had the potential to impact the conservation of the resources of the sea.
- TA advised that spatial squeeze is occurring at an alarming rate and TA was offering to assist Western Gas to meet its environmental plan requirements. However, having a meeting without a service agreement in place would continue to absorb valuable resources.

Summary of Objection or Claim	Assessment of Merits	Western Gas Response	Environment Plan Controls
No objections or claims have been received about activity impacts or risks.	Western Gas has considered TA's request for a service agreement to be signed to support consultation. It was unclear to Western Gas what services were required from Tuna Australia as no indication was provided on expected activity impacts or risks to the Western Tuna and Billfish Fishery.	TA's contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.

	As a result, Western Gas did not sign the service agreement.		
Industry Association • **Western Australian Fishing Industry Council (WAFIC)**			
Summary of consultation responses: On 11 November 2022 Western Gas sent an email to WAFIC and provided a consultation information sheet and a map showing the well locations relative to the Western Deepwater Trawl Fishery. On 11 November 2022 Western Gas sent an email to WAFIC and provided a clarification on oil spill modelling. On 5 December 2022 WAFIC sent an email to Western Gas and provided a confidential draft position regarding consultation with WAFIC and commercial fishing licence holders for significant unplanned events, such as an oil spill. WAFIC requested that the advice remain confidential, as WAFIC was still working through refining the document and was potentially subject to change. WAFIC also confirmed it had no concerns regarding the proposed surveys on the wellhead. On 6 December 2022 Western Gas sent an email to WAFIC and provided the following response: • Western Gas acknowledged the provision of the draft position document and would respond if it had any questions on preparedness and consultation in the event of a significant marine pollution event. • Western Gas will request assurance from NOPSEMA that the position document remain confidential to the Regulator as part of the Environment Plan assessment. Western Gas acknowledged that WAFIC had no concerns regarding planned activities. Consultation conducted for a previous, on 20 December 2019 Western Gas sent an email to WAFIC and provided a consultation information sheet. On 20 December 2019 WAFIC sent an email to Western Gas confirming there is no active commercial fishing for state managed fisheries over 1,000 metres water depth, and to confirm that consultation is not required with either state or commonwealth managed commercial fisheries for the activities described for this EP at this deep water location. On 3 January 2020 Western Gas sent an email to WAFIC to: • Confirm the information provided by WAFIC in their email. • Noted the Western Deepwater Trawl Fishery may be relevant persons. • Discussed consultation approaches for the Equus Gas Project.			
Summary of Objection or Claim	**Assessment of Merits**	**Western Gas Response**	**Environment Plan Controls**
No objections or claims have been received about activity impacts or risks.	Not applicable.	WAFIC contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.
Industry Association • **WA Game Fishing Association (WAGFA)**			
Summary of consultation responses:			

On 6 November 2022 Western Gas sent an email to WAGFA and provided a consultation information sheet. On 11 November 2022 Western Gas sent an email to WAGFA and provided a clarification on oil spill modelling. On 4 December 2022 Western Gas sent a reminder email to WAGFA and outlined what details would be provided in the event of a marine pollution incident. No feedback has been received from the WAGFA at the time of Environment Plan submission.			
Summary of Objection or Claim	**Assessment of Merits**	**Western Gas Response**	**Environment Plan Controls**
No objections or claims have been received about activity impacts or risks.	Not applicable.	WAGFA contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.
Local Government • **Shire of Ashburton (SoA)**			
Summary of consultation responses: On 6 November 2022 Western Gas sent an email to SoA and provided a consultation information sheet. On 11 November 2022 Western Gas sent an email to SoA and provided a clarification on oil spill modelling. On 30 November 2022 Western Gas met with SoA to discuss planned activities and emergency response arrangements. On 7 December 2022 Western Gas sent an email to SoA thanking them for the meeting, noting that the widest extent possible of modelled oil dispersion did not overlap the Shire's local government area boundary.			
Summary of Objection or Claim	**Assessment of Merits**	**Western Gas Response**	**Environment Plan Controls**
No objections or claims have been received about activity impacts or risks.	Not applicable.	No response required.	No additional EP controls are required.
Local Government • **Shire of Exmouth (SoE)**			
Summary of consultation responses: On 6 November 2022 Western Gas sent an email to SoE and provided a consultation information sheet. On 11 November 2022 Western Gas sent an email to SoE and provided a clarification on oil spill modelling. On 7 December 2022 Western Gas sent a reminder email to SoE.			
Summary of Objection or Claim	**Assessment of Merits**	**Western Gas Response**	**Environment Plan Controls**

No objections or claims have been received about activity impacts or risks.	Not applicable.	DISR contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.
Petroleum Industry • **Chevron (adjacent titleholder)**			
Summary of consultation responses: On 6 November 2022 Western Gas sent an email to Chevron and provided a consultation information sheet. On 11 November 2022 Western Gas sent an email to Chevron and provided a clarification on oil spill modelling. On 4 December 2022 Western Gas sent a reminder email to Chevron and outlined what details would be provided in the event of a marine pollution incident. No feedback has been received from the Chevron at the time of Environment Plan submission.			
Summary of Objection or Claim	**Assessment of Merits**	**Western Gas Response**	**Environment Plan Controls**
No objections or claims have been received about activity impacts or risks.	Not applicable.	Chevron contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.
Petroleum Industry • **All other titleholders**			
Summary of consultation responses: On 6 November 2022 Western Gas sent an email to Chevron and provided a consultation information sheet. On 11 November 2022 Western Gas sent an email to Chevron and provided a clarification on oil spill modelling. On 4 December 2022 Western Gas sent a reminder email to Chevron and outlined what details would be provided in the event of a marine pollution incident. No feedback has been received from the Chevron at the time of Environment Plan submission.			
Summary of Objection or Claim	**Assessment of Merits**	**Western Gas Response**	**Environment Plan Controls**
No objections or claims have been received about activity impacts or risks.	Not applicable.	Chevron contact details to be included in the Western Gas emergency response database.	No additional EP controls are required.
Recreational fishers • **All other titleholders**			
See Recfishwest consultation (this table)			

Other persons or organisations that Western Gas considers relevant			
Australian Marine Oil Spill Centre (AMOSC)			
Summary of consultation responses: On 6 December 2022 Western Gas sent an email to AMOSC providing information about proposed activities.			
Summary of Objection or Claim	**Assessment of Merits**	**Western Gas Response**	**Environment Plan Controls**
No objections or claims have been received about activity impacts or risks.	Not applicable.	Not required.	AMOSC contact details and communications requirements are included in OPEP.

4

10.8 ONGOING CONSULTATION

The determination and classification of Relevant Persons is dynamic and it is recognised that new Relevant Persons may emerge or the interest of existing Relevant Persons may change over the life of the EP.

Western Gas will maintain oversight of Relevant Persons identified for this EP and capture updates in its consultation register.

Western Gas also recognises that Relevant Persons may continue to have an interest during Activity implementation, particularly notifications prior to the start and upon completion of the annual vessel survey.

No notifications are planned with commercial fishers or their representative organisations given the location and duration of the vessel survey.

Should Western Gas consider amendment to the accepted EP or OPEP be required as a result of feedback from Relevant Persons, Western Gas will seek to make these amendments in accordance with NOPSEMA's requirements. Western Gas will advise Relevant Persons and organisations of the response to the feedback provided and any resultant action taken.

Ongoing Relevant Persons engagement is outlined in Table 10-9.

Table 10-9: Ongoing Relevant Persons engagement program

Relevant Persons and organisations	Activity	Purpose of Engagement	Timing
Prior to the start of activities			
DoD	Email	Consideration of Defence activities Consideration of restricted airspace	No less than five weeks prior to the start of activities.
Australian Hydrographic Office	Email	Promulgation of Notice to Mariners.	No less than five weeks prior to the start of activities.
DMIRS	Email	Consideration of previous request to be notified.	No less than five weeks prior to the start of activities.
NOPSEMA	Written Notification	Formal notification of survey start date (Reg 29)	At least 10 days before the survey commences, and as soon as practicable (no later than 10 days) after the completion.
AMSA Joint Rescue Coordination Centre (JRCC)	Email	Promulgation of radio-navigation warnings.	Commence no less than 48 hrs prior to commencing survey

Relevant Persons and organisations	Activity	Purpose of Engagement	Timing
			and at completion of survey
Following the completion of activities			
AHO AMSA JRCC DoD DMIRS	Email	Advice of activity completion	Within one week of completion.
NOPSEMA	Written Notification	Formal notification of survey completion date (Reg 29)	Within 10 days of completion of the Activity
Ongoing			
AMSA	Email	Ongoing discussion with AMSA for the development of arrangements for emergency response communications.	
DCCEEW	Application	Sea dumping permissions	Ongoing
DNP	Activity update	Notify DNP of any activity changes that has implications for an Australian Marine Park.	Ongoing

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WESTERN GAS

WA-474-P, WA-70-R SUSPENDED WELLS

ENVIRONMENT PLAN APPENDICES

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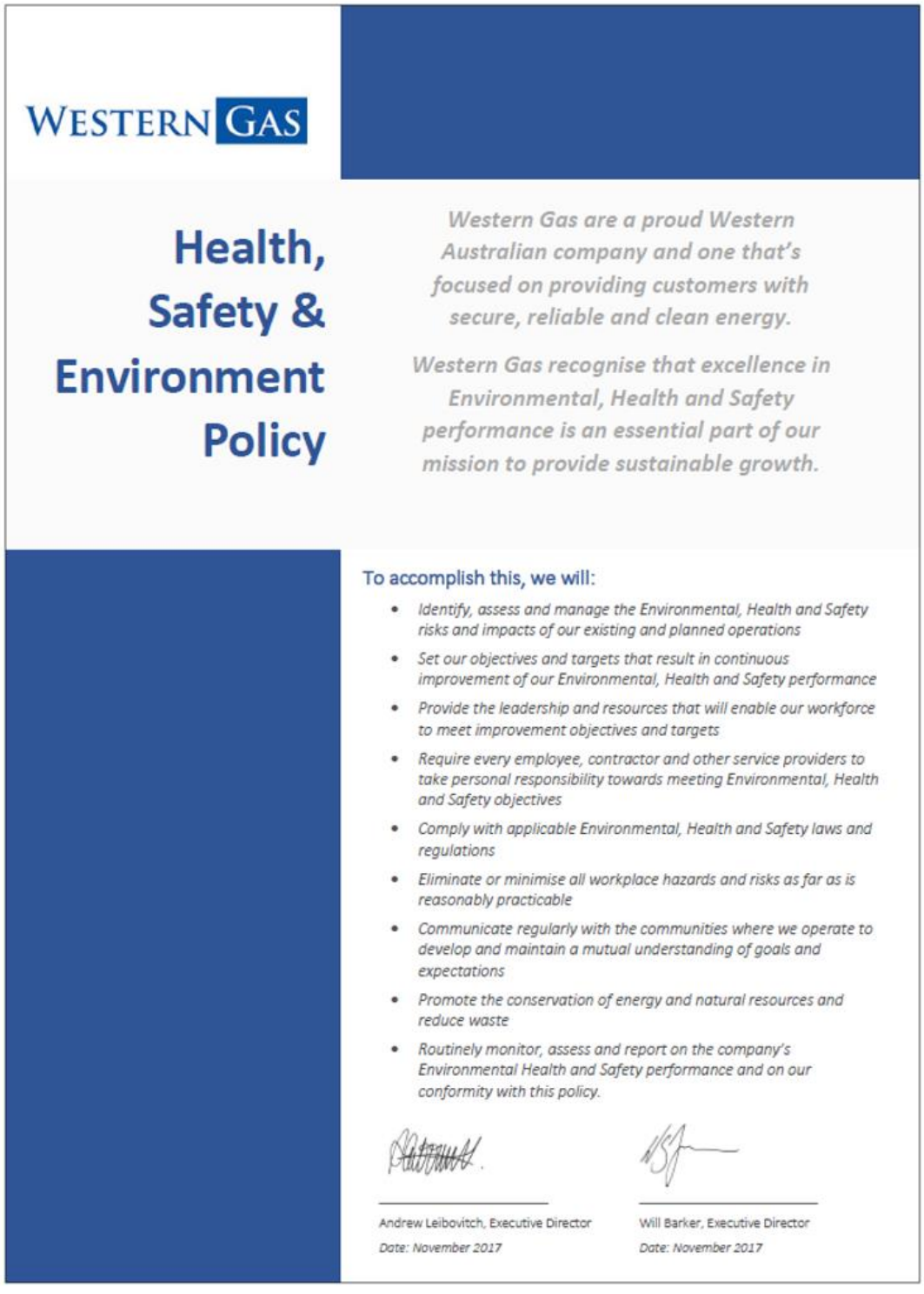


WESTERN GAS

Health, Safety & Environment Policy

Western Gas are a proud Western Australian company and one that's focused on providing customers with secure, reliable and clean energy.

Western Gas recognise that excellence in Environmental, Health and Safety performance is an essential part of our mission to provide sustainable growth.

To accomplish this, we will:

- *Identify, assess and manage the Environmental, Health and Safety risks and impacts of our existing and planned operations*
- *Set our objectives and targets that result in continuous improvement of our Environmental, Health and Safety performance*
- *Provide the leadership and resources that will enable our workforce to meet improvement objectives and targets*
- *Require every employee, contractor and other service providers to take personal responsibility towards meeting Environmental, Health and Safety objectives*
- *Comply with applicable Environmental, Health and Safety laws and regulations*
- *Eliminate or minimise all workplace hazards and risks as far as is reasonably practicable*
- *Communicate regularly with the communities where we operate to develop and maintain a mutual understanding of goals and expectations*
- *Promote the conservation of energy and natural resources and reduce waste*
- *Routinely monitor, assess and report on the company's Environmental Health and Safety performance and on our conformity with this policy.*

Andrew Leibovitch, Executive Director
Date: November 2017

Will Barker, Executive Director
Date: November 2017

APPENDIX B: DECOMISSIONING OPTIONS EVALUATION WORKSHOP OUTCOMES

WESTERN GAS

Chester-2, Mentorc-2, Glencoe-2H and Snapshot-1 Wellhead Options Assessment

Criteria	Sub-criteria	Description	Options							
			Removal (External cutting above the mudline)		Removal (Internal cutting below the mudline)		Leave In-situ		Install Cover/Cap	
			Justification	Score	Justification	Score	Justification	Score	Justification	Score
Environment	Water quality and sediment quality	Assessment of water and sediment quality.	If part of the the wellhead is left in-situ as a result of external cutting it would slowly degrade overtime releasing corrosion material. The wellhead is comprised predominantly of mild steel, iron the primary component of steel (98%) is only toxic to marine organisms at extremely high concentrations (Grimwood and Dixon, 1997). Based on the low toxicity of iron, the slow release rate and rapid dilution of the open ocean environment, any impacts to sediments and water quality will be low and in the immediate vicinity of the wellhead. If there are any external obstructions, sediment removal may be required to access the wellhead in an appropriate manner. No risk of LOWC as adequate well control barriers are in place via the plugging and abandonment oprations. Vessel discharges and vessel MDO risk associated with the vessel campaigns.	Least Preferred	Short-term local impact to water and sediment quality during the removal process. An internal cutting tool will be used to cut below the mudline. No risk of LOWC as adequate well control barriers are in place via the plugging and abandonment oprations. Vessel discharges and vessel MDO risk associated with the vessel campaigns.	Least Preferred	If the wellhead is left in-situ it would slowly degrade overtime releasing corrosion material. The wellhead is comprised predominantly of mild steel, iron the primary component of steel (98%) is only toxic to marine organisms at extremely high concentrations (Grimwood and Dixon, 1997). Based on the low toxicity of iron, the slow release rate and rapid dilution of the open ocean environment, any impacts to sediments and water quality will be low and in the immediate vicinity of the wellhead. No risk of LOWC as adequate well control barriers are in place via the plugging and abandonment oprations. No vessel discharges or vessel MDO risk.	Most preferred	If a cover/cap is installed it would slowly degrade overtime releasing corrosion material. The cover/cap is comprised predominantly of mild steel, iron the primary component of steel (98%) is only toxic to marine organisms at extremely high concentrations (Grimwood and Dixon, 1997). Based on the low toxicity of iron, the slow release rate and rapid dilution of the open ocean environment, any impacts to sediments and water quality will be low and in the immediate vicinity of the wellhead. No risk of LOWC as the well did not enter production. Vessel discharges and vessel MDO risk associated with the single vessel campaign.	-
	Ecological services	Assessment of biodiversity and habitat changes due to the physical presence of infrastructure, and seabed disturbance because of the petroleum activity.	Due to the depth and age of the wellheads, it is unlikely that there will be significant marine growth, however in the event of external cutting above the mudline for the removal of the wellhead, marine growth around/on the well will be removed. A portion of infrastrucure will remain above the seabed (marine growth on this piece will remain / re-grow). Over time the remaining infrastructure will deteroriate. Vessel and ROV activity with associated impacts and risks to the marine environment. No risk of LOWC as adequate well control barriers are in place via the plugging and abandonment oprations.	-	Due to the depth and age of the wellheads, it is unlikely that there will be significant marine growth, however in the event of internal cutting below the mudline for the removal of the wellhead, marine growth around/on the well will be removed. Seabed disturbance will occur as a result of cutting below the mudline and lifting the infrastructure to remove from the ground. Vessel and ROV activity with associated impacts and risks to the marine environment. No risk of LOWC as adequate well control barriers are in place via the plugging and abandonment oprations.	-	If marine growth is present around/on the well, it will remain. Deterioriation of the infrastructure will occur over time, however analoguous data from Glenloth-1 shows this is slow / unlikely. No vessel or ROV activity, therefore no associated impacts or risks to the marine environment. No LOWC risk as the well did not encounter hydrocarbons.	Most preferred	Any marine growth around/on the well may not survive as a result of being trapped by the cover/cap. Installing a cover/cap will create a alrger seabed footprint and higher profile to cover the wellhead. Deterioriation of the infrastructure will occur over time, however analoguous data from Glenloth-1 shows this is slow / unlikely. Vessel and ROV activity with associated impacts and risks to the marine environment. No LOWC risk as the well did not encounter hydrocarbons.	Least Preferred
	Emissions	Emissions such as light, noise, atmospheric (including GHG) and marine discharges.	Vessel and ROV activity creating light, noise and atmospheric (including GHG) emissions, discharges, and both minor and major MDO spill risk.	-	Vessel and ROV activity creating light, noise and atmospheric (including GHG) emissions, discharges, and both major and minor MDO spill risk.	-	No vessel or ROV activity, therefore no associated emissions, discharges, or MDO spill risk.	Most preferred	Vessel and ROV activity creating light, noise and atmospheric (including GHG) emissions, discharges, and both major and minor MDO spill risk.	-
	Waste	Volume and type of waste associated with offshore operations (e.g. landfill, recyclables).	General vessel operations related waste (food, grey water, bilge, cooling water) Onshore disposal required of retrieved well materials (concrete, steel, etc.).	-	General vessel operations related waste (food, grey water, bilge, cooling water) Onshore disposal required of retrieved well materials (concrete, steel, etc.).	-	No waste generated by the vessel operations. No need for onshore disposal of of well materials (concrete, steel, etc.)	Most preferred	General vessel operations related waste (food, grey water, bilge, cooling water)	-
Technical Feasibility	Engineering and execution complexity	The extent to which the option requires the use of proven technology. The ability to recover from unplanned excursions and complete the planned option.	Cutting above the mudline using a cutting tool such as a diamond wire saw (DWS). This tool may require removal of sediment to reach a suitable point for cutting, which would result in seabed disturbance. This option is feasible, however other options may be more suitable to ensure that seabed disturbance is less impacted. The wellheads are located in 1,100-1,125 m of water, this exceeds max operating depth for air diving, consequently ROV operations are required for removal.	Least Preferred	Cutting below the mudline would require removal of sediment to a suitable point (e.g. jetting). This would be the most complex option associated with the removal of the wellheads	Least Preferred	Leaving in-situ ensures the material remains in the one location and poses no technical risk. Therefore, the preference from a technical feasibility perspective is to leave the wellhead in place.	Most preferred	A larger vessel with crane capability required to maneuver the cover/cap.	-
Health and Safety	Risk to personnel (offshore and onshore)	Health and safety risks to company-related personnel both onshore (e.g. logistics) and offshore.	Complete removal may require more than one single campaign and associated vessel hours, land logistics, supply needs, waste disposal health and safety risks.	-	Complete removal may require more than one single campaign and associated vessel hours, land logistics, supply needs, waste disposal health and safety risks.	-	No health and safety risk to personnel as no removal camapign/s would be created.	Most preferred	Installing a cover/cap would require one campaign and associated vessel hours, land logistics, supply needs, waste disposal health and safety risks.	-
	Residual risk to other marine users	Health and safety risks to marine users such as commercial vessels, fishers and members of the public.	Given the remote offshore location of the wellhead and the water depth of 1,110-1,250 m, no credible health and safety risks to marine users have been identified. The wellhead has been in place since ~2010 and no harm or events are known. Commercial fisheries are not active at this depth or region.		Given the remote offshore location of the wellhead and the water depth of 1,110-1,250 m, no credible health and safety risks to marine users have been identified. The wellhead has been in place since ~2010 and no harm or events are known. Commercial fisheries are not active at this depth or region.		Given the remote offshore location of the wellhead and the water depth of 1,110-1,250 m, no credible health and safety risks to marine users have been identified. The wellhead has been in place since ~2010 and no harm or events are known. Commercial fisheries are not active at this depth or region.		Given the remote offshore location of the wellhead and the water depth of 1,110-1,250 m, no credible health and safety risks to marine users have been identified. The wellhead has been in place since ~2010 and no harm or events are known. Commercial fisheries are not active at this depth or region.	
Social	Effect on current and future commercial fisheries	Displacing commercial fisheries or affecting their catch. Consideration given to current and potential future commercial fisheries.	The wellhead may not be able to be removed at/below the seabed with this method, therefore snag risk remains to trawl fishing operations, however, commercial fishing is not known to occur in the operational area. Vessel activity and associated impacts and risks for no additional benefit.	-	Complete removal of the well below the seabed. No snag risk to commercial fisheries if they operate in the region in the future.	Most preferred	Snag risk remains to trawl fishing operations, however, commercial fishing is not known to occur in this area.	Least Preferred	The presence of a cover/cap still poses potential snag risk for trawl fishing due to the extended height added over the wellhead. However, commercial fishing is not known to occur in this area. Vessel activity and associated impacts and risks for no extra benefit.	-
	Other socio-economic effects	Effects on local communities, recreational users, commercial activities, etc.	Reputational benefits as a responsible petroleum operator.	Most preferred	Reputational benefits as a responsible petroleum operator.	Most preferred	Possibility of reputational impacts.	Least Preferred	Potential reputational benefits as a responsible petroleum operator for attempting to address the legacy asset.	-
Economic	Financial cost	Operational / capital costs to Western Gas.	Costs are associated with vessel use, personnel, removal of the wellhead and disposal of the wellhead	Least Preferred	Costs are associated with vessel use, personnel, removal of the wellhead and disposal of the wellhead	Least Preferred	No cost	Most preferred	Costs are associated with vessel use, personnel, design and implementation of the wellcap	Least Preferred

APPENDIX C: EXISTING ENVIRONMENT

1 REGIONAL SETTING

The Operational Area for the proposed Activity lies within the Northern Carnarvon Basin, approximately 150 km from the closest mainland coast and approximately 135 km from Barrow Island (refer to EP Figure 2-1). The area lies directly north of Exmouth, and occurs within waters approximately 9,00 m to 1,200 deep.

This document provides details of the sensitivities that occur within the Operational Area, as well as those that occur within the environment that may be affected (EMBA) by unplanned events associated with the Activity. The largest EMBA identified for the Activity is that associated with a potential diesel spill as a result of a vessel collision. This EMBA encompasses all other activity-specific EMBAs (e.g. area that may be influenced by underwater noise), and includes the Operational Area.

Australia's offshore waters have been divided into six marine bioregions to facilitate their management by the Australian Government under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The EMBA sits entirely within the North-West Marine Region (NWMR). Within this region, the EMBA intersects six (6) smaller bioregions based upon the Integrated Marine and Coastal Regionalisation of Australia (IMCRA) (Table 1-1).

The operational area for this activity is located in Commonwealth waters within the North West Shelf Province, in water depths of approximately 800 m – 1,200 m. These bioregions fall within the NWMR, as defined under IMCRA, and are based on fish, benthic habitats and oceanographic data.

Table 1-1: Australian Bioregions within the EMBA

Name	Hydrocarbon Presence	
	Operational Area	EMBA
Northwest Province	-	✓
Northwest Shelf Province	-	✓
Northwest Transition	-	✓
Central Western Transition	-	✓
Central Western Shelf Transition	-	✓
Central Western Shelf Province	-	✓

The NWMR encompasses Commonwealth waters from the Western Australia (WA)/Northern Territory (NT) border in the north, to Kalbarri in the south (DSEWPC, 2012). 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 (DEWHA, 2008).

The NWMR consists entirely of continental slope and is characterised by muddy sediments and water depths that predominately range between 1,000 to 3,000 m (DEWHA. 2008). The Exmouth Plateau is the dominant topographical feature within the North West Province, with water depth ranges from 30 to 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 and 90 m (DEWHA 2007). In the deeper waters of the mid shelf (60 to 100 m), sediments comprise sands and gravels on cemented hard grounds. It is reasonably barren substratum with 50% comprising relict reworked material, such as ooid old shoal; hence, there is little recent organic material, and the substrata support a generally low biota (DEWHA, 2007). The sediments of the outer shelf (100 to 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).

2 PHYSICAL ENVIRONMENT

2.1 CLIMATE AND METEROLOGY

The EMBA 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 (DEWHA, 2008). Historical rainfall data shows the highest mean monthly rainfall occurs from January to June (BoM, 2021). The climate is controlled by two major atmospheric pressure systems: Indian Tropical Maritime air moving in from the west or north-west, and tropical continental air from the inland (ANRA, 2013).

The northwest coast between Broome and Exmouth experiences on average about five tropical cyclones between November to April each year (BoM, n.d.). Cyclones can bring in vast amounts of rain into 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 farther south they go (BoM, n.d.). Observations from the Learmonth weather station are summarised in Table 2-1 and shown in Figure 2-1.

Historical rainfall data indicates the highest rainfall occurs in late autumn/early winter (May to June), while the lowest rainfall occurs in late spring/early summer (October to December).

Table 2-1: Meteorological conditions (Learmonth) representative of the EMBA (BoM, n.d.)

Month	Mean Maximum Monthly Temperature (°C)	Mean Minimum Monthly Temperature (°C)	Mean Rainfall (mm)
January	38.0	23.1	29.1
February	37.5	24.0	39.2
March	36.5	23.0	40.9
April	33.4	20.5	18.1
May	28.6	16.0	41.9
June	24.8	13.1	43.1
July	24.4	11.5	21.5
August	26.5	12.1	11.6
September	29.5	13.8	2.0
October	32.8	16.4	1.5
November	34.6	18.5	1.7
December	36.9	20.9	6.0
Annual Average	**32.0**	**17.7**	**251.5**

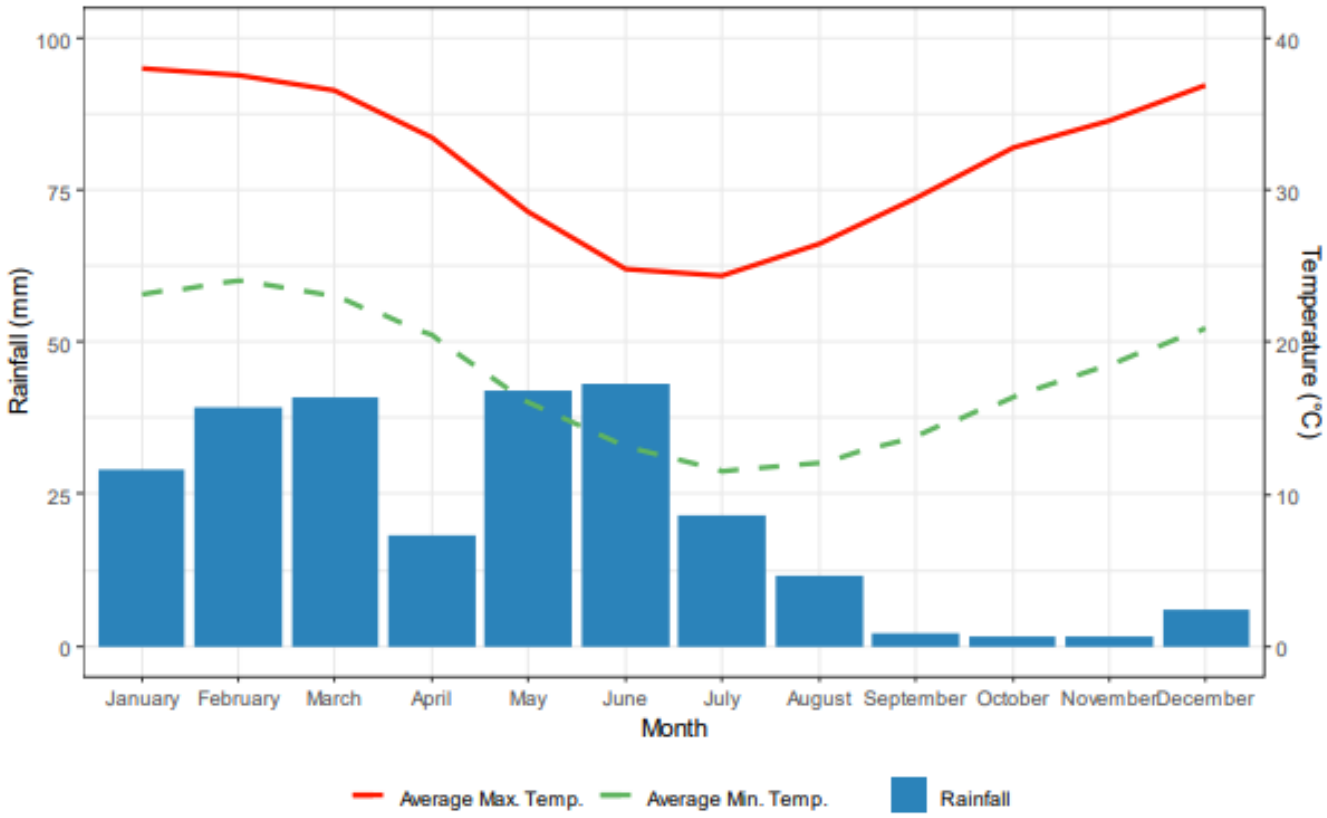


Figure 2-1: Monthly average maximum temperature, minimum temperature, and rainfall from Learmonth meteorological station (BoM, n.d.)

Sea surface wind data was sourced from the National Centre for Environmental Predictions (NCEP) Climate Forecast System Reanalysis. Table 2-2 and Figure 2-2 presents wind data from the nearest NCEP wind station to Exmouth.

Table 2-2: Predicted average and maximum winds from the closest station to Exmouth (RPS, 2022)

Month	Average wind (knots)	Maximum wind (knots)	General direction
January	14.2	53.4	Southwest
February	13.2	43.5	Southwest
March	12.0	37.5	Southwest
April	11.4	49.9	South
May	11.5	40.5	Southeast
June	13.0	38.7	Southeast
July	13.0	28.3	Southeast
August	12.0	30.2	South
September	13.1	29.2	Southwest
October	14.5	28.6	Southwest
November	14.9	29.1	Southwest
December	14.6	31.0	Southwest
Minimum	**11.4**	**28.3**	**-**
Maximum	**14.9**	**53.4**	**-**
Annual Average	**13.1**	**36.7**	**-**

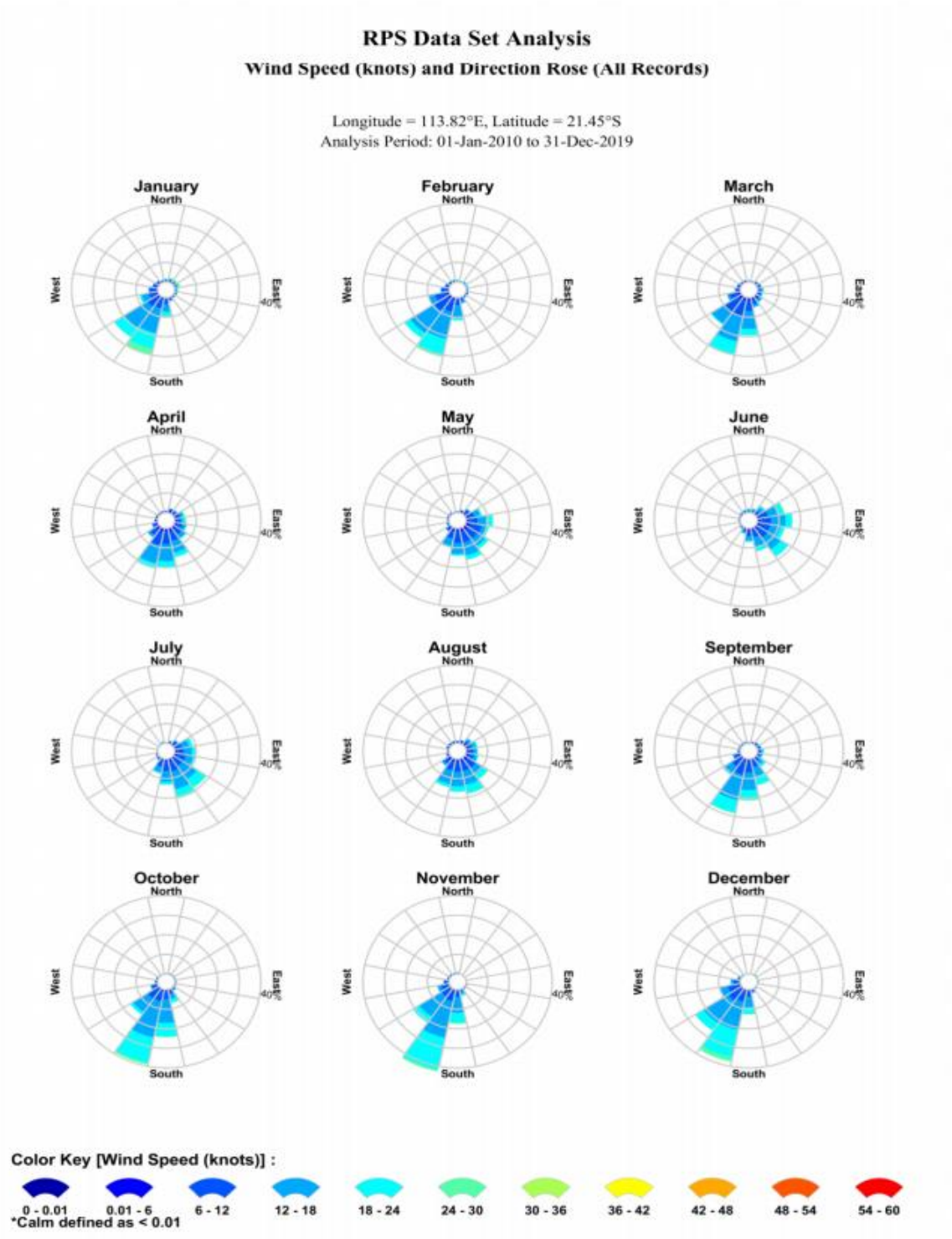


Figure 2-2: Monthly wind roses from the closest station to Exmouth (RPS, 2022)

2.2 OCEANIC CURRENTS

2.2.1 Currents and Tides

The oceanography within the EMBA is strongly influenced by the warm, low-salinity waters of the Indonesian Throughflow (ITF), which influences the upper 1,250 m of the water column (DEWHA, 2007). While the origin and movement of shelf waters such as those in the permit areas are not well understood, it is believed that the ITF waters flood the shelf via the Eastern Gyral Current and the Leeuwin Current (Figure 2-3). Surface currents are subject to strong seasonal variations; the Eastern Gyral Current intensifies during July to 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 (DEWHA, 2007). In addition to the major surface and subsurface currents, smaller localised currents also occur nearshore, such as the Capes, Ningaloo and Shark Bay Currents (Figure 2-3). 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 Currents during El Niño/Southern Oscillation and reversing in La Niña years (DEWHA, 2007). There is evidence of a strong northward current between 200 m, and 500 m in this area, which may be an offshoot of the Eastern Gyral Current (DEWHA, 2007).

Tides in the region are semi-diurnal (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 predominately from the southwest during summer and from the east, southeast and south during winter (Figure 2-2). These prevailing winds generate surface currents of about 0.2 to 0.3 m/sec in the direction of the prevailing wind (Woodside, 2002).

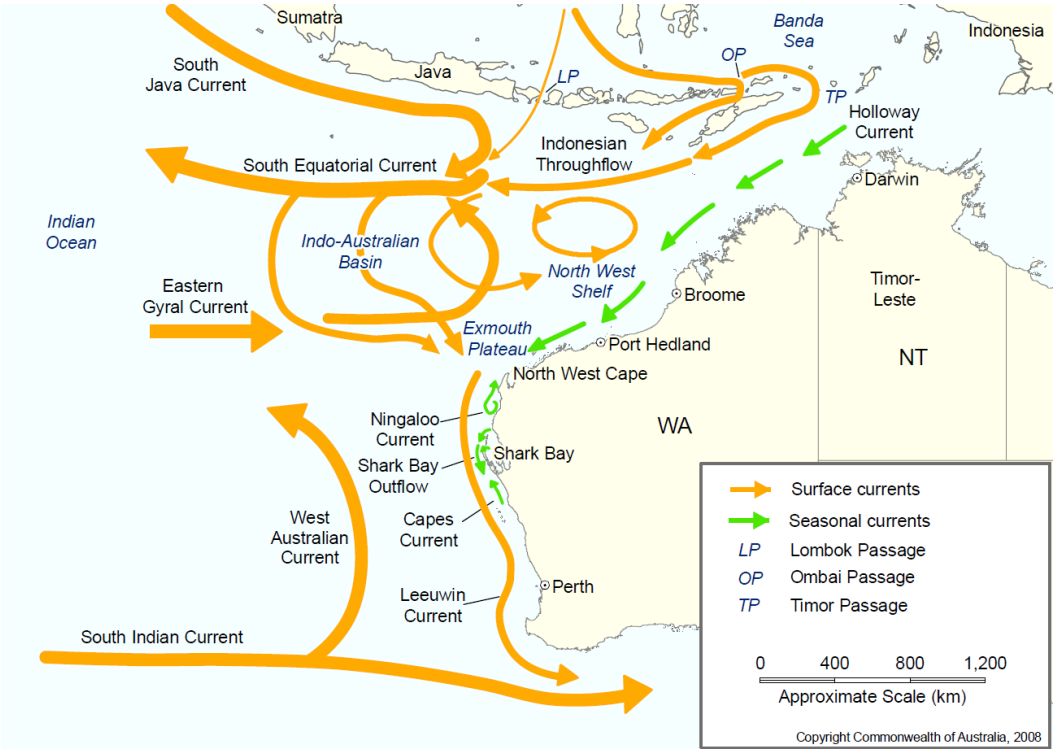


Figure 2-3: Oceanic currents present within the Indian Ocean and the western Australian coastline (DEWHA, 2007)

2.2.2 Waves

The wave regimes in the EMBA are caused by the combination of sea waves and swells. Sea waves occur predominantly from the southwest throughout the year, with more easterly waves experienced in winter, while the largest swells generally occur from June to October (Pearce et al., 2003; Woodside, 2002). 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 northeast.

2.2.3 Water Temperature and Salinity

The average sea surface temperature within the operational area ranges from 22.9 °C (September) to 28.9 °C (March) (RPS, 2022). There is likely to be a distinct thermocline in deep offshore waters, associated with the warming influence of the Leeuwin Currents, which overlays colder, more saline, deeper ocean waters that vary seasonally (DEWHA, 2008). Salinity is relatively uniform at 35 parts per thousand.

Although the Leeuwin Current is a core movement of the EMBA region, it is overall dominated by the ITF. The ITF is one of the primary links in the global exchange of water and heat between ocean basins

and is an essential element in the global climate system. It delivers warm, oligotrophic (low in nutrients) and low-salinity ocean water from the western Pacific Ocean to the Indian Ocean and is a fundamental driver of oceanographic and ecological processes in the EMBA region (DEWHA, 2008).

2.2.4 Bathymetry and Geomorphology

The seafloor of the EMBA consists of four general feature types: continental shelf, continental slope, continental rise and abyssal plain (deep ocean floor). Most of the region consists of either continental slope or continental shelf. Seabed sediments are expected to compromise 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 on the continental shelf in the EMBA include storm events such as tropical cyclones, internal tides and ocean currents including the Leeuwin Current (Baker et al., 2008). Sediments of the middle shelf region are predominately influenced by tidal processes, including internal tides (Baker et al., 2008).

Seabed geomorphology is distinguished by notable topographic features, such as the Exmouth Plateau, terraces and canyons (including the Swan and Cape Range Canyons), as well as deep holes and valleys on the inner slope. The Montebello Trough occurs on the eastern side of the Exmouth Plateau and represents more than 90% of the area of troughs in the North-west Marine Region (Baker et al., 2008).

The Dirk Hartog Shelf varies in width from 40 km wide to the south of North West Cape, to approximately 7 km wide at Ningaloo Reef (Baker et al., 2008). 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 (Marine Parks and Reserves Authority (MPRA) and Department of Conservation and Land Management (CALM), 2005) 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 (MPRA and CALM, 2005). These longshore drainage channels skirt the shoreward edge of the reef and may be up to 12 m deep (MPRA and CALM, 2005). The underlying limestone may occasionally be exposed as bare pavement where the sand veneer has been swept away.

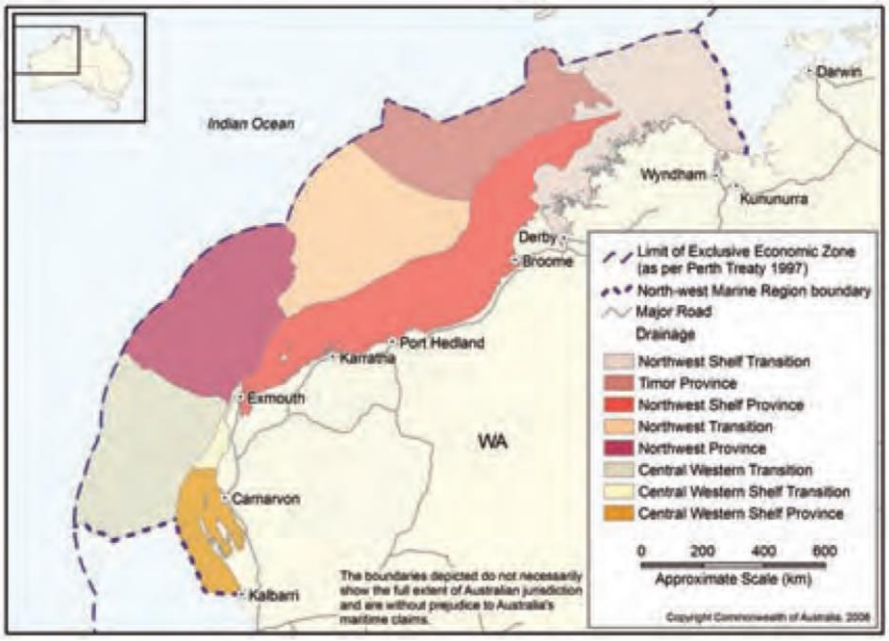
Continuing on from North West Cape, the Muiron Islands are low dome-shaped, limestone islands separated by a deep navigable channel. The continental shelf is much broader to the northeast of the Cape, sloping away from the Muiron Islands to the shelf break some 30 km seaward. The western shores of the islands are characterised by limestone cliffs fronted by sandy beaches, reef flats and intertidal 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.

3 BIOLOGICAL ENVIRONMENT

3.1 BIOREGIONAL CONTEXT

The Operational area is situated within the Northwest Province, as defined in the Northwest Marine Bioregional Plan (DEWHA, 2008). Figure 3-1 illustrates this marine region and bioregions. This region covers an area of 178,651 km^2, from the north-west Cape to west of the shelf break. The area largely consists of benthic features such as the Exmouth Plateau, continental slopes and canyons in waters depths of between 1,000 to 3,000 m.

A



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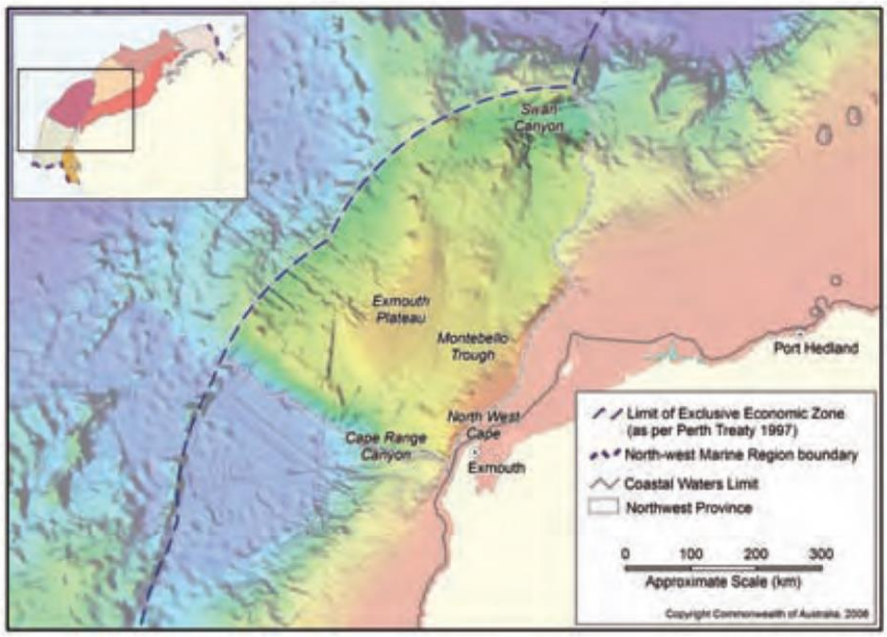

Figure 3-1: A) Bioregions of the Northwest Marine Region, and B) Location of the North West Province (taken from DEWHA, 2008)

3.2 MARINE BENTHIC HABITATS

3.2.1 Deep-water Benthic Habitats

The EMBA falls within the outer shelf, continental slope, and deep ocean. 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 filter feeders (e.g., sponges, soft corals etc.), infauna, and a mobile epibiota (e.g., crustaceans, echinoderms, and molluscs).

Sea floor communities in deeper shelf waters receive insufficient light to sustain ecologically sensitive primary producers such as seagrasses, macroalgae or reef-building corals. Given the depth of water at the operational area (approximately 810-850 m), these benthic primary producer groups will not occur in the operational area but are present in shallower waters within the wider region. Pelagic fish species occur in the deeper offshore waters of the region, including billfish, sailfish, marlin, and swordfish. Pelagic fish species are seasonally abundant and may pass through the area during annual migrations.

Demersal fish assemblages in relatively deep continental slope and deep ocean habitat also occur, although typically in much lower

3.2.2 Shallow Water Benthic Habitats

Water depths in the Operational Area are approximately 1,100 m to 1,200 m, which is too deep to support benthic primary producers, such as macroalgae, seagrasses and zooxanthellate corals. These habitats are typically restricted to relatively shallow water (< 50 m) and occur widely in the inner continental shelf in the region.

The distribution of shallow water and coastal benthic habitats of the Ningaloo Reef is well understood. Perhaps the most comprehensive study of habitats of Ningaloo Reef is the work conducted by the Ningaloo Collaboration Cluster (Kobryn et al., 2013), funded in part by BHP, to provide a highly resolved classification of benthic habitats associated with the reef and coastal shallow waters. Habitat characterisation showed most (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 km^2). There were 5,854 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). Most 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 to 10% of the coral cover, while branching Acropora was around 8.5%. Most of the hard coral occurred as either very dense (continuous >90%) cover or as patchy distribution (20 to 45%). Around 15,200 ha (21%) of the mapped habitats were close to shore (0 to 500 m).

3.2.3 Coral Reefs

The EMBA overlaps several areas which would contain extensive coral communities including the Ningaloo Marine Park. The Ningaloo Coast is approximately 180 km southeast of the Operational Area.

Corals are both primary producers and filter feeders and thus play a role in providing food to marine fauna and in recycling nutrients to support ecosystem functioning (MPRA and CALM, 2005). Corals

create settlement substrate and shelter for marine flora and fauna. Studies have shown declines in the abundance, or even marked changes in species composition of corals, have a marked impact on the biodiversity and productivity of coral reef habitats (Pratchett et al., 2008).

Coral within this region can be categorises into three general groups, being:

- Scleractinian corals (hard corals) – reef building corals
- Non-scleractinian corals (often referred to as calcified soft corals) – generally not considered to be reef-building
- Soft corals belonging to the Order Alcyconacea (soft corals) – non-reef building corals

The distribution of corals is governed by the availability of hard substrate for attachment and light-availability. Hard habitats, such as limestone pavements of the NWS and reefs on the edge of the shelf and offshore islands, support coral reef systems. Particularly, the coral reef system of Ningaloo is globally significant as it is the only extensive coral reef in the world that fringes the west coast of a continent (Department of Sustainability, Environment, Water, Population and Communities, 2012). As part of the reef-building process, scleractinian corals are also important for protecting coastlines through accumulating and cementing sediments and dissipating wave energy (MPRA and CALM, 2005).

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 more than 250 different species of coral have been recorded so far on Ningaloo Reef, including representatives from all 15 families of corals dominated by Acroporidae and Faviidae (Veron and Marsh, 1988).

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 most of their energy requirements (Muscatine, 1990). Consequently, most coral habitat is present in shallow water, particularly 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 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.

The hyperspectral data collected via Kobryn et al. (2013) (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 km^2, encompassing Ningaloo Reef to a depth of around 20 m, as well as the coastal strip adjacent to the Ningaloo Marine Park. There were 5,854 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). Most 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 around10% of the coral cover, while the branching coral species Acropora was around 8.5%. Most of the hard coral occurred as either very dense (continuous >90%) cover or as patchy distribution (20 to 45%). Around15,200 ha (21%) of the mapped habitats were close 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 coasts support many 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 wide 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 wide. 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 (such 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 Ningaloo Reef from along the western side of the 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 suitable habitats for seagrasses and macroalgae.

3.2.4 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 have 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 (BHPIO, 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 (see below), 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.

3.2.5 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 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 interannual variability and it is not clear why some areas of suitable substrate will support seagrass in one year but not the next. It appears recruitment to what may otherwise be suitable substrate is haphazard, lending weight to the description of these seagrass communities as ephemeral (MPRA and CALM, 2005).

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.

3.2.6 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, such as 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, such as primary productivity, competition and acclimatisation. Natural seasonal and interannual changes in these variables can also modify recruitment success and mortalities of individual species, and consequently the community structure of the benthos (OzCoasts, 2020).

3.3 SHORELINE HABITAT

The Operational Area and the EMBA do not overlap any shoreline habitats such as mangroves, sandy beaches, rocky shores or wetlands. At its closest, the EMBA is approximately 14 km from the nearest shoreline.

3.4 PELAGIC ENVIRONMENTS

3.4.1 Plankton

Plankton consists of microscopic organisms typically divided into phytoplankton (algae) and zooplankton (fauna including larvae). Planktons 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 depend on oceanographic processes, such as 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, 2008). The distribution of plankton is often associated with localised and seasonal productivity that results in sporadic bursts of phytoplankton and zooplankton communities (DEWHA, 2008). However, in general,

the mixing of warm surface water with deeper, more nutrient-rich water generates phytoplankton production and zooplankton blooms.

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, 2008).

3.4.2 Fish

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, 2008). 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 around 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 m^2 transect.

Interestingly, recruitment rates varied significantly among sampling times (in other words, temporal variation). Transect abundance means ranged from 82 ± 6.3 individuals (2009), 19 ± 1.2 individuals (2010) to 77 ± 4.6 individuals (Depczynski et al., 2011). The authors of this study noted the 75% drop in abundance in 2010 coincided with a small increase in mean species richness. 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 2005–2015 (MPRA and CALM, 2005) 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 2005–2015 references 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 presently a low level of threat to these populations. The current major pressure is from commercial and recreational fishing; however, population information is limited.

3.5 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

3.5.1 Overview

Searches of the Protected Matters Database were undertaken for the EMBA identified for the Activity to identify the potential protected species, habitats and areas listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) that may occur within this area; this Section details all sensitivities identified in the reports.

3.5.2 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 EMBA intercepts the boundary of one World Heritage Property: the Ningaloo Coast.

3.5.2.1 Ningaloo Coast

The Ningaloo Coast was included on the World Heritage List in June 2011 for its natural beauty, aesthetic importance and significant habitats of biological diversity containing threatened species. Located on WA's remote coast along the East Indian Ocean, it covers an area of 6045 km² and includes one of the longest nearshore reefs in the world (UNESCO, 2020). The Ningaloo Coast World Heritage Area comprises 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 values recognised by the World Heritage listing are:

- Landscapes and seascapes of the property compromise mostly intact and large scale marine and terrestrial environments
- Whale shark aggregations follow the mass coral spawning and seasonal upwelling each autumn at Ningaloo Reef, one of the few places in the world where this species congregates
- It forms part of the annual migration route for whales and turtle species
- Marine turtle density is exceptionally high, with green turtles being the most abundant
- The Ningaloo Coast is on the migratory route for many trans-equatorial wader bird species and provides feeding grounds for many migratory seabirds

- More than 300 coral species and 155 species of sponges have been documented
- More than 700 species of reef fish and more than 650 species of molluscs are present
- There are 600 species of crustaceans
- A high diversity of echinoderms are present, including 25 new species

3.5.3 National Heritage Properties

There are 13 National Heritage Places located in WA, of which none are in the Operational Area. One National Heritage Property lies within the boundaries of the EMBA: the Ningaloo Coast

3.5.3.1 Ningaloo Coast

The Ningaloo Coast was included in the National Heritage List in May 2007, refer to Section 3.5.2.1.

3.5.4 Commonwealth Marine Reserves

One Commonwealth Marine Reserve intersects the EMBA. There are no Commonwealth Marine Reserves within the Operational Area.

The EMBA intersects the Multi-use zone (IUCN category VI) of the Gascoyne Commonwealth Marine Reserve. This category is described as:

“Protected areas that conserve ecosystems and habitats, together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level non-industrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area” (IUCN, 2012). A description of this reserve is detailed in Table 3-1.

Table 3-1: Key features of the Gascoyne Commonwealth Marine Reserve

Commonwealth Marine Parks & Marine Management Areas	Key Features
Gascoyne Commonwealth Marine Reserve	• Important foraging area for migratory seabirds, turtles and the whale shark. • A continuous connectivity corridor from shallow depths around 15 m out to deep offshore waters on the abyssal plain at over 5,000 m in depth. • Seafloor features including canyon, terrace, ridge, knolls, deep hole/valley and continental rise. It also provides protection for sponge gardens in the south of the reserve adjacent to Western Australian coastal waters. • Ecosystems examples from the Central Western Shelf Transition, the Central Western Transition and the Northwest province provincial bioregions as well as the Ningaloo meso-scale bioregion.

	• The canyons in this reserve are believed to be associated with the movement of nutrients from deep water over the Cuvier Abyssal Plain onto the slope where mixing with overlying water layers occurs at the canyon heads. These canyon heads, including that of Cloates Canyon, are sites of species aggregation and are thought to play a significant role in maintaining the ecosystems and biodiversity associated with the adjacent Ningaloo Reef. • The reserve therefore provides connectivity between the inshore waters of the existing Ningaloo Commonwealth marine park and the deeper waters of the area.

Reserve Management Requirements	
Reserve Management Principle[1]	**Activity Consistent with Principle?**
7.01 The reserve or zone should be managed mainly for the sustainable use of natural ecosystems based on the following principles	**Yes -** Activity consistent with the following principles as outlined below
7.02 The biological diversity and other natural values of the reserve or zone should be protected and maintained in the long term.	**Yes -** EP describes how activities with the potential to impact natural values of the reserve will be managed – no significant impacts to biodiversity or other values of the reserve predicted
7.03 Management practices should be applied to ensure ecologically sustainable use of the reserve or zone.	**Yes -** EP describes how activities that may occur within the reserve (i.e. spill response) will be managed
7.04 Management of the reserve or zone should contribute to regional and national development to the extent that this is consistent with these principles.	**Yes -** Petroleum development a significant contributor to regional and national development

Note: [1] Australian IUCN reserve management principles, as relevant under transitional management arrangements

3.5.5 Wetlands of International Importance

No Wetlands of International Importance were identified within the EMBA or the Operational Area.

3.5.6 Protected Species and Communities

Protected species and communities listed as a MNES are discussed in Section 3.6.

3.5.7 Key Ecological Features

Four Key Ecological Features (KEFs) intersects both the Operational Area and the spill EMBA.

3.5.7.1 Exmouth Plateau

The Exmouth Plateau is a regionally and nationally unique tropical deep-sea plateau. It may serve an important ecological role by acting as a topographic obstacle that modifies the flow of deep waters which generate internal tides, causing upwelling of deeper water nutrients closer to the surface (Brewer *et al*. 2007).

3.5.7.2 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 to 500 m) and the mid slope (750 to 1000 m).

3.5.7.3 Canyons linking to 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 water interacts with the Leeuwin Current at the canyon heads. Thus, the canyons probably play a part in the enhanced productivity of the Ningaloo Reef system.

3.5.7.4 Ancient Coastline at 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 NWMR contains 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 around 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 NWS 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

3.5.7.5 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 2435 km^2. This feature lies adjacent to the Ningaloo Reef State waters margin at the 3 nm 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

3.6 BIOLOGICALLY IMPORTANT AREAS

The DCCEEW's National Conservation Atlas identifies areas that are considered to be important for the conservation of protected species and where aggregations of individuals display biologically important behaviour such as breeding, foraging, resting or migration. The Marine Bioregional Plan for the North-west Marine Region provides advice on rating potential risk to BIAs while noting that "biologically important areas are not protected matters and should not be confused with 'critical habitat' as defined in the EPBC Act."

A review of the Atlas indicates that a BIA for pygmy blue whale migration occurs across the Operational Area and EMBA.

3.6.1 Species Recovery Plans, Conservations Atlas and Threat Abatement Plans

Table 3-4 of the EP provides the EPBC Act listed threatened and migratory species that may occur within the Operational Area and EMBA. Of those, a number have Recovery Plans, Conservation Management Plans or approved Conservation Advice in place (Table 3-2, below).

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 3-2 provides information on the specific requirements of the relevant conservation advice, species recovery plans and threat abatement plans that is applicable to the 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 Activity are managed to ALARP and acceptable levels.

Table 3-2: Summary of relevant Species Recovery Plans, approved Conservation Plan and Threat Abatement Plans

Species	Relevant Plan/Conservation Advice	Summary and Relevance to the EP
Fish		

Species	Relevant Plan/Conservation Advice	Summary and Relevance to the EP
Great white shark	Recovery Plan for the White Shark (DSEWPaC, 2013).	• The great white shark may occur within the Operational Area and spill EMBA. • The Recovery Plan considers habitat critical to the survival of the species as nursery, pupping, foraging/feeding and migration areas. Important habitats for the species are identified and mapped as BIAs. Although there are no BIAs for the great white shark within either area, the species occurs along the length of the WA coastline and undertakes pelagic and offshore movements; as such, is likely to transit through. • The Recovery Plan lists a number of threats to the species in Australian waters. Threats potentially applicable to the Activity are habitat modification. The Activity is not predicted to hinder the recovery or impact on the conservation status of the species.
Marine Mammals		
Sei whale	Approved Conservation Advice (TSSC, 2015a)	• The sei whale may occur within the Operational Area and spill EMBA. • The Conservation Advice lists a number of threats to the species in Australian waters. Threats applicable to the Activity are vessel strike, anthropogenic noise and acoustic disturbance. • This EP assesses potential impacts and risks to whales from noise emissions and vessel strike in Section 5 and Section 6 of the EP, respectively. As part of Western Gas's reporting requirements for the Activity (refer to Section 9.6 of the EP), any vessel strikes with cetaceans will be reported in the National Ship Strike Database.
Blue whale	Conservation Management Plan (Recovery Plan) for the Blue Whale (DoE, 2015)	• Pygmy blue whales may occur in the Operational Area and spill EMBA. • The Recovery Plan identifies anthropogenic threats that may inhibit the recovery of the populations in Australian waters. Those potential threats that are applicable to the Activity are noise interference (e.g. vessel noise), vessel disturbance (e.g. physical presence and strike) and marine pollution (e.g. unplanned releases of materials and objects). This EP assesses potential impacts and risks to whales from noise emissions, solid wastes, unplanned interference with marine fauna (physical presence and vessel strike with marine fauna), and various unplanned materials/object releases Sections 5 and 6 of the EP. As part of Western Gas's reporting requirements for the Activity (refer to Section 8.7), any vessel strikes with cetaceans will be reported in the National Ship Strike Database.
Fin whale	Approved Conservation Advice (TSSC, 2015b)	• The fin whale may occur within the Operational Area and spill EMBA. • The Conservation Advice lists a number of threats to the species in Australian waters. Threats applicable to the Activity are vessel strike and anthropogenic noise.

Species	Relevant Plan/Conservation Advice	Summary and Relevance to the EP
		This EP assesses potential impacts and risks to whales from noise emissions and vessel strike in Section 5 and 6 of the EP, respectively. As part of Western Gas's reporting requirements for the Activity (refer to Section 9.6 of the EP), any vessel strikes with cetaceans will be reported in the National Ship Strike Database.
Humpback whale	Approved Conservation Advice (TSSC, 2015c)	• The humpback whale may occur in the Operational Area and spill EMBA. • The Approved Conservation Advice lists a number of threats to the species in Australian waters. Threats applicable to the Activity are anthropogenic noise sources (e.g. ship-sourced noise), impacts from vessel presence and strike, and entanglement from marine debris (e.g. plastic garbage and non-biodegradable floating materials lost at sea). This EP assesses potential impacts and risks from noise pollution, solid wastes, and vessel strike in Sections 5 and 6 in the EP, respectively. As part of Western Gas's reporting requirements for the Activity (refer to Section 9.6 of the EP), any vessel strikes with cetaceans will be reported in the National Ship Strike Database.
EPBC Act listed cetacean and other mammal species identified as occurring in the Operational Area and spill EMBA at risk of being adversely impacted by marine debris: • Sei whale • Blue whale • Fin whale • Humpback whale • Bryde's whale	Draft Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Marine Life (DotEE, 2017)	• The threat abatement plan is being revised and the draft plan is currently released for public comment. • The plan recognises harmful marine debris includes ship-sourced, solid non-biodegradable material disposed of at sea is a risk to vertebrate marine life through entanglement or ingestion. The plan includes an appendix of EPBC Act listed species at risk of being impacted by marine debris. Of those species listed in the draft plan, five have been identified as potentially occurring within the Operational Area and spill EMBA. The EP assesses potential impacts and risks from solid waste discharges (Section 5 and 6 of the EP).
Marine Reptiles		
Loggerhead turtle Green turtle Hawksbill turtle	Recovery Plan for Marine Turtles in Australia (DoEE, 2017b)	• The Recovery Plan lists a number of threats to turtle species in Australian waters and identifies that the risks posed by these threats vary depending on the habitats, timing of habitat occupancy, life cycle stage affected, abundance and trends in nesting and foraging numbers and the management/mitigation currently in place.

Species	Relevant Plan/Conservation Advice	Summary and Relevance to the EP
Leatherback turtle Flatback turtle		• The Plan identifies habitats critical to nesting and internesting behaviours of turtles – none of these occur in or in proximity of the EMBA. • Identified threats potentially applicable to the Activity are marine debris, chemical discharge, light pollution, vessel disturbance and noise interference. • The management proposed for the Activity is consistent with the Actions identified to address relevant threats Potential risks and impacts to marine turtles from the Activity are assessed in the EP.
EPBC Act listed marine turtle species identified as occurring in the Operations Area at risk of being adversely impacted by marine debris: • Flatback turtle • Green turtle • Hawksbill turtle • Leatherback turtle • Loggerhead turtle	Draft Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Marine Life (DoEE, 2017)	• The threat abatement plan is being revised and the draft plan is currently released for public comment. • The plan recognises harmful marine debris includes ship-sourced, solid non-biodegradable material disposed of at sea is a risk to vertebrate marine life through entanglement or ingestion. The plan includes an appendix of EPBC Act listed species at risk of being impacted by marine debris. Of those species listed in the draft plan, five marine turtles have been identified as potentially occur within the Operational Area and spill EMBA. The EP assesses potential impacts and risks from solid waste discharges (Section 5 and 6 of the EP).
Marine Birds		
Southern giant petrel	National Recovery Plan for Threatened Albatrosses and Giant Petrels 2011-2016 (DSEWPaC, 2011a) Background Paper, Population Status and Threats to Albatrosses and Giant Petrels Listed as Threatened under the Environment and	• The plan constitutes the Australian National Recovery Plan for a number of albatross and giant petrel species under the EPBC Act 1999 from 2011 to 2016. Under the Act, the Environment Minster must review a recovery plan at intervals of not longer than 5 years. The plan is due a review. • The plan considers habitat critical to the survival of albatrosses and giant petrels as breeding and foraging habitat. There are no BIAs for these species within the Operational Area or spill EMBA. • The Recovery Plan (DSEWPaC, 2011a) and the accompanying Background Paper (DSEWPaC, 2011b) lists a number of threats to the albatross and giant petrel species in Australian waters. Threats applicable to the Activity are marine debris (non-biodegradable, floating materials) and habitat modification from marine pollution (oil spills). This EP assesses potential impacts and risks to seabirds from various unplanned spills in Section 6 of the EP. Impacts and risks associated with solid wastes (hazardous and non-hazardous) are provided Section 5 of the EP.

Species	Relevant Plan/Conservation Advice	Summary and Relevance to the EP
	Biodiversity Conservation Act 1999 (DSEWPaC, 2011b)	
Red knot	Approved Conservation Advice (TSSC, 2016)	• The red knot may occur in the Operational Area and spill EMBA. • The Approved Conservation Advice lists a number of threats to the species in Australian waters. None of the threats identified are applicable to the Activity. This EP assesses potential impacts and risks to seabirds from various unplanned spills in Section 6 of the EP.
EPBC Act listed marine seabird species identified as occurring in the Operational Area and spill EMBA at risk of being adversely impacted by marine debris: • Southern giant petrel	Draft Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Marine Life (DoEE, 2017)	• The threat abatement plan is being revised and the draft plan is currently released for public comment. • The plan recognises harmful marine debris includes ship-sourced, solid non-biodegradable material disposed of at sea is a risk to vertebrate marine life through entanglement or ingestion. The Draft Abatement Plan includes an appendix of EPBC Act listed species at risk of being impacted by marine debris. Of those species listed in the draft plan, only one (southern giant petrel) may potentially occur within the Operational Area and spill EMBA.

3.7 MARINE FLORA AND FAUNA

3.7.1 Fish

The Operational Area lies over the Exmouth Plateau which is described as a unique seafloor features that may serve an important ecological roles through upwelling of deeper water nutrients.

The demersal zone of the NWS (which includes the Northwest Province and Northwest Shelf Province) hosts a diverse assemblage of fish of tropical Indo-west Pacific affinity, with up to 1,400 species known to occur, with a great proportion of these occurring in shallow coastal waters (Allen *et al*. 1986).

Within the southern portion of the Northwest Province, small pelagic fish (e.g. lantern fishes) comprise a third of the total fish biomass (Bulman, 2006) and inhabit a range of marine environments, including inshore and continental shelf waters. These small pelagic fish play an important ecological role, not only for this particular area but for the entire North-west Marine Region. They feed on pelagic phytoplankton and zooplankton and provide a food source for a wide variety of predators such as

marine mammals, sharks, large pelagic fish and seabirds, thus providing a vital link between many of the region's trophic systems (Mackie *et al*. 2007, Brewer *et al*. 2007).

Using the online Protected Matters Search Tool (PMST), a search of the EPBC Act Protected Matters Database was undertaken for the permit areas and the spill EMBA to identify the potential presence of any species or communities listed as Matters of National Environmental Significance under the EPBC Act (the Protected Matters Reports are provided in Appendix D. The following species may occur within the Operational Area and the EMBA.

3.7.1.1 Great White Shark

The great white shark is listed as Vulnerable under the EPBC Act. In Australian waters, they are widely but not evenly distributed and sightings are considered uncommon to rare compared to most other large sharks (CITES, 2004). Great white sharks can be found in areas close inshore around rocky reefs, surf beaches and shallow coastal bays and also as far out as the outer continental shelf and slope areas (Pogonoski *et al*., 2002). Given the species occurs along the length of the Western Australian coastline, and undertakes pelagic and offshore movements, it is possible to occur within the Operational Area and EMBA.

3.7.1.2 Shortfin Mako Shark

Offshore littoral and epipelagic shark species found in depths up to 500 m. Widespread throughout tropical and temperate oceans worldwide (Cailliet *et al*, 2009). Known to migrate distances >3000 km. Paucity of information on migratory patterns or timing. Given the species undertakes pelagic and offshore movements, it is possible to occur within the Operational Area and EMBA.

3.7.1.3 Longfin Mako Shark

The longfin mako is listed as migratory under the EPBC Act, and is classified as Vulnerable on the World Conservation Union's Red List of Threatened Species (Reardon *et al*., 2006). The longfin mako is a widely distributed oceanic tropical shark, but rarely encountered. Given the species undertakes pelagic and offshore movements, it is possible to occur within the Operational Area and EMBA.

3.7.1.4 Giant Manta Ray

The largest of the rays, this species has a tropical and semi-temperate distribution around Australia's coastline. This species appears to be a seasonal visitor to coastal areas; exact timings of appearance on the NWS are not well documented. Locally, this species is distributed sparsely but normally shallower than the 50 m water depth contour (Jenner *et al*., 2010). It is therefore unlikely to be present in the Operational Area and spill EMBA.

3.7.2 Marine Mammals

Marine mammals represent a diverse group of animals that including cetaceans (whales, dolphins and porpoises), pinnepeds (seals, sea lions), sirenians (dugongs) and fissipeds (polar bears). Forty-five species of cetacean occur in Australian waters, of these, nine species are known to occur regularly in the waters of the North Marine Regions, including three species of whale and six species of dolphin (DSEWPaC, 2011c). Under the EPBC Act, all cetaceans and pinnepeds are protected in Australian waters. The following protected marine mammal species may occur within the Operational Area and the EMBA. Listed Threatened and Migratory species are considered MNES and are therefore discussed in more detail in this Section.

3.7.2.1 Sei Whale

Sei whales tend to be found further offshore than other species of large whales (Bannister *et al*. 1996). The sei whale moves between Australian waters and Antarctic feeding areas, however they are only infrequently recorded in Australian waters (Bannister *et al*. 1996) and their movements and distribution in Australian waters is not well known. There are no known mating or calving areas in Australian waters. The Blue, Fin and Sei Whale Recovery Plan and the National Conservation Values Atlas currently record no biologically important areas for this species. It is therefore unlikely to be present in the Operational Area and spill EMBA.

3.7.2.2 Blue whale

In the southern hemisphere, there are two recognised subspecies of blue whale 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 whale 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 (and therefore within the operational areas and spill EMBA) are assumed to be pygmy blue whales, and are discussed below.

Blue whales typically feed as individuals or in small groups. In Australia, there are only two known feeding aggregations at Perth Canyon off the coast of southern Western Australia and the Bonney Upwelling, which runs along the coast of South Australia into Victoria.

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). 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).

Migrating north, 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).

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, Woodside 2012) (Figure 3-2).

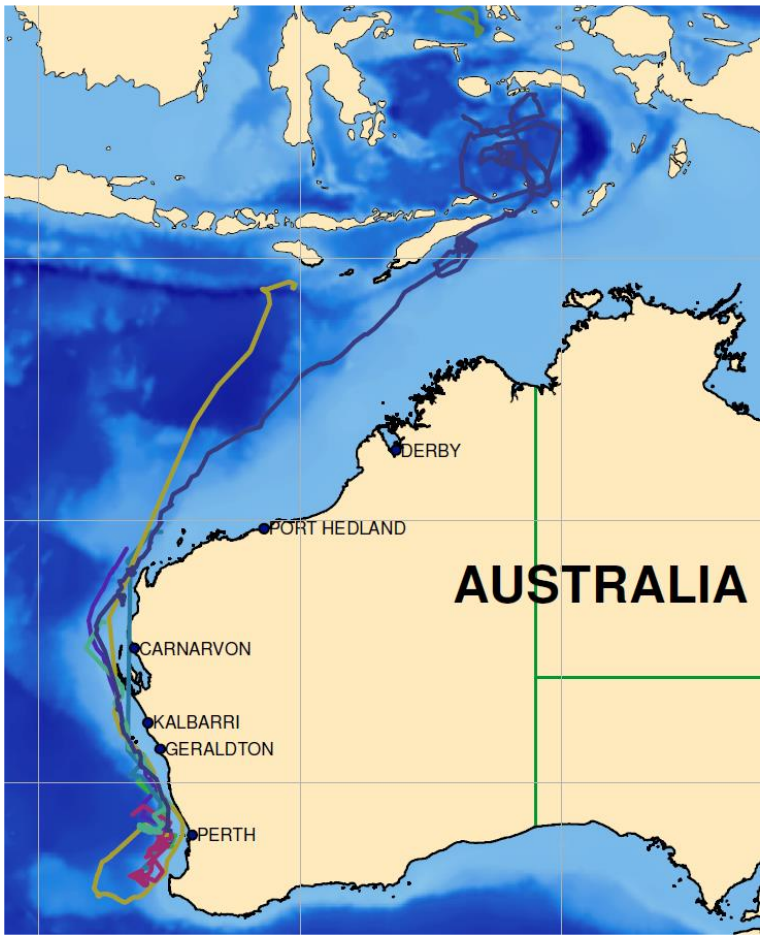

Figure 3-2: Satellite tracking of Blue Whales in 2010/2011, modified from Double *et al*. (2012)

3.7.2.3 Fin Whales

Fin whales have a worldwide distribution generally in deeper waters, with oceanic migrations between warm water breeding grounds and cold water feeding grounds.

The fin whale distribution in Australia is not clear due to the scarcity of sightings. According to the Species Profile and Threats database, fin whales are thought to be present from Exmouth, along the southern coastline, to southern Queensland.

Migration paths are uncertain but are not thought to follow Australian coastlines (Bannister *et al*. 1996). There is insufficient data to prescribe migration times for fin whales. During summer and autumn this species has been recorded visually at the Bonney Upwelling and acoustically at the Rottnest Trench.

There are no known mating or calving areas in Australian waters and no biologically important areas for the fin whale are currently identified by the National Conservation Values Atlas or Blue, Fin and Sei Whale Recovery Plan. It is therefore unlikely to be present in the Operational Area and spill EMBA.

3.7.2.4 Humpback whale

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 3-3 illustrates the results of aerial surveys conducted during a single year between the north-west cape and Barrow Island.

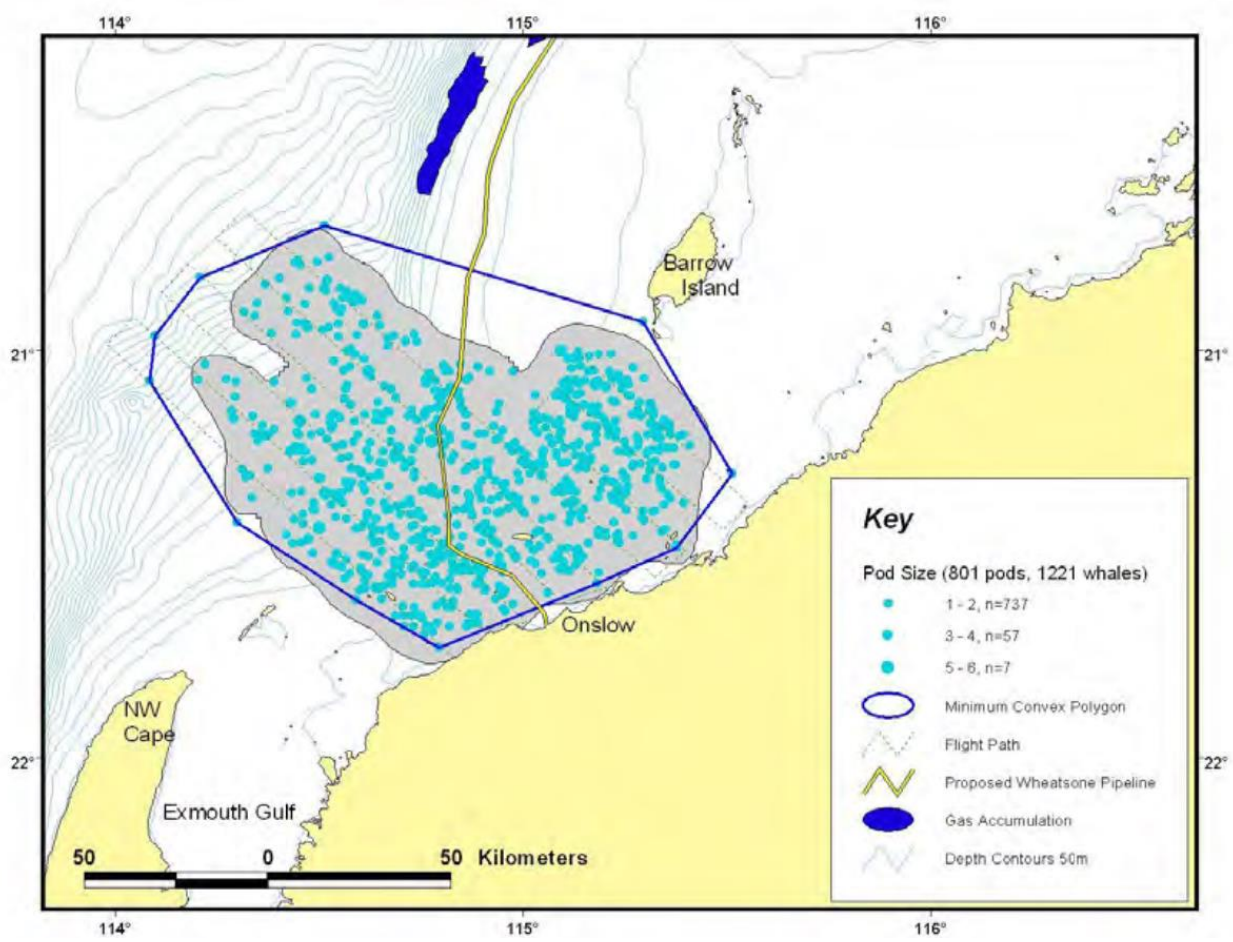

Figure 3-3: Aerial survey sightings of humpback whales from June to December 2009 (taken from Jenner *et al.*, 2010)

3.7.2.5 Bryde's Whale

Bryde's whale is known to inhabit tropical and warm temperate waters, travelling alone or in pairs. There is a small estimated population in Australian waters (DoE, 2014a) and is thought to migrate towards warmer waters during winter, although not enough data is available to understand movement routes or timing. Due to a small populations and a lack of sightings of this whale in a commercially active area it is considered unlikely to be encountered within the Operational Area or EMBA.

3.7.2.6 Antarctic Minke Whale

Generally inhabits waters from 21°S to 65°S (Bannister *et al.*, 1996). No population estimates are available for Australian waters. This whale migrates between summer Antarctic feeding grounds and winter sub-tropical breeding grounds. Due to a small populations and a lack of sightings of this whale in a commercially active area it is considered unlikely to be encountered within the Operational Area or EMBA.

3.7.2.7 Sperm Whale

The sperm whale has been recorded in all Australian States (Bannister *et al*., 1996). No population estimates are available for Australian waters. Uncommon in waters greater than 300 m and generally southwards in summer and northwards in winter (to tropical breeding grounds).

3.7.2.8 Killer Whale

Killer whales are the largest member of the dolphin family. Observations of this species have occurred in both tropical and temperate waters across oceanic, pelagic and neritic waters. Animals tend to be gregarious, usually forming pods of 10-30 animals of all genders and ages (DoE 2014b). Killer whales make seasonal migrations, and may follow regular migratory pathways; however this has not been proven.

Killer whales have been recorded relocating to Antarctic waters during summer months and back to warmer waters during winter. This suggests that the winter months would be the highest likelihood of occurrence of killer whales outside of the Antarctic. Killer whales are top-level carnivores that have been known to attack dolphins, young whales and sea lions.

Killer whale observations are uncommon in the Pilbara, with recent observations during the months of December and May.

3.7.2.9 Other Cetaceans

In addition to the cetaceans listed as MNES under the EPBC Act, several other species of whales and pelagic dolphins are known from the region and may occur in the EMBA. Many of these species are frequently associated with oceanographic or seafloor features that are not present in the EMBA and therefore are not expected to occur in significant numbers during the Activity. Oceanic dolphins are often gregarious and frequently recorded in mixed schools with other cetacean species.

The following descriptions of these cetaceans have been primarily sourced from the Species Group Report Card - Cetaceans (DSEWPaC 2012a) or from DotEE Species Profile and Threats (SPRAT) database profiles (DotEE 2017b).

Common Dolphin

Common dolphins have been recorded in offshore waters off all Australian states and territories but are rarely seen in northern Australian waters (Ross 2006). They appear to occur in two main locations around Australia: the southern south-eastern Indian Ocean and in the Tasman Sea. The species feeds on a variety of small prey, mainly epipelagic schooling and mesopelagic fishes, cephalopods and crustaceans.

Minke Whale

The minke whale is distributed worldwide in oceanic habitats, feeding in cold waters and migrating to warmer waters to breed (Bannister et al. 1996). Relatively common and generally an offshore species but not restricted to deeper waters and have been recorded close to coastlines. Their distribution in Australia is thought to extend northward off the WA coast to 20° S. The species feeds predominantly on *Euphausia superba* and some smaller euphausiid species. Often occur singly or in groups of two to three, though feeding congregations may be encountered (Bannister et al. 1996).

Pygmy Killer Whale

The Pygmy Killer Whale is a tropical and subtropical species that inhabits oceanic waters and is known from strandings in NSW and Western Australia, with the current extent of occurrence in Australia considered to include all waters north of 35° S. They are generally considered to occur in relatively low abundance (Reeves et al. 2003) with the total number of mature animals within Australian waters less than 10 000, typically in group sizes less than 50 individuals. Pygmy killer whales are wary of boats and tend to bunch together when disturbed (Leatherwood & Reeves 1983). The species is not well surveyed within Australian waters, but their prey is known to include other cetaceans.

Short-finned Pilot Whale

Short-finned pilot whales occur in tropical to temperate (10–32 °C) oceanic waters in Australia, generally occurring at the edge of the continental shelf and over deep submarine canyons. The current distribution for the species is considered to extend north of about 41°S (Ross 2006). They feed mainly on squid, cuttlefish, octopus and some fish. Seasonal inshore and offshore movements may occur in response to abundance and spawning of prey.

Pygmy Sperm Whale

The Pygmy sperm whale inhabits open-ocean temperate to tropical waters around the world and have been reported for all Australian states, apart from the Northern Territory (Ross 2006). They are thought to live mostly beyond the edge of the continental shelf. The species is thought to feed in deep water mostly on cephalopods, but also on deep-sea fishes and shrimps.

Dwarf Sperm Whale

The dwarf sperm whale occurs in all oceans apart from polar or sub-polar seas and is considered oceanic (Ross 2006), generally occurring in areas >200 m deep but may also approach coastal areas. They have been recorded (mostly as stranded animals) from Western Australia, South Australia,

Tasmania, NSW and the Northern Territory. Dwarf sperm whales feed in deep water on cephalopods and, less often, on deep-sea fishes and crustaceans

Blainvilles Beaked Whale

Blainville's beaked whale is considered to have an oceanic distribution encompassing waters off most states of Australia, although with a preference for tropical and warm temperate waters ranging from 700–1000 m deep, often adjacent to much deeper waters (Bannister et al. 1996). Sightings and strandings are rare in Australia and population estimates not available, but the species is the most common of the beaked whales in tropical waters.

Melon-headed Whale

Melon-headed whales are pantropical, occurring in all deep oceanic waters between 35° N and 35° S (DEWHA 2008). Most sightings of this species are from the continental shelf seaward, and around oceanic islands. They feed on pelagic squid and fishes, and occasionally crustaceans and may occur in groups of less than 40 up to large herds of 150–1500 animals.

False Killer Whale

False killer whales are found worldwide in deep offshore tropical and temperate waters and estimated to occur in all Australian waters north of 35° S. They typically occur in herds of about 20–50 animals, but aggregations of between 100 to 800 individuals from temporary associations of several smaller herds may occur to exploit locally abundant prey (Ross 2006). False killer whales primarily eat fish and cephalopods but appear to be opportunistic feeders, consuming a large size range and wide variety of prey.

Common bottlenose dolphin

Bottlenose dolphins are widespread in the region with both inshore and offshore forms known to occur (Hoelzel et al 1998). The offshore form ranges widely and feeds on mesopelagic fish and oceanic squid.

Fraser's dolphin

Fraser's dolphins are generally found in deep oceanic waters in association with areas of increased productivity, such as upwellings and where islands abut deep water. They feed on a wide range of fish, squid and crustaceans from throughout the water column to depths of 600 m.

Risso's dolphin

Risso's dolphin is widely distributed in deep waters (400–1000 m) of the region, often in areas of upwelling or steep seabed relief such as seamounts and escarpments. Oceanic cephalopods are its main prey.

Rough-toothed dolphin

The rough-toothed dolphin is usually found in deep offshore waters, often around the edges of oceanic reefs but have also been recorded around Barrow Island. Most of the species' prey comprises fish and squid. They are known to dive to at least 70 m.

Pantropical spotted dolphin, spinner dolphin and striped dolphin

The taxonomy of Stenella species is not completely resolved and they are discussed in DSEWPaC (2012a) as one group due to similarities in habitat, prey and associations. They occur in tropical and subtropical waters of the world with their distribution closely linked to oceanographic processes such as upwelling, currents and frontal zones. Stenella can dive to depths of 200–300 m and generally feed on small squid, shrimp and fish in the mesopelagic zone.

Little is known about the distribution of Stenella species in the North-west Marine Region, and available data is limited. They have been recorded at the shelf edge and shelf slope area of the Browse Basin and in small groups resting in nearshore areas of the Kimberley coast. The striped dolphin is abundant around Barrow Island.

Cuvier's Beaked Whale

Cuvier's beaked whales has a worldwide distribution in all temperate and tropical waters, and in Australia, are estimated to occur in all waters >200m depth and north of 55° S. The species tends to avoid vessels, with the few confirmed sightings usually alone or in small groups (up to seven individuals). Off Australia, Cuvier's beaked whales appear to feed primarily on oceanic squid, many of which have also been recorded from studies elsewhere in the world (Bannister et al. 1996). Seasonal migrations may occur, with most recordings in Australia between January to July (Ross 2006).

3.7.3 Marine Reptiles

Marine reptiles represent a group of animals that include sea turtles, sea snakes and saltwater crocodiles. Under the *Environmental Protection and Biodiversity Conservation Act 1999*, all marine reptiles are protected in Australian waters, and are therefore discussed in more detail in the following Section. The North-west Marine Region is an important area for several species of marine reptiles, including marine turtles and sea snakes (DSEWPaC, 2012b). The following protected marine reptile species may occur within the Operational Area and the EMBA.

3.7.3.1 Loggerhead turtle

The loggerhead turtle has a worldwide distribution, living and breeding in subtropical to tropical and locations (Limpus, 2008a). Nesting and breeding on the west coast of Australia occurs from November to March, with a peak in late December/early January (DoE, 2014c). Occasional late summer nesting crawls have been recorded at Barrow and the Lowendal Islands. Major nesting locations include the Muiron Islands and the Ningaloo Coast south to Carnarvon (Limpus, 2008a).

Foraging areas are widespread for loggerhead turtle and migrations from nesting to feeding grounds can stretch 1000s 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 50 m to near shore tidal areas (DoE, 2014c) including areas of rocky and coral reef, muddy bays, sand flats, estuaries and seagrass meadows (Limpus, 2008a).

Considering the water depths of the Operational Area and EMBA, the loggerhead is unlikely to be using this area for feeding, nor are these areas between known nesting, interesting or feeding areas and therefore it is unlikely that loggerhead turtles will be using or transiting through these areas.

3.7.3.2 Green turtle

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 (Limpus, 2008b). The NWS stock nests on sandy beaches extending from the Ningaloo Coast to the Lacepede Islands (Limpus, 2008b), with nesting occurring between November and March. The key nesting areas include the Dampier Archipelago, Lacepede Islands, the Ningaloo and Jurabi Coasts, Thevenard Island, Barrow Island, the Lowendal and Montebello Islands, Northwest Cape, Exmouth Gulf and the Muiron Islands.

Green turtles spend the first five to ten years of their life drifting on ocean currents, before moving to reside in shallower benthic habitats, including tropical reef and seagrass beds. Green turtles have been known to migrate more than 2,600 km between feeding and breeding grounds (DoE, 2014d). 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 (DoE, 2014d).

Considering the water depths of the Operational Area and EMBA, the green turtle is unlikely to be using this area for feeding, nor are these areas between known nesting, interesting or feeding areas and therefore it is unlikely that green turtles will be using or transiting through these areas.

3.7.3.3 Hawksbill turtle

Hawksbill turtles have a global distribution throughout tropical and sub-tropical marine waters. The WA stock is concentrated on the NWS (Limpus, 2009a), and is 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.

Nesting occurs throughout the year in WA, peaking between October and January (Woodside, 2006). With an interbreeding period of 2–4 years, 2,000–4,500 hawksbill turtles probably nest in WA waters (Morris, 2004). Individuals may migrate up to 2,400 km between their nesting and foraging grounds Satellite tracking of nesting turtles on Varanus Island and Rosemary Island has shown adult turtles to feed between 50 and 450 km from their nesting beaches. Adults tend to forage in tropical tidal and sub-tidal coral and rocky reef habitat where they feed on an omnivorous diet of sponges, algae, jelly fish and cephalopods.

Considering distances from known nesting and feeding areas, the hawksbill turtle is unlikely to be using or transiting through these areas.

3.7.3.4 Leatherback turtle

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). Only irregular and isolated nesting (one to three nests per annum) occurs in southern Queensland and the Northern Territory (Limpus and McLachlin, 1994).

There have been several observations of leatherback turtles off of the coast of WA, further south than the NWS (Limpus, 2009b). Due to the lack of nesting sites around Australian coastal waters, it is presumed that leatherback turtles observed in Australian waters are migrating from neighbouring countries to utilise feeding grounds in Australia (Limpus, 2009b). The leatherback turtle will feed at all levels of the water column and is carnivorous.

3.7.3.5 Flatback turtle

The flatback turtle has an Australasian distribution, with all recorded nesting beaches occurring within tropical to sub-tropical Australian waters (Limpus, 2007). Breeding on the NWS region peaks in the summer months, with nesting areas from approximately Exmouth in the south, to the Lacepede Islands in the north. Significant nesting areas exist in the Dampier Archipelago and Kimberley region, the Montebello and Lowendal islands and Barrow and Varanus Island, and also along the mainland beaches of the Pilbara coast (Limpus, 2007, DoE, 2014e).

The flatback turtle lacks a wide oceanic dispersal phase and adults tend to be found foraging on soft sediment habitats within the continental shelf of northern Australia (DoE, 2014e). Limited migration information on the NWS group is available; post nesting recaptures have been recorded from Exmouth Gulf to the Kimberley Coast and also from the Northern Territory (Limpus, 2007).

Considering distances from known nesting and feeding areas, the flatback turtle is unlikely to be using or transiting through these areas.

3.7.3.6 Sea Snakes

Storr *et al*. (1986) estimate that 22 species of sea snakes and kraits occur in WA waters, however there is a paucity of information on the distribution of individual species, population sizes or aspects of their ecology. Sea snakes inhabit offshore and nearshore habitats, throughout the tropical and sub-tropical waters of Western Australia. The small amount of ecological data available indicates that sea snakes have a restricted and patchy distribution and the number of species increases towards the northern parts of the North-west Marine Region (DSEWPaC 2012b). The EPBC Act protected matters database indicates seven species of sea snake may occur in the EMBA. The following information on these species has been compiled from SPRAT profiles.

The olive sea snake inhabits tropical and subtropical coastal and coral reef waters in northern Australia, including north from Exmouth in WA. A significant barrier to its movement is created by large, deep water expanses. The spectacled sea snake is considered to be confined to coastal waters (Cogger 2000). The north-western mangrove sea snake inhabits the intertidal zone of tidal creeks and flats of relatively compact mud or sandy mud with crab and mud skipper holes (Cogger 2000). The elegant sea snake uses a variety of marine and estuarine habitats, from sandy substrates in very shallow waters to depths of approximately 80 m (Limpus 1975). The remote offshore location and very deep waters of the EMBA therefore make it very unlikely these species will occur in the area.

The olive-headed sea snake is widely distributed in the tropical waters of northern Australia, from Shark Bay in WA. The species has been recorded in sand or mud habitats in water depths between 3–10 m (Limpus 1975). Considering the distances to shallow waters, olive-headed sea snakes are unlikely to be using or transiting through the EMBA.

Fine-spined sea snakes occur off the Pilbara coast and have been collected from up to 140 km north west of Dampier, WA, and recorded in trawl nets in water depths up to 103 m. Little is known of their seafloor preferences.

The yellow-bellied sea snake is the most widely distributed of all sea snakes and common in tropical oceans worldwide. The species is usually found within a few kilometers of the coast and prefers shallow inshore waters. However, they are also known to occur in open waters well away from coasts and reefs, where they live among drift lines eating fish attracted to the cover. They may occur in the EMBA, although given the distances from shorelines are unlikely to be present in significant numbers.

3.7.4 Birds

Coastal or terrestrial species inhabit the offshore islands and coastal areas of the mainland throughout the year. These species are either primarily terrestrial, or they may forage in coastal waters. Resident coastal and terrestrial species include osprey (*Pandion haliaetus*), white-bellied sea eagle (*Haliaeetus leucogaster*), silver gull (*Larus novaehollandiae*) and eastern reef egret (*Egreta sacra*) (DEWHA 2008).

Seabirds include those species whose primary habitat and food source is derived from pelagic waters. These species spend the majority of their lives at sea, ranging over large distances to forage over the open ocean. Seabirds present in the area include terns, noddies, petrels, shearwaters, tropicbirds, cormorants frigatebirds, shearwaters, petrels, terns, boobies and albatrosses (DEWHA 2008).

Shorebirds, including waders, inhabit the intertidal zone and adjacent areas. Other shorebirds are migratory and include species that utilise the East Asian–Australasian Flyway, a migratory pathway for millions of migratory shorebirds that travel from Northern Hemisphere breeding grounds to Southern Hemisphere resting and foraging areas. Shorebirds that regularly migrate through the area include the Scolopacidae (curlews, sandpipers *etc*.) and Charadriidae (plovers and lapwings) families.

The following protected marine bird species that may occur within the Operational Area and the EMBAs.

3.7.4.1 Southern Giant Petrel

The southern giant-petrel is the largest of the petrels and occurs from Antarctic to subtropical waters. The petrel spends the majority of the warmer months of the year in the southern extents of its distribution range whilst breeding, before leaving for warmer waters during winter, including the southern portion of the NWS region for foraging. The southern giant-petrel is both an opportunistic scavenger of carrion and a predator, with prey items ranging from surface marine life (including krill) to smaller seabirds (DoE, 2013i).

3.7.4.2 Red Knot

The red knot is a non-breeding visitor to Australia. Typically found feeding and roosting around intertidal and shallow coastal areas (Higgins & Davies 1996).

Due to the distance offshore and from roosting areas, the red knot is unlikely to be found in the Operational Area or spill EMBA unless transiting through the area on migrations.

3.7.4.3 Common Noddy

The common noddy is typically found feeding and roosting around coastal areas. Outside of the breeding season, this species has been found foraging hundreds of kilometers from breeding islands on fish, squid and other pelagic molluscs (Higgins & Davies 1996). Therefore, the common noddy may be found feeding or transiting through the Operational Area or EMBA.

3.7.4.4 Lesser Frigatebird

The lesser frigatebird is a marine bird with known breeding ground on remote islands in north-western Australia. The frigatebird is known to feed off fish in the open ocean. Although not known for travelling such distances to feed, the lesser frigatebird may be found in the Operational Area or EMBA.

4 SOCIO-ECONOMIC ENVIRONMENT

4.1 COMMERCIAL FISHERIES

4.1.1 Commonwealth Fisheries

Commonwealth fisheries are those within the 200 nautical mile Australian Fishing Zone managed by Australian Fisheries Management Authority (AFMA) and are, on the high seas, and, in some cases, by agreement with the States and Territory, to the low water mark. Australian Fishery boundaries can be seen in Figure 4-1.

Relevant to the Operational Area and spill EMBA are four Commonwealth managed fisheries Patterson et al., 2022):

- Western Tuna and Billfish Fishery
- Western Deepwater Trawl Fishery
- Southern Bluefin Tuna Fishery
- North West Slope Trawl Fishery

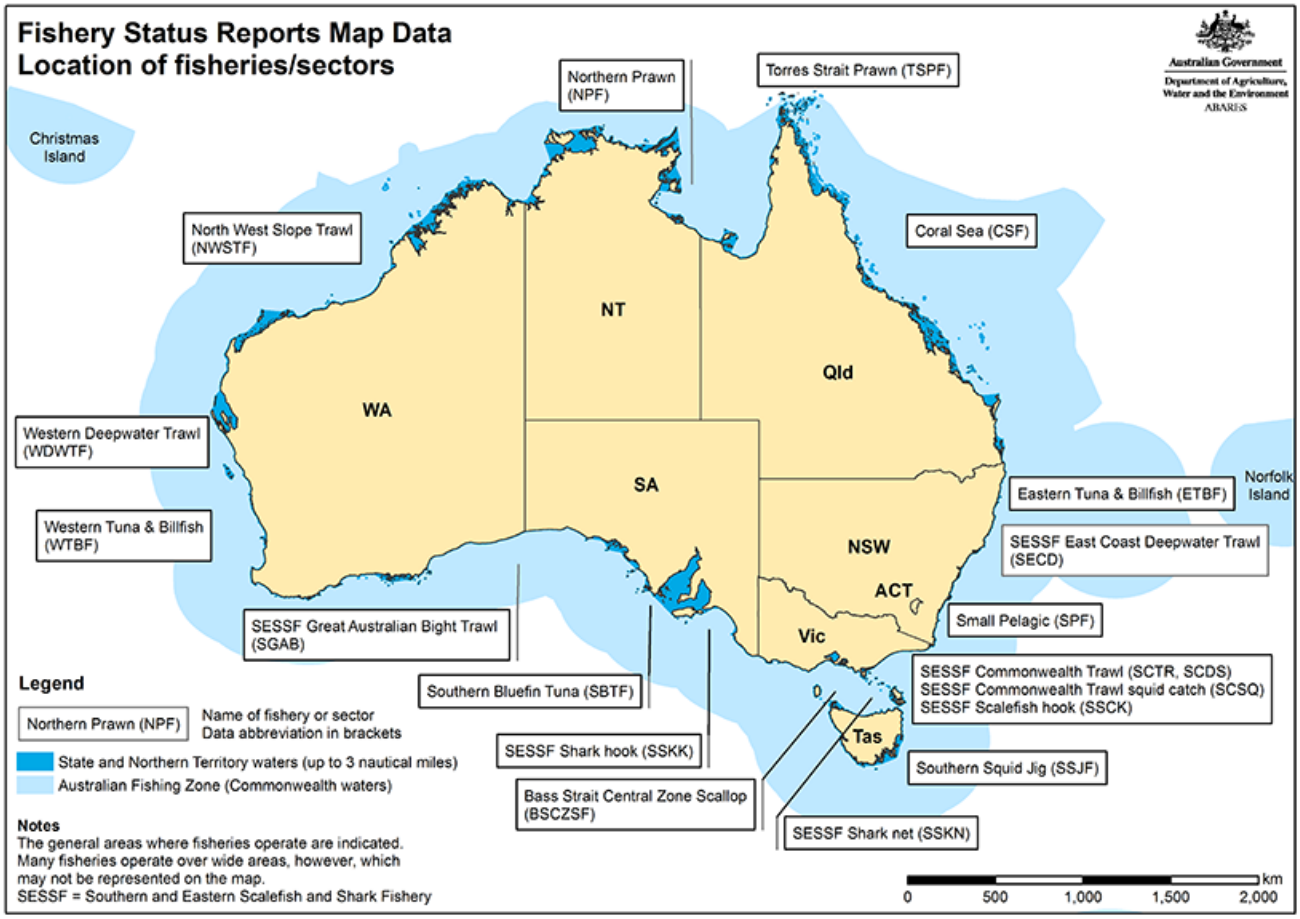

Figure 4-1: Australian Fisheries (Patterson et al., 2022)

4.1.1.1 Western Tuna and Billfish Fishery

The Western Tuna and Billfish Fishery extends eastward from the Victorian/South Australian border throughout South Australia and Western Australia waters to waters immediately westward of Cape York Peninsula (Figure 4-2) (Australian Fisheries Management Authority, 2014b).

Target species and fishing methods are entirely pelagic meaning there is no current or future potential for interaction with the seabed within the Operational Area or EMBA.

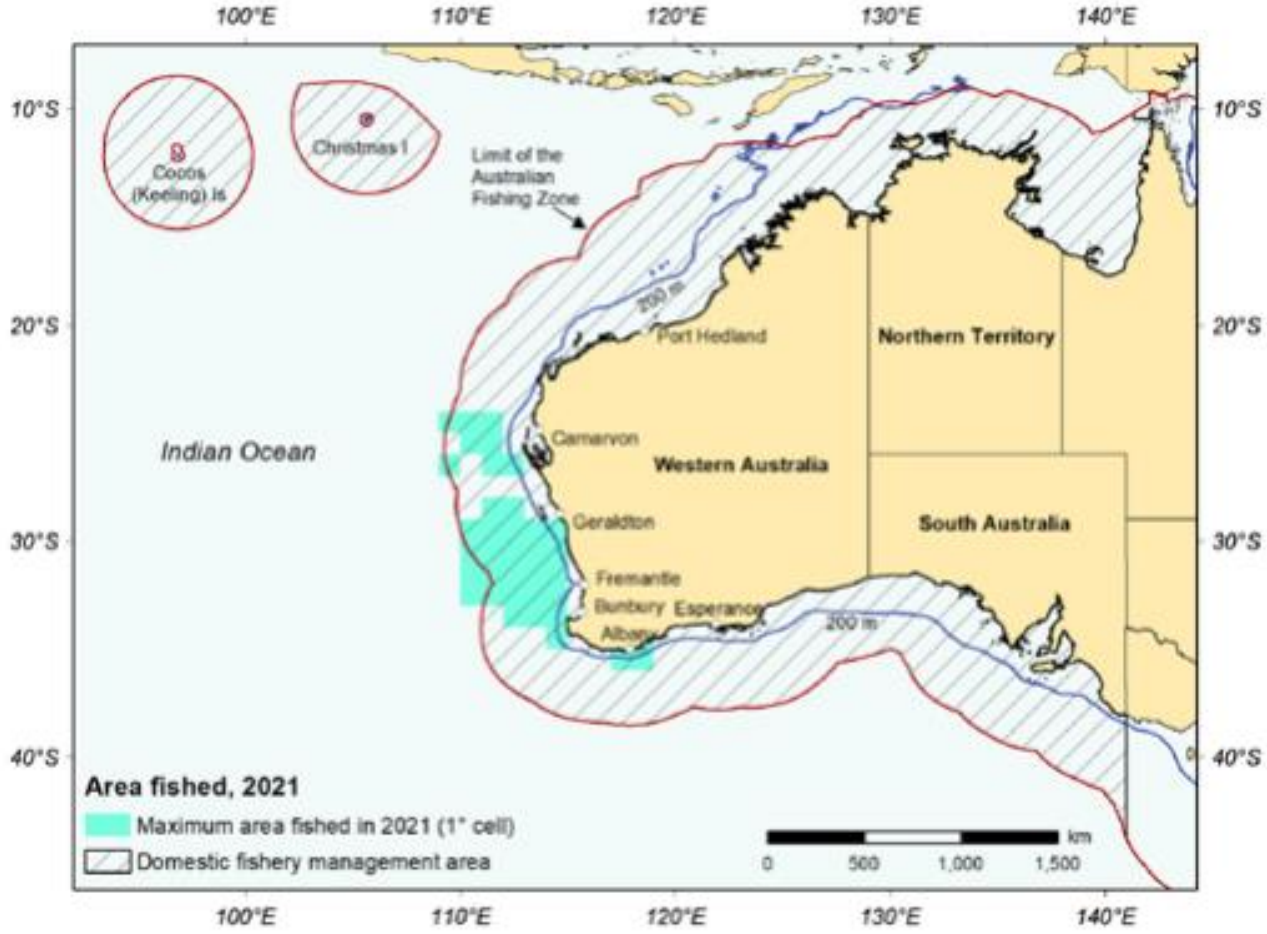

Figure 4-2: Western Tuna and Billfish Fishery Zone Map Patterson et al., 2022)

4.1.1.2 Western Deepwater Trawl Fishery

The WDTF is located from the 200 m isobath to the edge of the Australian Fishing Zone. Within the fishery boundary of Western Australia, the catches of commercially important species by weight are separated into two distinct geographic regions. The two regions are from the Northwest Shelf to Geraldton, and from Geraldton to Margaret River and southwest Western Australia (Figure 4-3). The key species are a diverse range of finfish species, with catches primarily landed from the upper (200 m to 700 m) and mid-continental shelf Patterson et al., 2022).

The number of vessels active in the fishery and total hours trawled have been variable but relatively low since 2005–06. In 2020–21, 30 trawl-hours were recorded in the fishery, down from a recent peak of 1,108 in 2017–18. Since 2004–05, 1–3 vessels have been active in the fishery. One vessel was active in 2020–21 (Patterson et al., 2022). Spatial data regarding effort is confidential, however, it is considered unlikely that WDTF will be interfered with by the Activity.

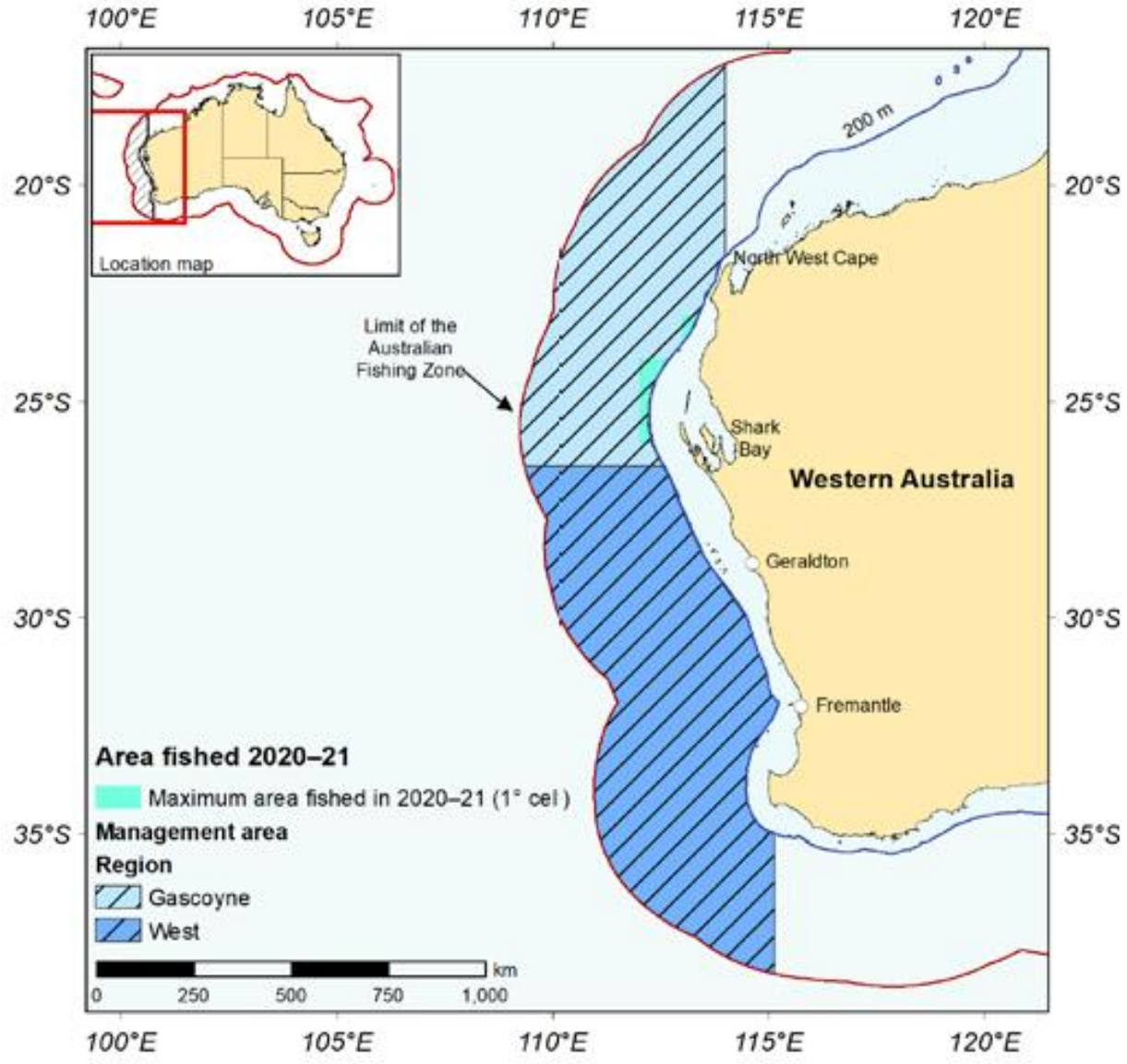

Figure 4-3: Western Deep Water Trawl Fishery boundary (Patterson et al., 2022)

4.1.1.3 Southern Bluefin Tuna Fishery

Given the highly migratory nature of the southern bluefin tuna (*Thunnus maccoyii*), the Southern Bluefin Tuna Fishery occurs in all Australian Waters (Australian Fisheries Management Authority, 2014e). Catches are generally highest within South Australia and South East Australian waters.

Target species and fishing methods are entirely pelagic meaning there is no current or future potential for interaction with the seabed within the Operational Area or EMBA.

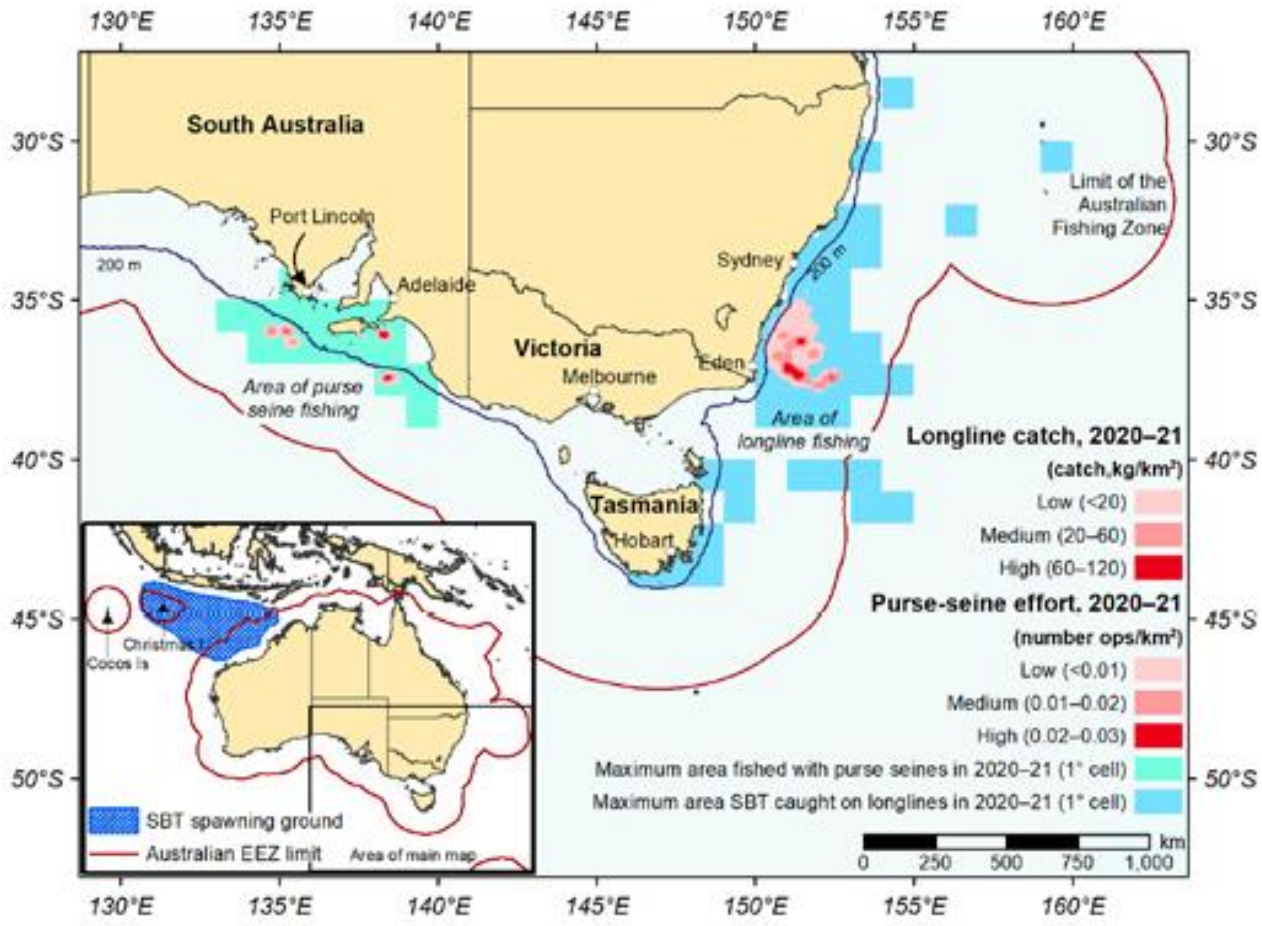

Figure 4-4: Southern Bluefin Tuna Fishery (Patterson et al., 2022)

4.1.1.4 North West Slope Trawl Fishery

The North West Slope Trawl is designated from 114°E to about 125°E off the Western Australian coast between the line approximating the 200 m isobath and the outer limit of the Australian Fishing Zone, but taking into account Australian-Indonesian maritime boundaries. The fishery targets scampi and prawns. Four vessels operated in the NWSTF in the 2020-21 season (down from six vessels during the 2019-20 season). There are six active fishing permits (Patterson et al., 2022).

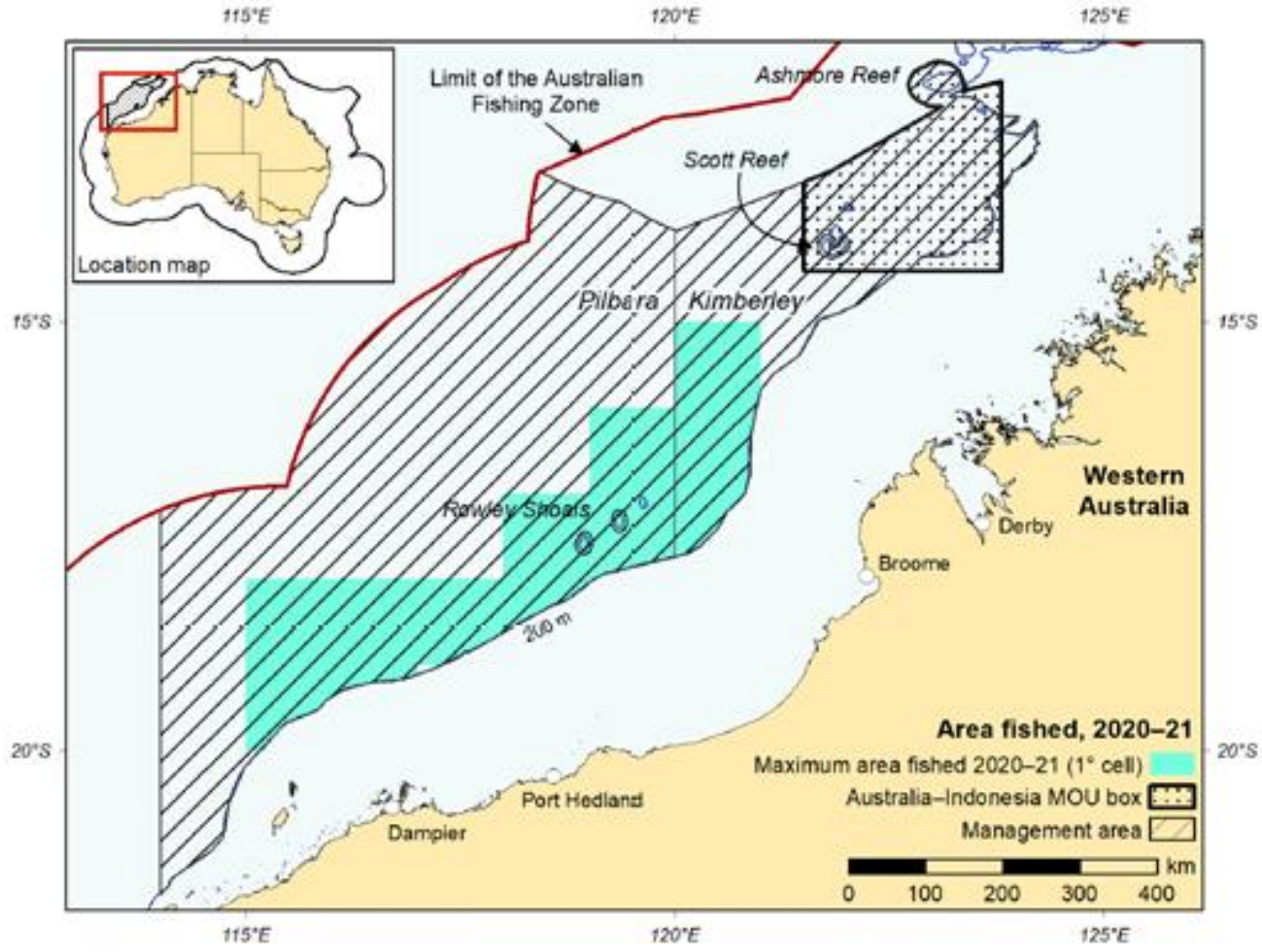

Figure 4-5: North West Slope Trawl Fishery boundary (Patterson et al., 2022)

4.1.2 State Fisheries

State fisheries are managed by the WA Department of Primary Industries and Regional Development - Fisheries (DPIRD - Fisheries) with specific management plans, regulations and a variety of subsidiary regulatory instruments under the *Fish Resources Management Act 1994* (WA). The information on State managed fisheries has been derived from the State of Fisheries Report 2012/2013 (Fletcher and Santoro, 2013).

State managed fisheries occur with zones that overlap or are in close proximity to the Operational Area and hydrocarbon spill EMBA. These fisheries are managed by DPIRD – Fisheries (WA DoF, 2015) and include:

- Mackerel managed Fishery (zones 2 and 3)
- Northern Shark Fishery
- Pearl Oyster Managed Fishery (Zone 1)

- West Coast Deep Sea Crustacean Managed Fishery
- Abalone Fishery
- Gascoyne Demersal Scalefish
- Onslow Prawn Fishery
- Marine Aquarium Managed Fishery
- Pilbara Crab Fishery
- Pilbara Fish Trawl Fishery
- Pilbara Trap Fishery
- Shark Bay Prawn Fishery
- Shark Bay Scallop Fishery
- South West Coast Salmon Fishery
- Specimen Shell Fishery
- West Coast Deep Sea Crustacean Fishery
- West Coast Rock Lobster Fishery

Fishing effort does not occur in all of these zones and is dependent on habitat types and fishing methods. For example, the Pearl Oyster Managed Fishery involves hand harvest using drift diving and so does not occur within the deep waters of the Operational Area and EMBA.

The state fisheries of Western Australia are managed by the adherence to specific management plans, regulations and a variety of subsidiary regulatory instruments under the *Fish Resources Management Act 1994* (WA). Based on information received from consultation with DPIRD - Fisheries, there are two species that may undertake spawning or reproductive behaviours within the Operational Area (Table 4-1:).

Table 4-1: Key fisheries species spawning timing* (green cells) relevant to the Gascoyne region

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sandbar shark *Carcharhinus plumbeus*												
Blacktip shark *Carcharhinus metlanopterus*												

Notes: * spawning timing provided by DPIRD - Fisheries during the stakeholder consultation process

4.2 TOURISM

Marine tourism and recreational activities tend to be concentrated in the vicinity of population centres along the WA coastline. The EMBA does not reach a shoreline however the closest population centres to the boundary of the EMBA are Exmouth (approximately 31 km southeast from the edge of EMBA) and Coral Bay (approximately 45 km). Tourism contributes to State and local economies in terms of both income and employment. Popular water-based activities include fishing, swimming, snorkelling/diving, wildlife-watching and boating.

The population centres nearest to the Operational Area are Exmouth (approximately 150 km) and Onslow (approximately 180 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 the Ningaloo Marine Park has to offer, such as at Jurabi Point, 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.

4.3 OIL AND GAS INDUSTRY

The NWS is Australia's most prolific oil and gas production area, largely responsible for WA accounting for 66% of the country's oil production, 76% of the country's condensate production and 37% of the country's gas production in 2013 (APPEA, 2014).

Oil and gas activities within the EMBA include:

- Chevron's Jansz/Io
- Woodside's Scarborough.
- John Brooks' Platform
- Woodside's Pyrenees Development

4.4 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 liquefied natural gas 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.

There are several declared and charted shipping fairways which intersect within Operational Area and the EMBA. The operational area lies outside of these declared and charted shipping fairways (Section 4.4.7 in the EP). The nearest shipping route heading northeast is around 30 km north of the operational area.

4.5 CULTURAL HERITAGE

4.5.1 Indigenous Heritage

Aboriginal sites are of immense cultural, scientific, educational and historic interest and provide 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, 2008). 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.

A search through the Aboriginal Heritage Inquiry System determined the coastal areas that have a long history of occupancy by Indigenous communities (i.e. Barrow Island, Montebello Islands, Exmouth, Ningaloo Reef, the Kimberley Coast) were outside of the EMBA. The search also determined there are no registered Aboriginal Heritage sites within the operational area.

Aboriginal heritage sites in WA are protected under the *Aboriginal Heritage Act 1972*, whether or not they are registered with Department of Planning, Lands and Heritage. While sea country is a recognised

value, the registered site list contains only land-based sites. Areas 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 network of 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. No IPAs intersect the operational area or the EMBA.

4.5.2 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 more than 1500 known shipwreck and historic (more than 75 years old) shipwreck and sunken aircraft sites listed to occur within Commonwealth waters offshore WA, as listed in the Australasian Underwater Cultural Heritage Database.

The Underwater Cultural Heritage Database was searched to identify any known shipwrecks protected under the *Underwater Cultural Heritage Act 2018*. There are no known historic shipwrecks within the operational area or the EMBA.

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 a protected zone. These zones may be established for many 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 4-6 shows Australian locations of Underwater Cultural Heritage Shipwreck Protected Zones. No Underwater Cultural Heritage Shipwreck Protected Zones overlap the operational area, nor do any Underwater Cultural Heritage Shipwreck Protected Zones overlap with the EMBA.

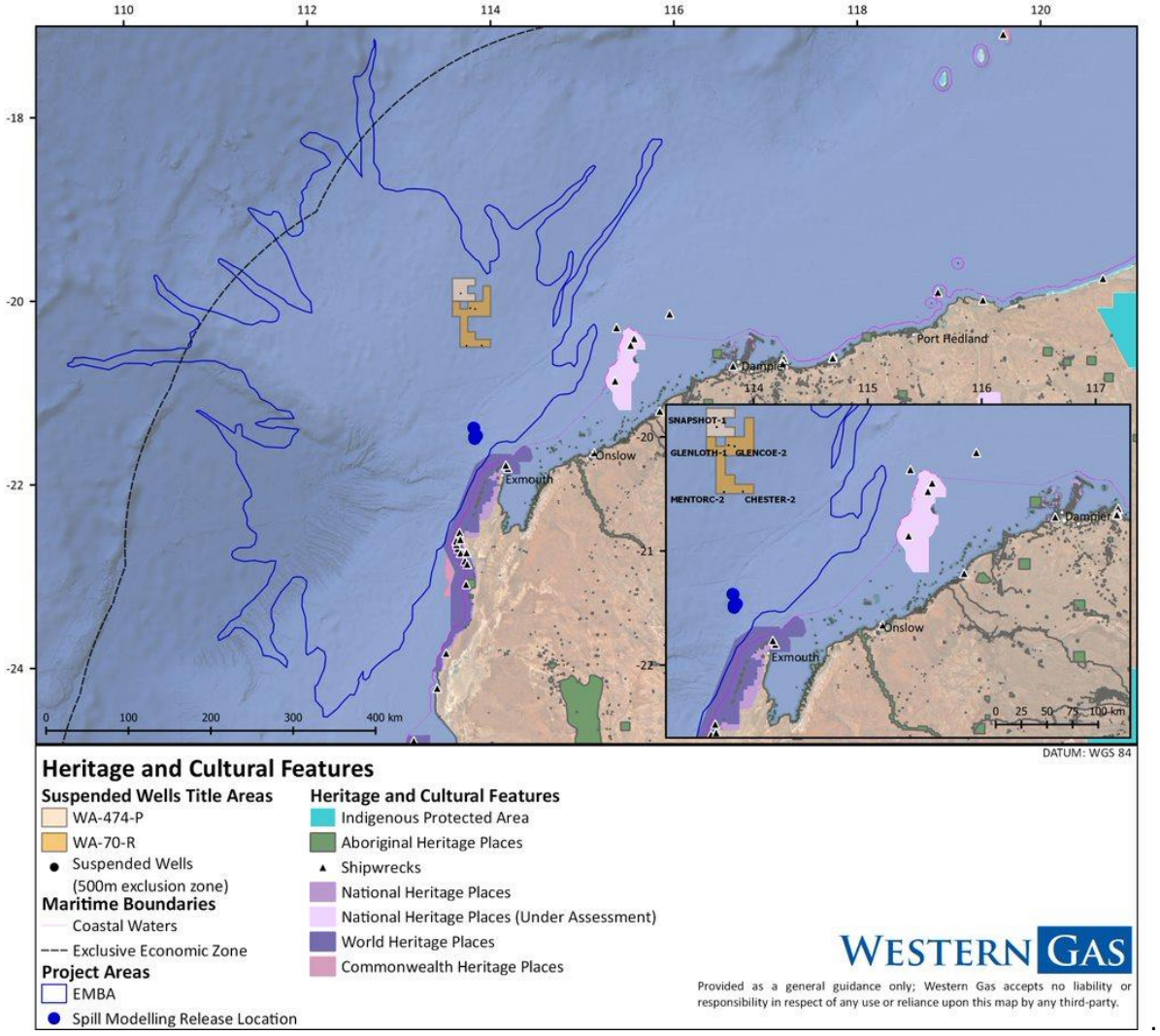

Figure 4-6: Heritage and Culture Features within the EMBA

4.6 DEFENCE

The Naval Communication Station Harold E. Holt is located on the northwest coast of Australia, 6 km north of the town of Exmouth, WA. Exmouth was built at the same time as the communications station to support the base and to house dependent families of United States of America Navy personnel (GDC, 2021).

The station provides very low frequency radio transmission to United States of America 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, 2021).

The Royal Australian Air Force Base Learmonth is located on the North West Cape, around 30 km south of Exmouth. It is one of the Air Force's three bases that can be used for exercises or operational requirements (GDC, 2021).

The operational area is within the North Western Training Area and military restricted airspace (R8541A) a designated defence exercise area which encompasses waters and airspace off the North West Cape (Figure 2-28). When activated by a 'Notice to Airmen', the restricted airspace can operate down to sea level.

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APPENDIX D: EPBC PROTECTED MATTERS REPORT

Australian Government
Department of Climate Change, Energy, the Environment and Water

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. Please see the caveat for interpretation of information provided here.

Report created: 16-Nov-2022

Summary

Matters of National Environment Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	31
Listed Migratory Species:	49

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 https://www.dcceew.gov.au/parks-heritage/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 Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	78
Whales and Other Cetaceans:	32
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	5
Habitat Critical to the Survival of Marine Turtles:	3

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	127
Key Ecological Features (Marine):	4
Biologically Important Areas:	11
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

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 a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
EEZ and Territorial Sea
Extended Continental Shelf

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Num··er is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
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
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	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	Species or species habitat may occur within area
FISH		
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Breeding known to occur within area
MAMMAL		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area

Scientific Name	Threatened Category	Presence Text
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat may occur within area
REPTILE		
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	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
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
SHARK		
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	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

Scientific Name	Threatened Category	Presence Text
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat likely 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
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
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 likely to 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 likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		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

Scientific Name	Threatened Category	Presence Text
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area
Sterna dougallii Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	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	Species or species habitat may occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		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

Scientific Name	Threatened Category	Presence Text
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	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	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
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat may 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

Scientific Name	Threatened Category	Presence Text
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation 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]		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 likely to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sousa sahulensis as Sousa chinensis Australian Humpback Dolphin [87942]		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 known to 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 known to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		
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
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to 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 overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine 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 likely to occur within area

Scientific Name	Threatened Category	Presence Text
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		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
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Foraging, feeding or related behaviour likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Sterna dougallii Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Thalassarche cauta Shy Albatross [89224]	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	Species or species habitat may occur within area
Fish		
Acentronura larsonae Helen's Pygmy Pipehorse [66186]		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 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 suillus Pig-snouted Pipefish [66198]		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

Scientific Name	Threatened Category	Presence Text
Cosmocampus banneri Roughridge Pipefish [66206]		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 grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
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
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		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 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 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
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
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
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
Reptile		
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 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

Scientific Name	Threatened Category	Presence Text
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
Chitulia ornata as Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [87377]		Species or species habitat may occur within area
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
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	Species or species habitat known to occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Leioselasma czeblukovi as Hydrophis czeblukovi		
Fine-spined Seasnake, Geometrical Seasnake [87374]		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]
Current Scientific Name	Status	Type of Presence
Mammal		
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	Migration route known to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	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

Current Scientific Name	Status	Type of Presence
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat may 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
Grampus griseus Risso's Dolphin, Grampus [64]		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 sima as Kogia simus Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Orcaella heinsohni as Orcaella brevirostris 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
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
Sousa sahulensis as Sousa chinensis Australian Humpback Dolphin [87942]		Species or species habitat may 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 Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
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

Australian Marine Parks [Resource Information]

Park Name	Zone & IUCN Categories
Carnarvon Canyon	Habitat Protection Zone (IUCN IV)
Gascoyne	Habitat Protection Zone (IUCN IV)
Gascoyne	Multiple Use Zone (IUCN VI)
Montebello	Multiple Use Zone (IUCN VI)
Gascoyne	National Park Zone (IUCN II)

Habitat Critical to the Survival of Marine Turtles

Scientific Name	Behaviour	Presence
Aug - Sep		
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur
Dec - Jan		
Chelonia mydas Green Turtle [1765]	Nesting	Known to occur
Nov - May		
Eretmochelys imbricata Hawksbill Turtle [1766]	Nesting	Known to occur

Extra Information

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Project Highclere Cable Lay and Operation	2022/09203		Completed
Controlled action			
'Van Gogh' Petroleum Field Development	2007/3213	Controlled Action	Post-Approval
Construct and operate LNG & domestic gas plant including onshore and offshore facilities - Wheatston	2008/4469	Controlled Action	Post-Approval
Develop Jansz-Io deepwater gas field in Permit Areas WA-18-R, WA-25-R and WA-26-	2005/2184	Controlled Action	Post-Approval
Development of Coniston/Novara fields within the Exmouth Sub-basin	2011/5995	Controlled Action	Post-Approval
Development of Stybarrow petroleum field incl drilling and facility installation	2004/1469	Controlled Action	Post-Approval
Enfield full field development	2001/257	Controlled Action	Post-Approval
Equus Gas Fields Development Project, Carnarvon Basin	2012/6301	Controlled Action	Completed
Gorgon Gas Development	2003/1294	Controlled Action	Post-Approval
Gorgon Gas Development 4th Train Proposal	2011/5942	Controlled Action	Post-Approval
Greater Enfield (Vincent) Development	2005/2110	Controlled Action	Post-Approval
Nava-1 Cable System	2001/510	Controlled Action	Completed
Pluto Gas Project	2005/2258	Controlled Action	Completed
Pluto Gas Project Including Site B	2006/2968	Controlled Action	Post-Approval
Pyrenees Oil Fields Development	2005/2034	Controlled Action	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
The Scarborough Project - FLNG & assoc subsea infrastructure, Carnarvon Basin	2013/6811	Controlled Action	Post-Approval
Vincent Appraisal Well	2000/22	Controlled Action	Post-Approval
Not controlled action			
'Van Gogh' Oil Appraisal Drilling Program, Exploration Permit Area WA-155-P(1)	2006/3148	Not Controlled Action	Completed
APX-West Fibre-optic telecommunications cable system, WA to Singapore	2013/7102	Not Controlled Action	Completed
Bollinger 2D Seismic Survey 200km North of North West Cape WA	2004/1868	Not Controlled Action	Completed
Bultaco-2, Laverda-2, Laverda-3 and Montesa-2 Appraisal Wells	2000/103	Not Controlled Action	Completed
Carnarvon 3D Marine Seismic Survey	2004/1890	Not Controlled Action	Completed
Cazadores 2D seismic survey	2004/1720	Not Controlled Action	Completed
Construction and operation of an unmanned sea platform and connecting pipeline to Varanus Island for	2004/1703	Not Controlled Action	Completed
Controlled Source Electromagnetic Survey	2007/3262	Not Controlled Action	Completed
Development of Halyard Field off the west coast of WA	2010/5611	Not Controlled Action	Completed
Exploration drilling well WA-155-P(1)	2003/971	Not Controlled Action	Completed
Exploration of appraisal wells	2006/3065	Not Controlled Action	Completed
Exploration Well in Permit Area WA-155-P(1)	2002/759	Not Controlled Action	Completed
Exploratory drilling in permit area WA-225-P	2001/490	Not Controlled Action	Completed
HCA05X Macedon Experimental Survey	2004/1926	Not Controlled Action	Completed
Hess Exploration Drilling Programme	2007/3566	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
INDIGO West Submarine Telecommunications Cable, WA	2017/8126	Not Controlled Action	Completed
Jansz-2 and 3 Appraisal Wells	2002/754	Not Controlled Action	Completed
Montesa-1 and Bultaco-1 Exploration Wells	2000/102	Not Controlled Action	Completed
Project Highclere Geophysical Survey	2021/9023	Not Controlled Action	Completed
Subsea Gas Pipeline From Stybarrow Field to Griffin Venture Gas Export Pipeline	2005/2033	Not Controlled Action	Completed
To construct and operate an offshore submarine fibre optic cable, WA	2014/7373	Not Controlled Action	Completed
Wanda Offshore Research Project, 80 km north-east of Exmouth, WA	2018/8293	Not Controlled Action	Completed
Wheatstone 3D seismic survey, 70km north of Barrow Island	2004/1761	Not Controlled Action	Completed
Not controlled action (particular manner)			
'Tourmaline' 2D marine seismic survey, permit areas WA-323-P, WA-330-P and WA-32	2005/2282	Not Controlled Action (Particular Manner)	Post-Approval
"Leanne" offshore 3D seismic exploration, WA-356-P	2005/1938	Not Controlled Action (Particular Manner)	Post-Approval
2D and 3D seismic surveys	2005/2151	Not Controlled Action (Particular Manner)	Post-Approval
2D marine seismic survey	2012/6296	Not Controlled Action (Particular Manner)	Post-Approval
2D seismic survey	2008/4493	Not Controlled Action (Particular Manner)	Post-Approval
3D marine seismic survey	2008/4281	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
3D Marine Seismic Survey in Permit Areas WA-15-R, WA-18-R, WA-205-P, WA-253-P, WA-267-P and WA-268-P	2003/1271	Not Controlled Action (Particular Manner)	Post-Approval
3D marine seismic survey over petroleum title WA-268-P	2007/3458	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Surveys - Contos CT-13 & Supertubes CT-13, offshore WA	2013/6901	Not Controlled Action (Particular Manner)	Post-Approval
3D seismic survey	2006/2715	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey, WA	2008/4428	Not Controlled Action (Particular Manner)	Post-Approval
Acheron Non-Exclusive 2D Seismic Survey	2008/4565	Not Controlled Action (Particular Manner)	Post-Approval
Acheron Non-Exclusive 2D Seismic Survey	2009/4968	Not Controlled Action (Particular Manner)	Post-Approval
Agrippina 3D Seismic Marine Survey	2009/5212	Not Controlled Action (Particular Manner)	Post-Approval
Apache Northwest Shelf Van Gogh Field Appraisal Drilling Program	2007/3495	Not Controlled Action (Particular Manner)	Post-Approval
Aperio 3D Marine Seismic Survey, WA	2012/6648	Not Controlled Action (Particular Manner)	Post-Approval
Australia to Singapore Fibre Optic Submarine Cable System	2011/6127	Not Controlled Action (Particular Manner)	Post-Approval
Babylon 3D Marine Seismic Survey, Commonwealth Waters, nr Exmouth WA	2013/7081	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Balnaves Condensate Field Development	2011/6188	Not Controlled Action (Particular Manner)	Post-Approval
Bonaventure 3D seismic survey	2006/2514	Not Controlled Action (Particular Manner)	Post-Approval
Cable Seismic Exploration Permit areas WA-323-P and WA-330-P	2008/4227	Not Controlled Action (Particular Manner)	Post-Approval
CGGVERITAS 2010 2D Seismic Survey	2010/5714	Not Controlled Action (Particular Manner)	Post-Approval
Charon 3D Marine Seismic Survey	2007/3477	Not Controlled Action (Particular Manner)	Post-Approval
Coverack Marine Seismic Survey	2001/399	Not Controlled Action (Particular Manner)	Post-Approval
CVG 3D Marine Seismic Survey	2012/6654	Not Controlled Action (Particular Manner)	Post-Approval
DAVROS MC 3D marine seismic survey northwaet of Dampier, WA	2013/7092	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Drilling Program	2010/5532	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Northwest Shelf 2D Seismic Survey	2007/3260	Not Controlled Action (Particular Manner)	Post-Approval
Draeck 3D Marine Seismic Survey, WA-205-P	2006/3067	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Drilling 35-40 offshore exploration wells in deep water	2008/4461	Not Controlled Action (Particular Manner)	Post-Approval
Eendracht Multi-Client 3D Marine Seismic Survey	2009/4749	Not Controlled Action (Particular Manner)	Post-Approval
Enfield M3 & Vincent 4D Marine Seismic Surveys	2008/3981	Not Controlled Action (Particular Manner)	Completed
Enfield M3 4D, Vincent 4D & 4D Line Test Marine Seismic Surveys	2008/4122	Not Controlled Action (Particular Manner)	Post-Approval
Enfield M4 4D Marine Seismic Survey	2008/4558	Not Controlled Action (Particular Manner)	Post-Approval
Enfield oilfield 3D Seismic Survey	2006/3132	Not Controlled Action (Particular Manner)	Post-Approval
Exmouth West 2D Marine Seismic Survey	2008/4132	Not Controlled Action (Particular Manner)	Post-Approval
Foxhound 3D Non-Exclusive Marine Seismic Survey	2009/4703	Not Controlled Action (Particular Manner)	Post-Approval
Geco Eagle 3D Marine Seismic Survey	2008/3958	Not Controlled Action (Particular Manner)	Post-Approval
Glencoe 3D Marine Seismic Survey WA-390-P	2007/3684	Not Controlled Action (Particular Manner)	Post-Approval
Guacamole 2D Marine Seismic Survey	2008/4381	Not Controlled Action (Particular Manner)	Post-Approval
Harmony 3D Marine Seismic Survey	2012/6699	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Honeycombs MC3D Marine Seismic Survey	2012/6368	Not Controlled Action (Particular Manner)	Post-Approval
Huzzas MC3D Marine Seismic Survey (HZ-13) Carnarvon Basin, offshore WA	2013/7003	Not Controlled Action (Particular Manner)	Post-Approval
Huzzas phase 2 marine seismic survey, Exmouth Plateau, Northern Carnarvon Basin, WA	2013/7093	Not Controlled Action (Particular Manner)	Post-Approval
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval
John Ross & Rosella Off Bottom Cable Seismic Exploration Program	2008/3966	Not Controlled Action (Particular Manner)	Post-Approval
Julimar Brunello Gas Development Project	2011/5936	Not Controlled Action (Particular Manner)	Post-Approval
Klimt 2D Marine Seismic Survey	2007/3856	Not Controlled Action (Particular Manner)	Post-Approval
Laverda 3D Marine Seismic Survey and Vincent M1 4D Marine Seismic Survey	2010/5415	Not Controlled Action (Particular Manner)	Post-Approval
Laying a submarine optical fibre telecommunications cable, Perth to Singapore and Jakarta	2014/7332	Not Controlled Action (Particular Manner)	Post-Approval
Leopard 2D marine seismic survey	2005/2290	Not Controlled Action (Particular Manner)	Post-Approval
Lion 2D Marine Seismic Survey	2007/3777	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Marine reconnaissance survey	2008/4466	Not Controlled Action (Particular Manner)	Post-Approval
Moosehead 2D seismic survey within permit WA-192-P	2005/2167	Not Controlled Action (Particular Manner)	Post-Approval
Munmorah 2D seismic survey within permits WA-308/9-P	2003/970	Not Controlled Action (Particular Manner)	Post-Approval
Ocean Bottom Cable Seismic Program, WA-264-P	2007/3844	Not Controlled Action (Particular Manner)	Post-Approval
Ocean Bottom Cable Seismic Survey	2005/2017	Not Controlled Action (Particular Manner)	Post-Approval
Offshore Canning Multi Client 2D Marine Seismic Survey	2010/5393	Not Controlled Action (Particular Manner)	Post-Approval
Orcus 3D Marine Seismic Survey in WA-450-P	2010/5723	Not Controlled Action (Particular Manner)	Post-Approval
Osprey and Dionysus Marine Seismic Survey	2011/6215	Not Controlled Action (Particular Manner)	Post-Approval
Palta-1 exploration well in Petroleum Permit Area WA-384-P	2011/5871	Not Controlled Action (Particular Manner)	Post-Approval
Pomodoro 3D Marine Seismic Survey in WA-426-P and WA-427-P	2010/5472	Not Controlled Action (Particular Manner)	Post-Approval
Pyrenees 4D Marine Seismic Monitor Survey, HCA12A	2012/6579	Not Controlled Action (Particular Manner)	Post-Approval
Pyrenees-Macedon 3D marine seismic survey	2005/2325	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Quiberon 2D Seismic Survey, permit area WA-385P, offshore of Carnarvon	2009/5077	Not Controlled Action (Particular Manner)	Post-Approval
Rydal-1 Petroleum Exploration Well, WA	2012/6522	Not Controlled Action (Particular Manner)	Post-Approval
Salsa 3D Marine Seismic Survey	2010/5629	Not Controlled Action (Particular Manner)	Post-Approval
Santos Winchester three dimensional seismic survey - WA-323-P & WA-330-P	2011/6107	Not Controlled Action (Particular Manner)	Post-Approval
Skorpion Marine Seismic Survey WA	2001/416	Not Controlled Action (Particular Manner)	Post-Approval
Sovereign 3D Marine Seismic Survey	2011/5861	Not Controlled Action (Particular Manner)	Post-Approval
Stybarrow 4D Marine Seismic Survey	2011/5810	Not Controlled Action (Particular Manner)	Post-Approval
Stybarrow Baseline 4D marine seismic survey	2008/4530	Not Controlled Action (Particular Manner)	Post-Approval
Tortilla 2D Seismic Survey, WA	2011/6110	Not Controlled Action (Particular Manner)	Post-Approval
Triton 3D Marine Seismic Survey, WA-2-R and WA-3-R	2006/2609	Not Controlled Action (Particular Manner)	Post-Approval
Undertake a three dimensional marine seismic survey	2010/5679	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Vincent M1 and Enfield M5 4D Marine Seismic Survey	2010/5720	Not Controlled Action (Particular Manner)	Post-Approval
Warramunga Non-Inclusive 3D Seismic Survey	2008/4553	Not Controlled Action (Particular Manner)	Post-Approval
West Anchor 3D Marine Seismic Survey	2008/4507	Not Controlled Action (Particular Manner)	Post-Approval
West Panaeus 3D seismic survey	2006/3141	Not Controlled Action (Particular Manner)	Post-Approval
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone 3D MAZ Marine Seismic Survey	2011/6058	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone Iago Appraisal Well Drilling	2007/3941	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone Iago Appraisal Well Drilling	2008/4134	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
Bianchi 3D Marine Seismic Survey, Carnavon Basin, WA	2013/7078	Referral Decision	Completed
CVG 3D Marine Seismic Survey	2012/6270	Referral Decision	Completed
Enfield 4D Marine Seismic Surveys, Production Permit WA-28-L	2005/2370	Referral Decision	Completed
Stybarrow Baseline 4D Marine Seismic Survey (Permit Areas WA-255-P, WA-32-L, WA-	2008/4165	Referral Decision	Completed

Key Ecological Features [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 Cuvier Abyssal Plain and the Cape Range Peninsula	North-west
Continental Slope Demersal Fish Communities	North-west
Exmouth Plateau	North-west

Biologically Important Areas

Scientific Name	Behaviour	Presence
Marine Turtles		
Caretta caretta Loggerhead Turtle [1763]	Internesting buffer	Known to occur
Chelonia mydas Green Turtle [1765]	Internesting buffer	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting buffer	Known to occur
Natator depressus Flatback Turtle [59257]	Internesting buffer	Known to occur
Seabirds		
Ardenna pacifica Wedge-tailed Shearwater [84292]	Breeding	Known to occur
Sterna dougallii Roseate Tern [817]	Breeding	Known to occur
Sharks		
Rhincodon typus Whale Shark [66680]	Foraging	Known to occur
Whales		
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Distribution	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Foraging	Known to occur

Scientific Name	Behaviour	Presence
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration (north and south)	Known to occur

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of international and National importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans. State vegetation maps and 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

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat, or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a 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 detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report.

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

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.

APPENDIX E: RELEVANT PERSONS SAMPLE ACTIVITY INFORMATION

Example of explanatory cover email

The email provided below demonstrates Western Gas' consultation approach where activity impacts and risks are expected.

Dear [relevant person]

Western Gas is a Western Australian company with natural gas interests in the North West Shelf. We hold acreage including petroleum titles WA-70-R and WA-474-P, which contain four abandoned wells and one suspended well.

The wells are approximately 180 km northwest of Onslow and 150 km north of Exmouth, Western Australia.

Activity

Western Gas plans to leave the four abandoned wellheads in situ, as well as conduct annual vessel-based wellhead surveys for the suspended well. The survey will involve a few days of vessel operations each year at the suspended well location.

All wells are in Commonwealth Waters approximately 180 km northwest of Onslow and 150 km north of Exmouth, Western Australia at water depths between 1,116 and 1,131 metres.

Further information is provided in the attached information sheet, which is also available on our web site at westerngas.com.au/consultation.

Consultation

As with all offshore petroleum activities in Commonwealth Waters, impacts and potential risks associated with these activities will be assessed and managed through regulatory processes under the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGS Act) and associated Regulations.

Western Gas has identified [relevant person] as a relevant person for consultation under these arrangements, given the potential for impacts to [function, activity or interest]. As such, we seek any claims or objections you may have about proposed activities.

A map showing WA-70-R and WA-474-P relative to [function, activity or interest] is attached for context.

We have also assessed that [functions, activities or interests] may be impacted in the unlikely occurrence of a marine pollution incident and seek your cooperation to develop communications protocols as part of marine pollution response preparedness.

Providing feedback – planned activities

Western Gas will assess the merits of any claims or objections you may have and will provide you with a response on how this assessment has been considered in activity planning.

A summary of your feedback and our response will be included in an Environment Plan under which all activities are proposed to be managed. This Plan will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment and must be accepted by NOPSEMA before any activities outlined in the Plan can take place.

Providing feedback – marine pollution

For this activity, we have determined a 250 m^3 marine diesel oil spill to be the worst-case credible spill scenario. This volume has been selected based on a vessel collision and resulting loss of containment from a fuel tank of a typical support vessel that will be used for the suspended wellhead surveys. This hydrocarbon volume and type were then modelled using a number of hypothetical spills under different environmental conditions to determine the widest extent of possible oil dispersion.

Can you please provide appropriate emergency response contact details for inclusion in our Oil Pollution Emergency Plan for proposed activities to ensure effective and timely emergency response in the event of a spill, as well as to establish communications protocols for future activities in the region.

We would also be pleased to discuss any appropriate communications arrangements specific to your information and reporting needs.

Feedback Date

Please provide feedback by **5 December 2022** to ensure we have sufficient time to respond and incorporate your feedback into planning activities for the development of the Environment Plan.

Please let us know if you wish your personal/organisation details or any part of your feedback to remain confidential to NOPSEMA.

We also request early engagement should you require additional information to help understand if proposed activities may impact your functions, activities or interests.

Example of explanatory cover email

The email provided below demonstrates Western Gas' consultation approach where activity risks only are expected.

Dear [relevant person]

Western Gas is a Western Australian company with natural gas interests in the North West Shelf. We hold acreage including petroleum titles WA-70-R and WA-474-P, which contain four abandoned wells and one suspended well.

The wells are approximately 180 km northwest of Onslow and 150 km north of Exmouth, Western Australia.

Activity

Western Gas plans to leave the four abandoned wellheads in situ, as well as conduct annual vessel-based wellhead surveys for the suspended well. The survey will involve a few days of vessel operations each year at the suspended well location.

All wells are in Commonwealth Waters approximately 180 km northwest of Onslow and 150 km north of Exmouth, Western Australia at water depths between 1,116 and 1,131 metres.

Further information is provided in the attached information sheet, which is also available on our web site at westerngas.com.au/consultation.

Consultation

As with all offshore petroleum activities in Commonwealth Waters, impacts and potential risks associated with these activities will be assessed and managed through regulatory processes under the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGS Act) and associated Regulations.

While planned activities are unlikely to impact the activities of any [socio economic activity] given the location of the wells and water depths, we have assessed that your functions, activities or interests may be impacted in the unlikely occurrence of a marine pollution incident and seek your cooperation to develop communications protocols as part of marine pollution response preparedness.

Providing feedback – marine pollution

We have identified that the following [socio economic activity] as being within the widest extent of possible oil dispersion:

[Details provided]

We seek your concurrence that consulting [relevant stakeholder] on behalf of [organisations] is appropriate at this time, acknowledging that not all [organisations] with activities or interests within the extent of the potentially impacted area would be affected in the event of an actual spill.

We also would be pleased to discuss appropriate communications arrangements for inclusion in our Oil Pollution Emergency Plan to ensure effective and timely emergency response in the event of a spill, as well as on how information is communicated to you where licence holders may be impacted, as well as how best to consult individual licence holders.

Feedback Date

Please provide feedback by **10 December 2022** to ensure we have sufficient time to respond and incorporate your feedback into planning activities for the development of the Environment Plan.

A summary of your feedback and our response will be included in an Environment Plan under which all activities are proposed to be managed. This Plan will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment and must be accepted by NOPSEMA before any activities outlined in the Plan can take place.

Please let us know if you wish your personal/organisation details or any part of your feedback to remain confidential to NOPSEMA.

We also request early engagement should you require additional information to help understand if proposed activities may impact your functions, activities or interests.

Initial consultation information sheet

WESTERN GAS

STAKEHOLDER CONSULTATION INFORMATION SHEET

NOVEMBER 2022

WA-474-P, WA-70-R ABANDONED AND SUSPENDED WELLS ENVIRONMENT PLAN

CARNARVON BASIN, NORTH-WEST AUSTRALIA

ACTIVITY

Western Gas is planning to permanently leave *in situ* a total of four subsea wellheads associated with four abandoned exploration wells, namely Chester-2, Glencoe-2, Mentorc-2 and Snapshot-1 in Petroleum Permits WA-70-R and WA-474-P.

Plugging and abandonment of these wells has already occurred, as described in the Government-accepted Well Operations Management Plan (WOMP) and Well Abandonment Reports for each well.

In addition, the Glenloth-1 well is to remain as a suspended well. Western Gas is proposing to undertake annual vessel-based wellhead survey activities on the suspended well, which is located in Petroleum Permit WA-70-R.

All wells are located approximately 180 km northwest of Onslow and 150 km north of Exmouth, Western Australia at water depths between 1,116 and 1,131 metres.

An Environment Plan for the proposed activities will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment, covering the *in situ* abandoned wellheads, the suspended well, and the vessel-based inspection survey.

Western Gas is Operator and 100% owner of WA-474-P and WA-70-R.

Western Gas welcomes feedback from stakeholders whose functions, activities or interests may be impacted by activities outlined in this Information Sheet. Please provide feedback by close of business on 5 December 2022.

Activity location

WESTERN GAS

SUSPENDED WELLHEAD SURVEY OVERVIEW	
Wellhead name:	Glenloth-1
Petroleum Permit:	WA-70-R
Commencement date:	Annually
Approximate estimated duration:	Up to seven days, including contingencies
Approximate location:	20° 04′ 23.9" S 113° 46′ 46.258" E
Approximate water depth:	1,116.53 m MDSS
Infrastructure:	Wellhead – 98% steel, approx 3m x 3m
Operational area:	500-metre zone from the wellhead
Vessels:	Small utility vessel or similar
Distance to nearest town:	Approx. 150 km northwest of Exmouth
Distance to nearest marine park:	Approx. 70 km north of Gascoyne

PERMANENT ABANDONMENT OF WELLHEADS IN-SITU OVERVIEW				
Wellhead name:	Chester-2	Glencoe-2H	Mentorc-2	Snapshot-1
Petroleum Permit:	WA-70-R	WA-70-R	WA-70-R	WA-474-P
Approximate duration:	Presence will be ongoing	Presence will be ongoing	Presence will be ongoing	Presence will be ongoing
Approximate locations:	20° 28' 48.528" S 113° 54' 20.136" E	20° 4′ 57.23" S 113° 49′ 55.4" E	20° 29′ 0.344" S 113° 44′ 22.35" E	19° 54' 49.451" S 113° 40′ 31.074" E
Approximate water depth:	1,125 m MDSS	1,116 m MDSS	1,131 m MDSS	1,121 m MDSS
Infrastructure:	Wellhead – 98% steel, approx. 3 m x 3 m	Wellhead – 98% steel, approx. 3 m x 3 m	Wellhead – 98% steel, approx. 3 m x 3 m	Wellhead – 98% steel, approx. 3 m x 3 m
Distance to nearest town:	Approx. 170 km northwest of Exmouth	Approx. 220 km northwest of Exmouth	Approx. 180 km northwest of Exmouth	Approx. 230 km northwest of Exmouth
Distance to nearest marine park:	Approx. 30 km north of Gascoyne Marine Park	Approx. 70 km north of Gascoyne Marine Park	Approx. 25 km north of Gascoyne Marine Park	Approx. 88 km north of Gascoyne Marine Park

WESTERN GAS

ACTIVITY DETAILS

Abandoned Wells

The presence of the four permanently abandoned wellheads in-situ will be ongoing and no further work will be required as part of proposed activities under the Environment Plan, as the integrity of the wells has been demonstrated through the WOMP and Well Abandonment process.

Suspended Well

Vessel-based surveys will be undertaken to inspect the suspended Glenloth-1 well and assist with the assessment of decommissioning options.

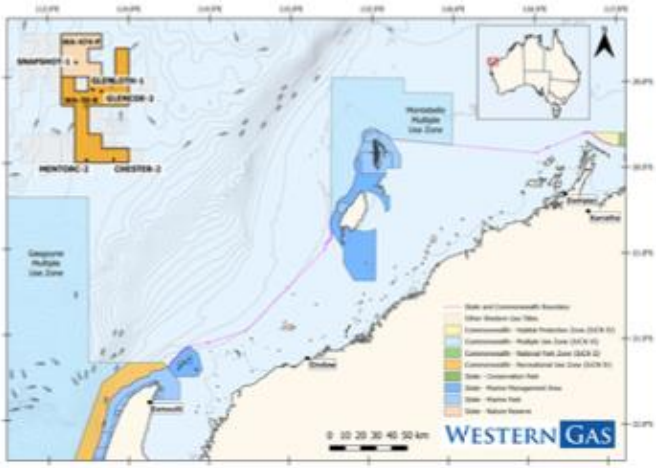
This survey will be undertaken annually from acceptance of the Environment Plan and may be undertaken at a time when Western Gas is performing other Petroleum Activities in the area.

The inspection survey will be undertaken using a remotely operated vehicle (ROV) deployed from a small utility vessel. The survey may take up to 7 days, including time for contingencies. The ROV inspection of the wellhead itself is expected to take approximately 4 hours.

To assist in locating the wellhead, the ROV will use various geophysical and hydrographic survey techniques such as Multibeam echo-sounder (MBES), Side-scan Sonar (SSS), Ultra-short Baseline System (USBL) and General Video Inspection (GVI).

At this time, the small utility vessel that will be used to undertake inspection survey activity has not been identified, however would typically be less than 30 m in length and support a crew of approximately 15 persons.

Vessels will be fuelled by marine diesel fuel, and there is no planned vessel refuelling to take place in the operational area. All vessel fuelling is proposed to take place within the nearest suitable harbour.



Activity location

ACTIVITY ASSESSMENT AND POTENTIAL IMPACTS

Western Gas has undertaken a comprehensive assessment of the four abandoned wellheads considering water depth, potential interaction with other marine users, and impacts and risks associated with the removal of the wellheads.

This assessment determined that leaving the wellheads *in situ* presented an equal or better environmental outcome compared to the regulatory base case of removing the wellheads.

Western Gas also considered potential impacts from the conduct of the vessel-based inspection survey for the suspended Glenloth-1 well.

Both assessments considered impacts to physical, ecological, social, economic, and cultural values and sensitivities based on a wide range of impact criteria. The outcome of the assessments will be provided in detail in the Environment Plan. A summary of key impacts and management measures is outlined in **Table 1** and **Table 2**.

Impacts from the vessel transiting to and from the operational area have not been included in the assessment scope of the Environment Plan.

WESTERN GAS

Table 1. Summary of key impacts

ACTIVITY	POTENTIAL RISKS AND/OR IMPACTS	ASSESSMENT	MITIGATION AND/OR MANAGEMENT MEASURES
PRESENCE OF THE WELLHEADS	**PHYSICAL**		
	Physical presence of the wellheads may cause interference.	Minor potential impact given water depth and distance from shore.	Consultation with maritime safety agencies. Wellhead locations marked on marine charts.
	Physical presence of the wellheads may cause snagging risks to trawl fisheries.	Minor potential impact as water depth is below that typically fished by trawl fishers.	Consultation with licence holders in the Western Deepwater Trawl Fishery, their representative organisation and relevant Commonwealth government agencies.
	ECOLOGICAL		
	Ecological values that may be impacted include: ■ Plankton ■ Fish ■ Marine mammals ■ State Protected Marine Values	There are little to no impacts associated to leaving the wellheads in-situ as there are no activities associated with this process.	No activity is associated with the process of leaving wellheads *in situ*.
	SOCIAL, ECONOMIC AND CULTURAL		
	Impacts to the functions, activities and interests of stakeholders relevant to: ■ Commercial fishing activities ■ Defence activities ■ Indigenous values ■ Petroleum activities ■ Shipping activities	There are little to no impacts associated to leaving the wellheads in-situ as there are no activities associated with this process.	Consultation with the following organisations to inform decision making for the proposed activity and development of the Environment Plan: ■ Commercial fishing licence holders and their representative organisations ■ Government Agencies ■ Indigenous representative bodies ■ Petroleum titleholders ■ Port authorities

WESTERN GAS

Table 2: Summary of key impacts

ACTIVITY	POTENTIAL RISKS AND/OR IMPACTS	ASSESSMENT	MITIGATION AND/OR MANAGEMENT MEASURES
VESSEL-BASED SURVEYS	**PHYSICAL**		
	Physical presence of the vessel may cause interference or displacement.	The potential impacts are predicted to be minor due to distance from shore.	Wellhead locations marked on marine charts.
	ECOLOGICAL		
	Ecological values that may be impacted include: ■ Plankton ■ Fish ■ Marine mammals ■ State Protected Marine Values	The potential impacts are predicted to be minor due to the short duration of activities, water depth and distance from shore.	Vessel activities will be managed according to relevant legislation and guidelines.
	SOCIAL, ECONOMIC AND CULTURAL		
	Impacts to the functions, activities and interests of stakeholders relevant to: ■ Commercial fishing activities ■ Defence activities ■ Indigenous values ■ Petroleum activities ■ Shipping activities	Minor potential impact given: ■ Water depth ■ Distance from shore Short duration of activities compared to regional marine traffic.	Consultation with the following organisations to inform decision making for the proposed activity and development of the Environment Plan: ■ Commercial fishing licence holders and their representative organisations ■ Government Agencies ■ Indigenous representative bodies ■ Petroleum titleholders ■ Port authorities Notifications prior to the start and upon completion of the vessel inspection survey will be provided to the Australian Hydrographic Office to generate a Notice to Mariners. Notifications prior to the start and upon completion of the vessel inspection survey will be provided to other marine users if requested.

WESTERN GAS

STAKEHOLDER CONSULTATION

Planned activities

Western Gas is consulting relevant stakeholders to inform planning for the development of the Environment Plan for proposed activities. Relevant stakeholders have been determined using the following methodology:

- Identifying physical, environmental, social, economic, and cultural values and sensitivities that may be affected by planned activities.
- Identifying government agencies with management roles for the identified values and sensitivities.
- Identifying government agencies with management roles for the development of plans to support emergency situations, such as marine pollution.
- Identifying other stakeholders whose functions, activities or interests are relevant to the identified values and sensitivities.

Western Gas complements this regulatory consultation approach by way of regular engagement of stakeholders who have identified an interest in the development of our Equus gas fields and adjacent exploration interests.

Unplanned activities

Western Gas is also consulting relevant stakeholders to inform planning for the development of the Environment Plan for unplanned activities, specifically marine pollution.

Relevant stakeholders, in addition to those government agencies already identified as having a role in response activities, have been determined using the following methodology:

- Identifying physical, environmental, social, economic, and cultural values and sensitivities that may be affected by marine pollution based on modelling predictions from a worst-case marine pollution event.
- Identifying stakeholders whose functions, activities or interests maybe impacted based on potential impacts to the identified values and sensitivities.
- Where possible, consult organisations that represent the interests of potentially impacted stakeholders, acknowledging that not all stakeholders within the extent of the modelled impacted area will be affected in the event of an actual spill.
- Confirm with these organisations notifications and communications expectations in the event of a spill to ensure efficient and timely emergency response effort.
- Include these stakeholder expectations in the Oil Pollution Emergency Plan that will be developed for this Environment Plan, which will provide a detailed assessment of marine pollution risk, and response preparedness and planning.

For this activity, a credible worst-case marine pollution event would be a marine diesel oil spill comprising 250 m^3 marine diesel oil spill. This volume has been identified based on a vessel collision and resulting loss of containment from a fuel tank of a typical support vessel.

This hydrocarbon volume and type were then modelled using a number of hypothetical spills under different environmental conditions to determine the widest extent of possible oil dispersion.

PROVIDING FEEDBACK

Please contact us before **close of business on 5 December 2022** with your comments on proposed activities outlined in this information sheet.

Your feedback will be included in the Environment Plan for the proposed activities, which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth).

Please let us know if wish your personal/organisation details or any part of your feedback to remain confidential as a summary of your feedback and our response in the Environment Plan for this activity will be published on NOPSEMA's web site.

Please contact Western Gas at: **feedback@westerngas.com.au**

WESTERN GAS **Accelerating development of Western Australia's gas resources**

Example of explanatory cover email – activity update on marine pollution planning

The email provided below demonstrates Western Gas' where there are changes to activity planning or scope that may impact the functions, activities or interests of relevant persons.

Dear [relevant person]

Western Gas wishes to clarify details in our consultation information sheet previously provided to you on proposed activities in WA-70-R and WA-474-P.

Marine pollution response planning
Our information sheet described a worst-case credible marine pollution event being a marine diesel oil spill due to a vessel collision. The typical support vessel required for this activity would have a maximum fuel tank size of less than 250 m^3.

However, as a conservative measure, our modelling assessed a 1000 m3 marine diesel oil release, not a 250 m3 release as previously advised. This 1000 m3 volume was modelled using a number of hypothetical spills under different environmental conditions.

The widest extent of possible oil dispersion was then used to identify stakeholders whose functions, activities or interests may be impacted in the unlikely event of a spill, acknowledging that not all stakeholders identified would be impacted.

As per previous advice, we are keen to discuss appropriate communications arrangements for inclusion in our Oil Pollution Emergency Plan to support emergency response planning, as well as how information is communicated to you where your functions, activities or interests may be impacted.

For reference, the fact sheet previously sent to you has been updated to reflect the change in modelling approach and is attached.

Providing feedback – planned activities
More broadly we would also like to understand any claims or objections you may have about impacts to your functions, activities or interests from planned activities.

Feedback Date
Please note that feedback is due by close of business **5 December 2022** to ensure we have sufficient time to respond and incorporate your feedback into planning activities for the development of the Environment Plan.

Please let us know if you wish your personal/organisation details or any part of your feedback to remain confidential to NOPSEMA.

We also request early engagement should you require additional information to help understand if proposed activities may impact your functions, activities or interests.

Regards

Updated consultation information sheet (following a review of spill modelling)

WESTERN GAS

STAKEHOLDER CONSULTATION INFORMATION SHEET

NOVEMBER 2022

WA-474-P, WA-70-R ABANDONED AND SUSPENDED WELLS ENVIRONMENT PLAN

CARNARVON BASIN, NORTH-WEST AUSTRALIA

ACTIVITY

Western Gas is planning to permanently leave *in situ* a total of four subsea wellheads associated with four abandoned exploration wells, namely Chester-2, Glencoe-2, Mentorc-2 and Snapshot-1 in Petroleum Permits WA-70-R and WA-474-P.

Plugging and abandonment of these wells has already occurred, as described in the Government-accepted Well Operations Management Plan (WOMP) and Well Abandonment Reports for each well.

In addition, the Glenloth-1 well is to remain as a suspended well. Western Gas is proposing to undertake annual vessel-based wellhead survey activities on the suspended well, which is located in Petroleum Permit WA-70-R.

All wells are located approximately 180 km northwest of Onslow and 150 km north of Exmouth, Western Australia at water depths between 1,116 and 1,131 metres.

An Environment Plan for the proposed activities will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment, covering the *in situ* abandoned wellheads, the suspended well, and the vessel-based inspection survey.

Western Gas is Operator and 100% owner of WA-474-P and WA-70-R.

Western Gas welcomes feedback from stakeholders whose functions, activities or interests may be impacted by activities outlined in this Information Sheet. Please provide feedback by close of business on 5 December 2022.

Activity location

WESTERN GAS Accelerating development of Western Australia's gas resources

1

WESTERN GAS

SUSPENDED WELLHEAD SURVEY OVERVIEW	
Wellhead name:	Glenloth-1
Petroleum Permit:	WA-70-R
Commencement date:	Annually
Approximate estimated duration:	Up to seven days, including contingencies
Approximate location:	20° 04′ 23.9″ S 113° 46′ 46.258″ E
Approximate water depth:	1,116.53 m MDSS
Infrastructure:	Wellhead – 98% steel, approx 3m x 3m
Operational area:	500-metre zone from the wellhead
Vessels:	Small utility vessel or similar
Distance to nearest town:	Approx. 150 km northwest of Exmouth
Distance to nearest marine park:	Approx. 70 km north of Gascoyne

PERMANENT ABANDONMENT OF WELLHEADS IN-SITU OVERVIEW				
Wellhead name:	Chester-2	Glencoe-2H	Mentorc-2	Snapshot-1
Petroleum Permit:	WA-70-R	WA-70-R	WA-70-R	WA-474-P
Approximate duration:	Presence will be ongoing	Presence will be ongoing	Presence will be ongoing	Presence will be ongoing
Approximate locations:	20° 28′ 48.528″ S 113° 54′ 20.136″ E	20° 4′ 57.23″ S 113° 49′ 55.4″ E	20° 29′ 0.344″ S 113° 44′ 22.35″ E	19° 54′ 49.451″ S 113° 40′ 31.074″ E
Approximate water depth:	1,125 m MDSS	1,116 m MDSS	1,131 m MDSS	1,121 m MDSS
Infrastructure:	Wellhead – 98% steel, approx. 3 m x 3 m	Wellhead – 98% steel, approx. 3 m x 3 m	Wellhead – 98% steel, approx. 3 m x 3 m	Wellhead – 98% steel, approx. 3 m x 3 m
Distance to nearest town:	Approx. 170 km northwest of Exmouth	Approx. 220 km northwest of Exmouth	Approx. 180 km northwest of Exmouth	Approx. 230 km northwest of Exmouth
Distance to nearest marine park:	Approx. 30 km north of Gascoyne Marine Park	Approx. 70 km north of Gascoyne Marine Park	Approx. 25 km north of Gascoyne Marine Park	Approx. 88 km north of Gascoyne Marine Park

WESTERN GAS

ACTIVITY DETAILS

Abandoned Wells

The presence of the four permanently abandoned wellheads in-situ will be ongoing and no further work will be required as part of proposed activities under the Environment Plan, as the integrity of the wells has been demonstrated through the WOMP and Well Abandonment process.

Suspended Well

Vessel-based surveys will be undertaken to inspect the Glenloth-1 well and assist with the assessment of decommissioning options.

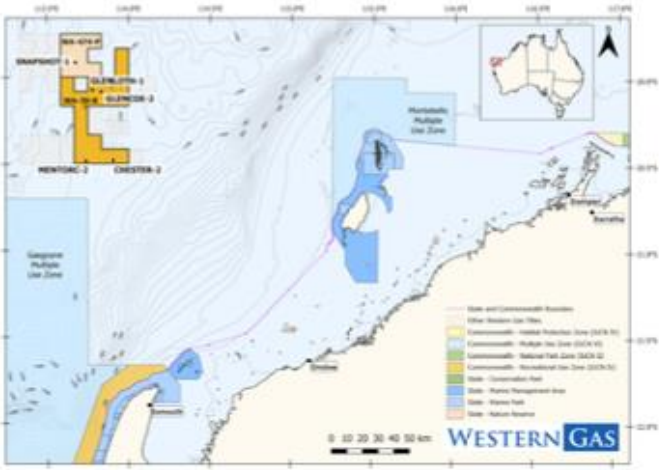
This survey will be undertaken annually from acceptance of the Environment Plan and may be undertaken at a time when Western Gas is performing other Petroleum Activities in the area.

The inspection survey will be undertaken using a remotely operated vehicle (ROV) deployed from a small utility vessel. The survey may take up to 7 days, including time for contingencies. The ROV inspection of the wellhead itself is expected to take approximately 4 hours.

To assist in locating the wellhead, the ROV will use various geophysical and hydrographic survey techniques such as Multibeam echo-sounder (MBES), Side-scan Sonar (SSS), Ultra-short Baseline System (USBL) and General Video Inspection (GVI).

At this time, the small utility vessel that will be used to undertake inspection survey activity has not been identified, however would typically be less than 30 m in length and support a crew of approximately 15 persons.

Vessels will be fuelled by marine diesel fuel, and there is no planned vessel refuelling to take place in the operational area. All vessel fuelling is proposed to take place within the nearest suitable harbour.



Activity location

ACTIVITY ASSESSMENT AND POTENTIAL IMPACTS

Western Gas has undertaken a comprehensive assessment of the four abandoned wellheads considering water depth, potential interaction with other marine users, and impacts and risks associated with the removal of the wellheads.

This assessment determined that leaving the wellheads *in situ* presented an equal or better environmental outcome compared to the regulatory base case of removing the wellheads.

Western Gas also considered potential impacts from the conduct of the vessel-based inspection survey for the suspended Glenloth-1 well.

Both assessments considered impacts to physical, ecological, social, economic, and cultural values and sensitivities based on a wide range of impact criteria. The outcome of the assessments will be provided in detail in the Environment Plan. A summary of key impacts and management measures is outlined in **Table 1** and **Table 2**.

Impacts from the vessel transiting to and from the operational area have not been included in the assessment scope of the Environment Plan.

WESTERN GAS

Table 1. Summary of key impacts

ACTIVITY	POTENTIAL RISKS AND/OR IMPACTS	ASSESSMENT	MITIGATION AND/OR MANAGEMENT MEASURES
PRESENCE OF THE WELLHEADS	**PHYSICAL**		
	Physical presence of the wellheads may cause interference.	Minor potential impact given water depth and distance from shore.	Consultation with maritime safety agencies. Wellhead locations marked on marine charts.
	Physical presence of the wellheads may cause snagging risks to trawl fisheries.	Minor potential impact as water depth is below that typically fished by trawl fishers.	Consultation with licence holders in the Western Deepwater Trawl Fishery, their representative organisation and relevant Commonwealth government agencies.
	ECOLOGICAL		
	Ecological values that may be impacted include: ■ Plankton ■ Fish ■ Marine mammals ■ State Protected Marine Values	There are little to no impacts associated to leaving the wellheads in-situ as there are no activities associated with this process.	No activity is associated with the process of leaving wellheads *in situ*.
	SOCIAL, ECONOMIC AND CULTURAL		
	Impacts to the functions, activities and interests of stakeholders relevant to: ■ Commercial fishing activities ■ Defence activities ■ Indigenous values ■ Petroleum activities ■ Shipping activities	There are little to no impacts associated to leaving the wellheads in-situ as there are no activities associated with this process.	Consultation with the following organisations to inform decision making for the proposed activity and development of the Environment Plan: ■ Commercial fishing licence holders and their representative organisations ■ Government Agencies ■ Indigenous representative bodies ■ Petroleum titleholders ■ Port authorities

WESTERN GAS

Table 2: Summary of key impacts

ACTIVITY	POTENTIAL RISKS AND/OR IMPACTS	ASSESSMENT	MITIGATION AND/OR MANAGEMENT MEASURES
VESSEL-BASED SURVEYS	**PHYSICAL**		
	Physical presence of the vessel may cause interference or displacement.	The potential impacts are predicted to be minor due to distance from shore.	Wellhead locations marked on marine charts.
	ECOLOGICAL		
	Ecological values that may be impacted include: ■ Plankton ■ Fish ■ Marine mammals ■ State Protected Marine Values	The potential impacts are predicted to be minor due to the short duration of activities, water depth and distance from shore.	Vessel activities will be managed according to relevant legislation and guidelines.
	SOCIAL, ECONOMIC AND CULTURAL		
	Impacts to the functions, activities and interests of stakeholders relevant to: ■ Commercial fishing activities ■ Defence activities ■ Indigenous values ■ Petroleum activities ■ Shipping activities	Minor potential impact given: ■ Water depth ■ Distance from shore Short duration of activities compared to regional marine traffic.	Consultation with the following organisations to inform decision making for the proposed activity and development of the Environment Plan: ■ Commercial fishing licence holders and their representative organisations ■ Government Agencies ■ Indigenous representative bodies ■ Petroleum titleholders ■ Port authorities Notifications prior to the start and upon completion of the vessel inspection survey will be provided to the Australian Hydrographic Office to generate a Notice to Mariners. Notifications prior to the start and upon completion of the vessel inspection survey will be provided to other marine users if requested.

WESTERN GAS

STAKEHOLDER CONSULTATION

Planned activities

Western Gas is consulting relevant stakeholders to inform planning for the development of the Environment Plan for proposed activities. Relevant stakeholders have been determined using the following methodology:

- Identifying physical, environmental, social, economic, and cultural values and sensitivities that may be affected by planned activities.
- Identifying government agencies with management roles for the identified values and sensitivities.
- Identifying government agencies with management roles for the development of plans to support emergency situations, such as marine pollution.
- Identifying other stakeholders whose functions, activities or interests are relevant to the identified values and sensitivities.

Western Gas complements this regulatory consultation approach by way of regular engagement of stakeholders who have identified an interest in the development of our Equus gas fields and adjacent exploration interests.

Unplanned activities

Western Gas is also consulting relevant stakeholders to inform planning for the development of the Environment Plan for unplanned activities, specifically marine pollution.

Relevant stakeholders, in addition to those government agencies already identified as having a role in response activities, have been determined using the following methodology:

- Identifying physical, environmental, social, economic, and cultural values and sensitivities that may be affected by marine pollution based on modelling predictions from a worst-case marine pollution event.
- Identifying stakeholders whose functions, activities or interests maybe impacted based on potential impacts to the identified values and sensitivities.
- Where possible, consult organisations that represent the interests of potentially impacted stakeholders, acknowledging that not all stakeholders within the extent of the modelled impacted area will be affected in the event of an actual spill.
- Confirm with these organisations notifications and communications expectations in the event of a spill to ensure efficient and timely emergency response effort.
- Include these stakeholder expectations in the Oil Pollution Emergency Plan that will be developed for this Environment Plan, which will provide a detailed assessment of marine pollution risk, and response preparedness and planning.

For this activity, the credible worst-case marine pollution event would be a marine diesel oil spill due to a vessel collision. The typical support vessel required for this activity would have a maximum fuel tank size of less than 250m^3. However, as a conservative measure, the marine diesel oil spill modelling assesses a 1000m^3 marine diesel oil release.

This hydrocarbon volume and type were then modelled using a number of hypothetical spills under different environmental conditions to determine the widest extent of possible oil dispersion.

PROVIDING FEEDBACK

Please contact us before **close of business on 5 December 2022** with your comments on proposed activities outlined in this information sheet.

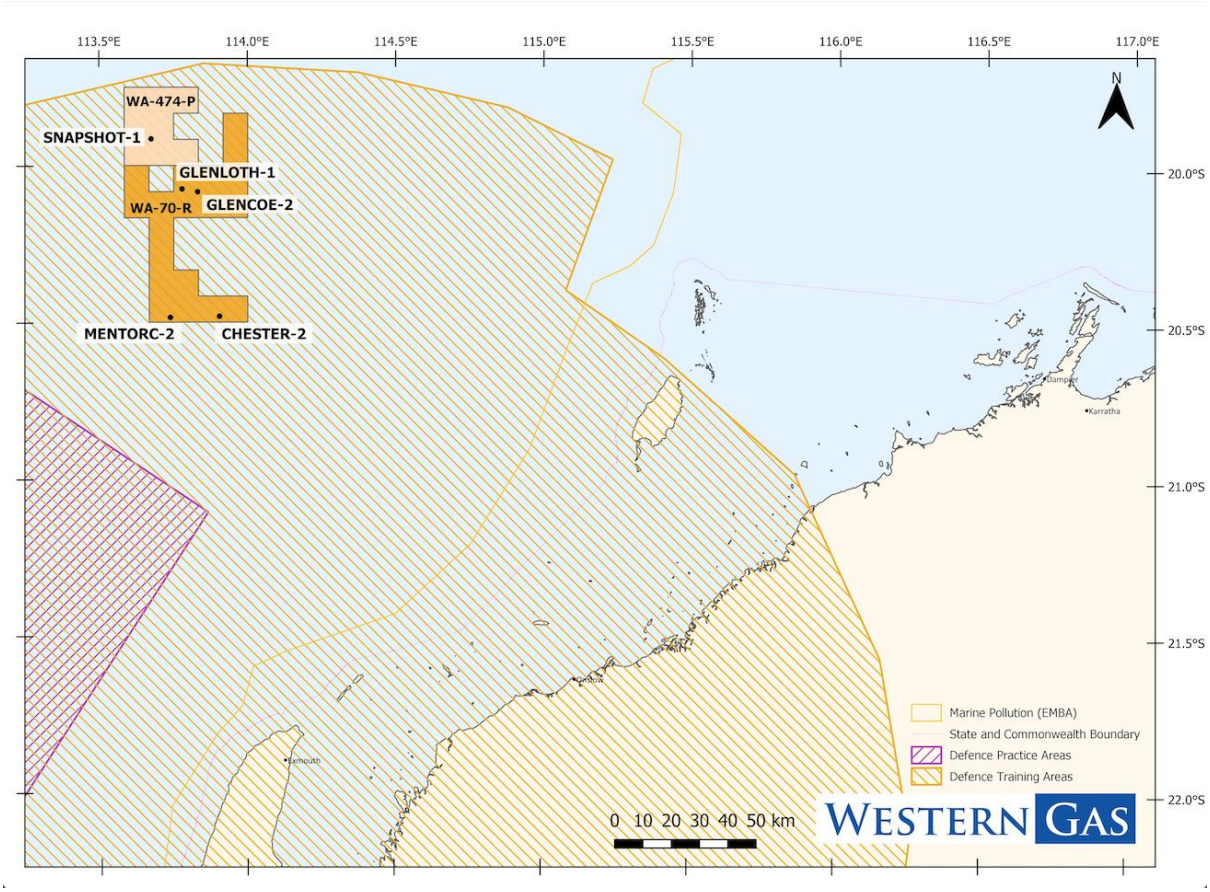
Your feedback will be included in the Environment Plan for the proposed activities, which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth).

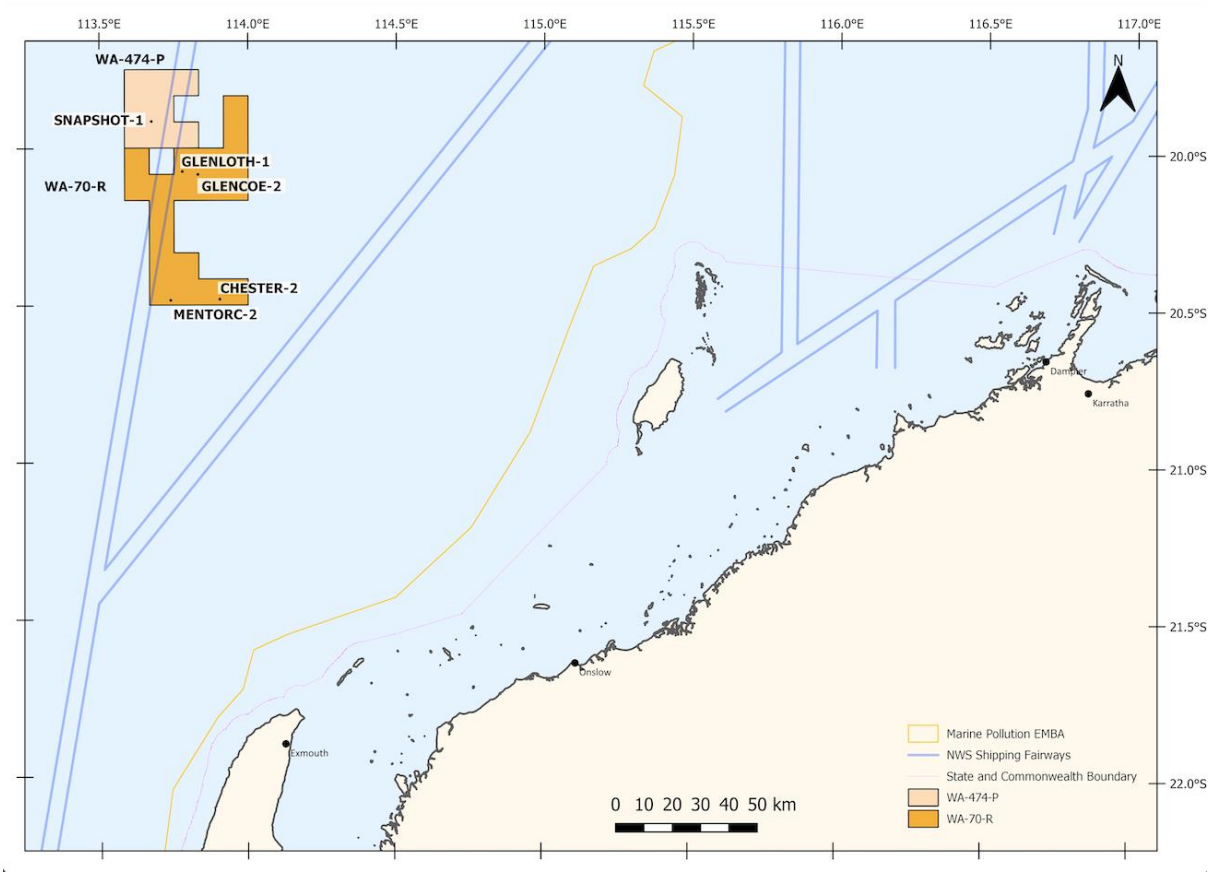
Please let us know if wish your personal/organisation details or any part of your feedback to remain confidential as a summary of your feedback and our response in the Environment Plan for this activity will be published on NOPSEMA's web site.

Please contact Western Gas at:
feedback@westerngas.com.au

WESTERN GAS **Accelerating development of Western Australia's gas resources**

Examples of maps provided to relevant persons – Defence and Shipping





Examples of Public Notice – The West Australian newspaper (7 November 2022)

PUBLIC NOTICE

WA-70-R and WA-474-P Activities

Western Gas is a Western Australian company with natural gas interests in the North West Shelf. We hold acreage including petroleum titles WA-70-R and WA-474-P, which contain four abandoned wells and one suspended well.

The wells are approximately 180 km northwest of Onslow and 150 km north of Exmouth, Western Australia. Western Gas plans to leave the four abandoned wellheads *in situ*, as well as conduct annual vessel-based wellhead surveys for the suspended well. The survey will involve a few days of vessel operations each year at the suspended well location.

As with all Petroleum Activities in Commonwealth Waters, impacts and potential risks associated with these activities will be assessed and managed through regulatory processes under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* and Regulations, with an Environment Plan submitted to the National Offshore Petroleum Safety and Management Authority (NOPSEMA) for assessment.

Western Gas welcomes feedback from stakeholders whose functions, activities or interests may be impacted by these activities.

Please visit our web site at westerngas.com.au/consultation or contact us at feedback@westerngas.com.au for more information about proposed activities.

WESTERN GAS