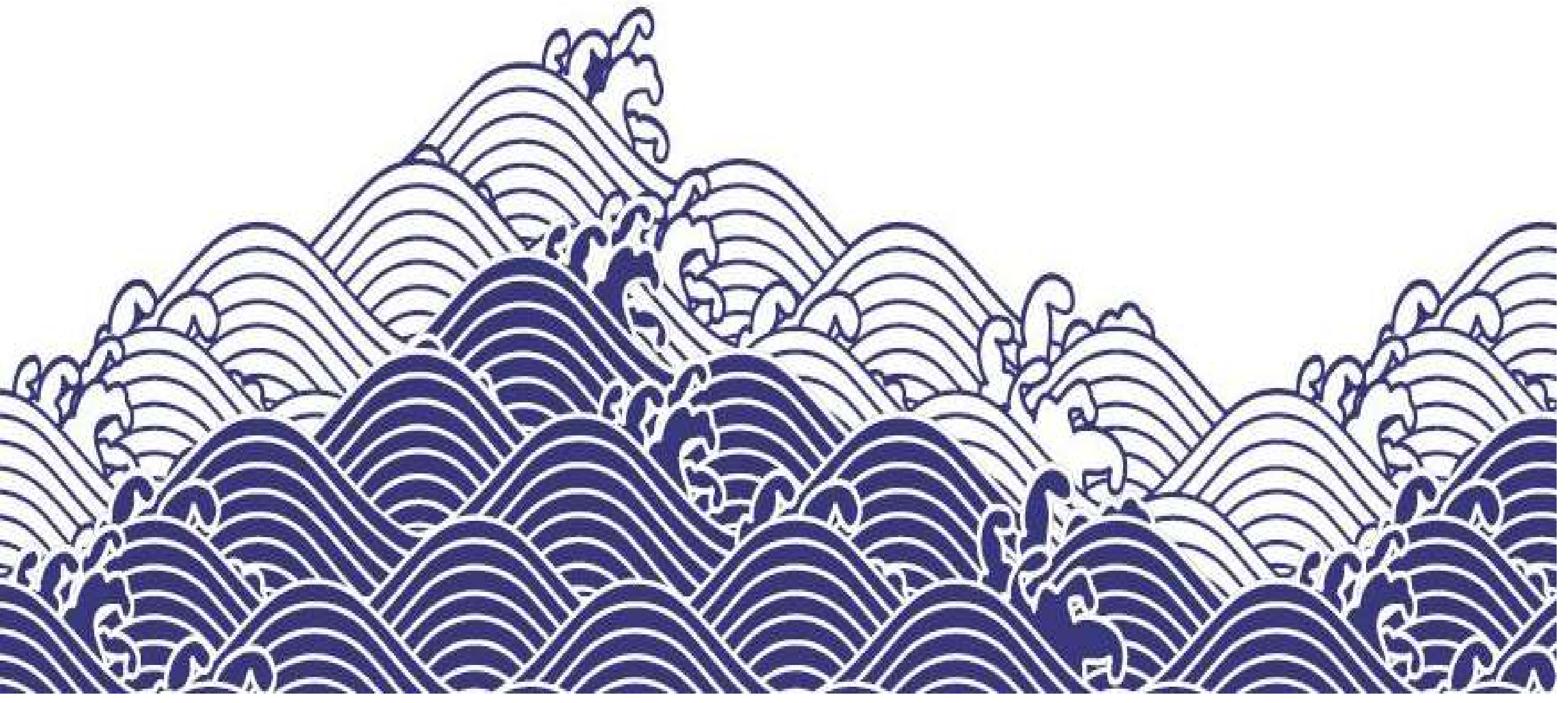
Bonaparte Basin Exploration Drilling Environment Plan



Acknowledgement

INPEX is committed to recognising and respecting Aboriginal and Torres Strait Islander peoples whose cultures have existed in Australia for tens of thousands of years.

We wish to pay respects to their Elders – past and present – and acknowledge the important role Aboriginal and Torres Strait Islander peoples continue to play in the development of our business in Australia.

Environment plan summary

This environment plan summary has been prepared from material provided in this environment plan (EP). The summary consists of the following as required by Regulation 11(4) of the OPGGS (E) Regulations 2009:

EP summary and material requirement	Relevant section of EP containing EP summary material
The location of the activity	Section 3.1
A description of the receiving environment	Section 4
A description of the activity	Section 3
Details of the environmental impacts and risks	Sections 7 and 8
The control measures for the activity	Sections 7 and 8
The arrangements for ongoing monitoring of the titleholder’s environmental performance	Sections 9.11, 9.12 and 9.13
Response arrangements in the oil pollution emergency plan	Section 8.3, 8.4 and INPEX *Browse Regional OPEP*
Consultation already undertaken and plans for ongoing consultation	Sections 5 and 9.8.3
Details of the titleholders nominated liaison person for the activity	Section 1.4

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Terms, abbreviations, and acronyms

Term, abbreviation, or acronym	Meaning
°C	degrees Celsius
%	percent
ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
AFMA	Australian Fisheries Management Authority (Cwlth)
AFZ	Australian fishing zone
AHD	Australian height datum
AHO	Australian Hydrographic Office
AHSV(s)	anchor-handling supply vessel(s)
AIMS	Australian Institute of Marine Science
AIS	automatic identification system
ALARP	as low as reasonably practicable
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian marine park
AMSA	Australian Maritime Safety Authority (Cwlth)
APPEA	Australian Petroleum Production and Exploration Association
AR-AFFF	alcohol resistant aqueous film-forming foam
BIA	biologically important area
BCF	bioconcentration factor
BMS	business management system
BOCP	blowout contingency plan
BOM	Bureau of Meteorology
Bonn Agreement	Bonn Agreement for Cooperation in Dealing with Pollution of the North Sea by Oil and other harmful substances
BOP	blowout preventer
BROPEP	INPEX's Browse Regional Oil Pollution Emergency Plan
BROPEP BOD/FCA	Browse Regional Oil Pollution Emergency Plan - Basis of Design and Field Capability Assessment

Term, abbreviation, or acronym	Meaning
BROPEP IMTCA	Browse Regional Oil Pollution Emergency Plan – Incident Management Team Capability Assessment
BTEX	Benzene, Toluene, Ethylene, Xylene
BWM	ballast water management
BWM Convention	International Convention for the Control and Management of Ships' Ballast Water and Sediments
CCS	carbon capture and storage
Cd	cadmium
CFC	chlorofluorocarbon
CHARM	chemical hazard assessment and risk management
CO_2	carbon dioxide
COLREGs	International Regulations for Preventing Collisions at Sea 1972
CRWG	Community Relations Working Group
CTS	craft tracking system
CW	cooling water
Cwlth	Commonwealth
dB	decibel
DBCA	Department of Biodiversity, Conservation and Attractions (WA)
DCCEEW	Department of Climate Change, Energy, Environment and Water (Cwlth) formerly the Department of Agriculture Water and the Environment (Cwlth)
DIPL	Department of Infrastructure, Planning and Logistics (NT)
DITT	Department of Industry, Tourism and Trade (NT)
DMIRS	Department of Mines, Industry Regulation and Safety (WA)
DNP	Director of National Parks (Cwlth)
DO	dissolved oxygen
DP	dynamically positioned
DPIRD	Department of Primary Industries and Regional Development (WA)
EAA	East Asian-Australasian

Term, abbreviation, or acronym	**Meaning**
EEZ	exclusive economic zone
EHS	environment, health, and safety
EIAPP	Engine International Air Pollution Prevention
EMBA	environment that may be affected
EP	environment plan
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
EPBC Regulations	Environment Protection and Biodiversity Conservation Regulations 2000
EPO	environmental performance outcome
EPS	environmental performance standard
EMS	Environmental management system
ESD	ecological sustainable development
FFFP	film forming fluoroprotein foam
g/m^2	grams per square metre
GHG	greenhouse gas
GT	gross tonnage
HCFC	hydrochlorofluorocarbon
HQ	hazard quotient
HSE	health, safety and environment
Hz	hertz
IAPP	International Air Pollution Prevention
IBA	important bird area
IEE	International energy efficiency
IFC	International Finance Corporation
IMO	International Maritime Organization
IMS	invasive marine species
IMT	incident management team
INPEX	INPEX Browse E & P Pty Ltd

Term, abbreviation, or acronym	Meaning
IOGP	International Association of Oil and Gas Producers
IOPP	International Oil Pollution Prevention
ISPPC	International Sewage Pollution Prevention Certificate
ISO	International Standards Organisation
IUCN	International Union for Conservation of Nature
JRCC	joint rescue coordination centre
KEF	key ecological feature
kHz	kilohertz
km	kilometre
km^2	square kilometre
km/h	Kilometre per hour
L	litre
LC_{50}	Lethal concentration 50. Lethal concentration in which 50% of the population will be killed in a given period of time
LWD	logging while drilling
m	metre
m^2	square metres
m^3	cubic metres
m^3/d	cubic metres per day
m/m	mass for mass
m/s	metres per second
MARPOL	International Convention for the Prevention of Pollution from Ships, 1973/1978
MBES	multi-beam echo sounder
mg/L	milligrams per litre
mg/m3	milligrams per cubic metre
MGO	marine gas oil
mm	millimetre

Term, abbreviation, or acronym	Meaning
MNES	Matters of National Environmental Significance
MoC	management of change
MODU	mobile offshore drilling unit
MP	marine park
MSI	maritime safety information
NatPlan	National Plan for Marine Environmental Emergencies
NAXA	North Australian Exercise Area
nm	nautical miles
NMR	north marine region
NO_2	nitrogen dioxide
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Administrator
NOTAM	Notice to Airmen
NPF	Northern Prawn Fishery
NRSMPA	National Representative System of Marine Protected Areas
NT	Northern Territory
NTG	Northern Territory government
NWCS	North-west cable system
NWMR	north-west marine region
NWS	north-west shelf
OCNS	Offshore Chemical Notification Scheme
ODS(s)	Ozone-depleting substance(s)
OEM	original equipment manufacturer
OIM	offshore installation manager
OIW	oil in water
OPEP	oil pollution emergency plan
OPGGS Act	*Offshore Petroleum and Greenhouse Gas Storage Act 2006* (Cwlth)

Term, abbreviation, or acronym	**Meaning**
OPGGS (E) Regulations	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cwlth)
OSPAR	The 1992 OSPAR Convention ("Convention for the protection of the marine environment of the north-east Atlantic")
OWD	oil-in-water dispersions
OWS	oil-water separator
PAH(s)	polycyclic aromatic hydrocarbon(s)
PDCA	plan, do check, act
PEZ	potential exposure zone (the area exposed to hydrocarbons in the event of a worst-case credible oil spill, established using low exposure thresholds)
PLONOR	pose little or no risk (to the environment)
POB	personnel on board
POTS Act	*Protection of the Sea (Prevention of Pollution from Ships) Act 1983*
ppb	parts per billion
ppm	parts per million
ppm(v)	parts per million by volume
ppt	parts per thousand
PSV	platform supply vessel
PTS	permanent threshold shift
PTW	permit to work
QA/QC	quality assurance and quality control
QLD	Queensland
Ramsar Convention	The Convention on Wetlands of International Importance, especially as Waterfowl Habitat (the Ramsar Convention)
RO	reverse osmosis
ROV	remotely operated (underwater) vehicle
SCE	solids control equipment
SCERP	Source Control Emergency Response Plan
SCR	Safety case revision

Term, abbreviation, or acronym	Meaning
Sea Dumping Act	*Environment Protection (Sea Dumping) Act 1981* (Cwlth)
SEEMP	Ship Energy Efficiency Management Plan
SIMA	spill impact mitigation assessment
SMPEP	a shipboard marine pollution emergency plan
SO_2	sulphur dioxide
SOLAS	International Convention for the Safety of Life at Sea
SOPEP	shipboard oil pollution emergency plan
SPL	sound pressure level
SPRAT	species profile and threats
STP	sewage treatment plant
T	tonne
TD	total depth
TPH	total petroleum hydrocarbons
TSS	total suspended solids
TTS	temporary threshold shift
TVDLAT	total vertical depth lowest astronomical tide
UXO	unexploded ordinance
VMS	vessel monitoring system
VSP	vertical seismic profile
WA	Western Australia
WA DoT	Department of Transport (WA)
WA EPA	Environment Protection Authority (WA)
WBM	water-based mud
WCSS	worst-case spill scenarios
WCWBS	Worst credible well blowout scenario
WL	wireline
WOMP	well operations management plan

Term, abbreviation, or acronym	Meaning
WSF	water-soluble fraction
wt/wt	weight per weight
µs	microseconds
µPa	micropascal
µg/l	micrograms per litre

1 INTRODUCTION

1.1 Scope

In December 2021, the Australian Government released five greenhouse gas (GHG) storage acreage release areas offshore of Western Australia (WA) and the Northern Territory (NT), for the purpose of GHG storage exploration and assessment. INPEX Browse E&P Pty Ltd (INPEX) on behalf of the Bonaparte Carbon Capture and Storage Assessment Joint Operating Agreement participants was successfully awarded a GHG assessment permit over one of these areas, G-7-AP (Figure 1-1), located offshore in the Bonaparte Basin off northern Australia.

INPEX is proposing to drill two exploration wells in G-7-AP during an initial exploration drilling campaign between 2023 and 2024. There is a possibility that up to three additional wells with associated pre-drill site surveys may also be undertaken during the life of this Environment Plan (EP).

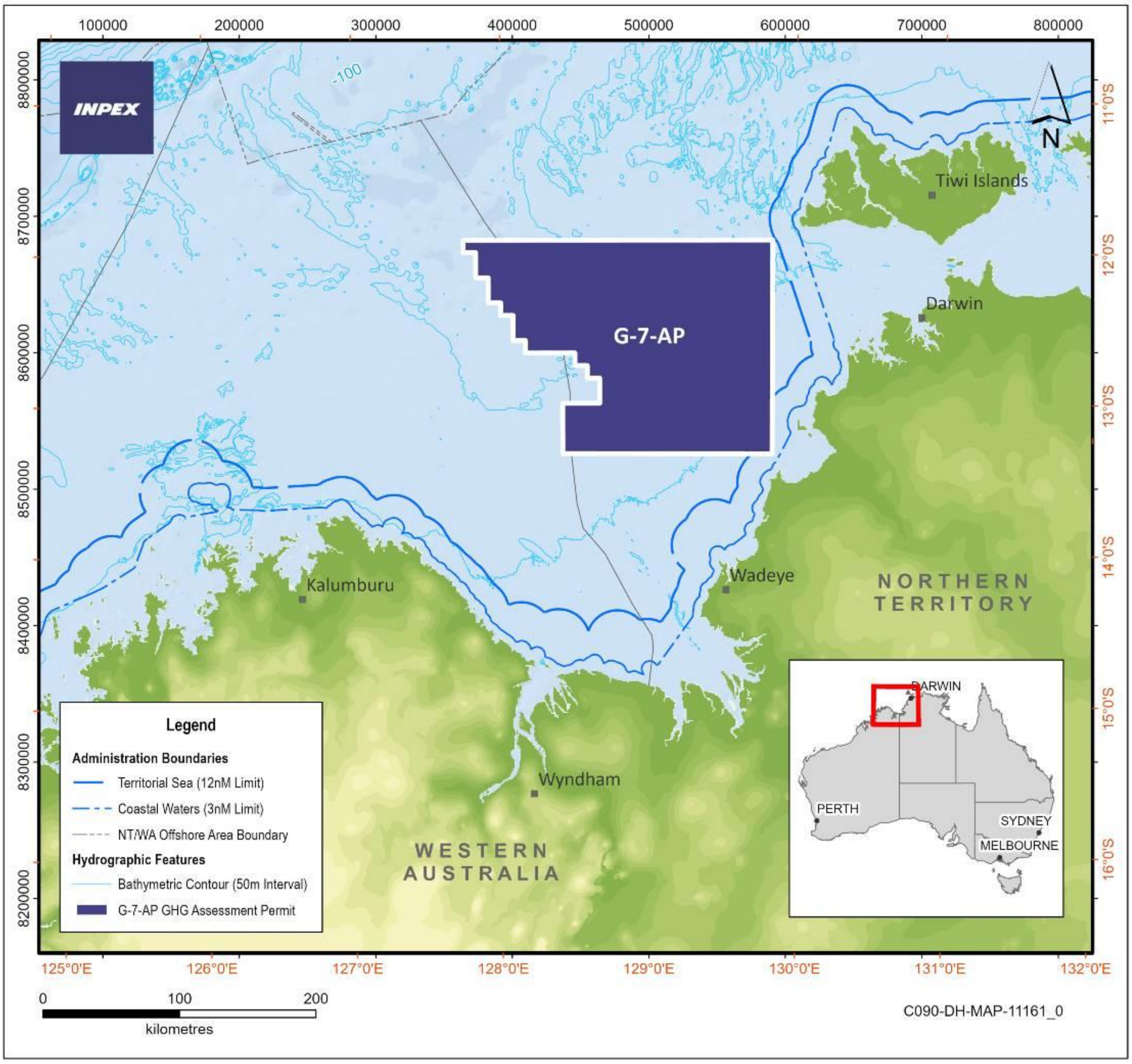


Figure 1-1: Location of greenhouse gas assessment permit G-7-AP

The G-7-AP permit area is wholly located within Commonwealth waters approximately 100 km from the NT coastline. The proposed GHG activity covered by this EP will consist of pre-drill site surveys, and the drilling and evaluation of two initial exploration wells and up to three possible additional wells and associated pre-drill site surveys in an area of G-7-AP.

As a precursor to exploration drilling activities, a pre-drill site survey will be undertaken. Drilling will be conducted using either a jack-up or semi-submersible mobile offshore drilling unit (MODU). It is anticipated that a minimum of two support vessels will be needed to provide support for the drilling activity. Personnel transfers to and from the MODU will be by helicopter several times per week.

The pre-drill site survey associated with the initial exploration drilling campaign is provisionally expected to be conducted in the first half of 2023 with the drilling activities scheduled to commence thereafter. However, for contingency purposes subject to MODU availability, operational efficiencies, weather, and analysis of geophysical and geotechnical data collected during the pre-drill site survey, this EP allows for the initial exploration activities to occur anytime between calendar years 2023 and 2024. Any possible additional wells and associated pre-drill site surveys (up to a maximum of three) will be undertaken within 5 years of acceptance of this EP, and so this EP will remain in force for a period of 5 years.

The scope of this EP does not include the movement of vessels, helicopters or MODUs outside of the permit area (e.g. travel to and from G-7-AP). These activities will be undertaken in accordance with other relevant maritime and aviation legislation; most notably, the *Navigation Act 2012* (Cwlth) and *Civil Aviation Act 1988* (Cwlth).

The activity described in this EP does not involve the injection of carbon dioxide (CO_2); the aim is to assess the suitability of potential reservoirs for future CO_2 storage.

1.2 Objectives

The objectives of this EP are to:

- demonstrate that the environmental impacts and risks associated with the greenhouse gas activity have been reduced to 'as low as reasonably practicable' (ALARP) and are of an acceptable level.
- establish appropriate environmental performance outcomes, environmental performance standards and measurement criteria in relation to the activity.
- define an appropriate implementation strategy and monitoring, recording and reporting arrangements, whereby compliance with this EP, the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cwlth) (OPGGS (E) Regulations), and other relevant legislative requirements, can be demonstrated.
- demonstrate that INPEX has carried out the consultations required by the OPGGS (E) Regulations.
- demonstrate that the measures adopted by INPEX, arising from the consultation process, are appropriate.
- demonstrate that the greenhouse gas activity complies with the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGS Act) and the OPGGS (E) Regulations.

1.3 Overview of activity description

Table 1-1 provides an overview of the exploration activities to be undertaken under this EP.

Table 1-1: Overview of the activity description

Item	Description
Basin	Petrel Sub-basin (adjacent to Petrel Field)
Reservoirs	Primary storage target: Elang/Plover Formation Secondary target: Sandpiper Formation Tertiary target: Cape Londonderry Formation.
Activity location	Wholly located within Commonwealth waters adjacent to the Joseph Bonaparte Gulf approximately 100 km west of Darwin Harbour, in the North Marine Region (NMR) of the Timor Sea. The exact locations of the proposed wells are yet to be finalised; however, they will fall within the boundaries of G-7-AP permit area.
Well type	Exploration
Hydrocarbon type	None
Water depth	Approximately 75 m to 100 m below Australian Height Datum (AHD; mean sea level).
MODU and vessels	Survey vessel, MODU (jack-up or moored semi-submersible) and other support vessels.
Activities	Pre-drill site survey and drilling & evaluation of two initial exploration wells and up to three additional wells and associated pre-drill site surveys in G-7-AP permit area.
Earliest activity commencement	Pre-drill site survey: 2023 Drilling activities: 2023.
Duration	Continual operations, 24 hours a day Pre-drill site survey: approximately 30 days Drilling activities: initial exploration campaign up to approximately 150 days.

1.4 Titleholder details

INPEX Browse E&P Pty Ltd is a joint titleholder of GHG assessment permit G-7-AP but has been nominated as the single titleholder for the purposes of taking eligible voluntary actions under subsection 775B of the OPGGS Act, such as making submissions.

In accordance with Regulation 15(1) of the OPGGS (E) Regulations, details of the titleholder are described in Table 1-2. INPEX will be responsible for ensuring that activities covered in this EP are carried out in accordance with the OPGGS (E) Regulations, this EP and other applicable Australian legislation.

In accordance with Regulation 15(2) of the OPGGS (E) Regulations, details of the titleholder's nominated liaison person are provided in Table 1-3.

Table 1-2: Titleholder details

Name	INPEX Browse E&P Pty Ltd (INPEX)
Business address	Level 22, 100 St Georges Tce, Perth, WA 6000
Telephone number	+61 8 6213 6000
Fax number	+61 8 6213 6455
Email address	enquiries@inpex.com.au
ABN	61 165 711 017

Table 1-3: Titleholder nominated liaison person

Name	Jake Prout
Position	Environment Operations Team Lead
Business address	Level 22, 100 St Georges Tce, Perth, WA 6000
Telephone number	+61 8 6213 6000
Email address	jake.prout@inpex.com.au

1.4.1 Notification arrangements

In the event that the titleholder, nominated liaison person or contact details for the nominated liaison person change, INPEX will notify the regulator in accordance with Regulation 15(3) of the OPGGS (E) Regulations.

2 ENVIRONMENTAL MANAGEMENT FRAMEWORK

2.1 Corporate framework

INPEX's Business Management System (BMS) is a comprehensive, integrated system that includes standards and procedures necessary for the management of health, safety and environment (HSE) risks.

The INPEX Environmental Policy sets the direction and minimum expectations for environmental performance and is implemented through the standards and procedures of the BMS. The BMS and Environment Policy are further described in Section 9 in accordance with Regulation 16(a) of the OPGGS (E) Regulations.

2.2 Legislative framework

In accordance with Regulation 13(4) of the OPGGS (E) Regulations, the legislative framework relevant to the activity is listed in Table 2-1. A summary of applicable industry standards and guidelines is also presented in Table 2-2. Ongoing management of legislative and other requirements is described further in in Section 9.8.1.

Table 2-1: Summary of applicable legislation

Legislation	Description	Requirements	Demonstration of how requirements are met in EP
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act; Cwlth) and Environment Protection and Biodiversity Conservation Regulations 2000 (EPBC Regulations)	Provides for the protection and management of nationally and internationally important flora, fauna, ecological communities, and heritage places.	The OPGGS (E) Regulations were revised in February 2014 to include the requirement that matters protected under Part 3 of the EPBC Act are considered and any impacts are at acceptable levels. Part 8 of the EPBC Regulations outlines requirements for vessel when interacting with cetaceans. EPBC Act Policy Statement 2.1 provides a framework for minimising the risk of injury to whales by outlining requirements for vertical seismic profiling. The EPBC Act provides for protection of 'matters of national environmental significance' including not only listed species but also heritage properties and Ramsar wetlands. There are exemptions covering provisions of Part 3 and 13 of the EPBC Act, for the undertaking of activities when responding to maritime environmental emergencies, in accordance with the National Plan for Marine Environmental Emergencies (NatPlan). Australian Marine Parks (AMPs) are proclaimed under the EPBC Act and associated management plans are enacted under this legislation.	Section 4.3 – Australian marine parks Section 7.6.1 – Physical presence of vessels and Section 7.4.2 - Interaction with marine fauna Section 7.3 – Noise and vibration Section 8 – Emergency conditions INPEX *Browse Regional Oil Pollution Emergency Plan (OPEP)* A demonstration of how this EP addresses the relevant conservation management documents related to EPBC Act listed species has been presented in Appendix A.
OPGGS Act and OPGGS (E) Regulations (Cwlth)	The OPGGS Act provides the regulatory framework for petroleum exploration, production and greenhouse gas activities in Commonwealth waters.	The OPGGS Act (Section 617) details the requirement for GHG safety zones. The GHG safety zone will be in place for the purposes of protecting a GHG well, structure or any equipment, in an offshore area, by notice published in the Gazette, administered by NOPSEMA.	Section 3.4.1 – Well abandonment Section 7.6.1 – Physical presence – disruption to other marine users Section 8.2 - Vessel collision Implementation of the BMS.

Legislation	Description	Requirements	Demonstration of how requirements are met in EP
	The OPGGS (E) Regulations under the OPGGS Act require a titleholder to have an accepted environment plan in place for an activity.	Section 572(2) and (3) of the OPGGS Act requires titleholders to maintain all structures, equipment and property in a title area in good condition and repair, and to remove all structures, equipment and property when it is neither used nor to be used in connection with operations authorised by the title. The OPGGS (E) Regulations require that the activity is undertaken in an ecologically sustainable manner, and in accordance with an accepted EP.	
Navigation Act 2012 (Cwlth)	The primary legislation that regulates ship and seafarer safety, shipboard aspects of protection of the marine environment, and employment conditions for Australian seafarers.	The *Navigation Act 2012* includes specific requirements for safe navigation, including systems, equipment and practices consistent with the International Convention for the Safety of Life at Sea (SOLAS) and the International Regulations for Preventing Collisions at Sea (COLREGS), as implemented as maritime law in Australia through a series of Marine Orders, including Marine Order 21 – Safety of navigation and emergency procedures and Marine Order 30 – Prevention of collisions. The *Navigation Act 2012*, in conjunction with the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* and through legislative Marine Orders, also requires vessels to have pollution prevention certificates (see below).	Section 7.6.1 – Physical presence – disruption to other marine users Section 8.2 - Vessel collision Implementation of the BMS.
Protection of the Sea (Prevention of Pollution from Ships) Act 1983 (POTS Act; Cwlth)	The POTS Act provides for the prevention of pollution from vessels, including pollution by oil, noxious liquid substances, packaged harmful substances, sewage, garbage, and air pollution.	The requirements of the POTS Act are implemented as maritime law in Australia through a series of Marine Orders and legislative instruments, made and administered by the Australian Maritime Safety Authority (AMSA). The requirements of each Marine Order made under the POTS Act and their relevance to the activity are outlined separately below.	Section 7 and Section 8 Implementation of the BMS.

Legislation	**Description**	**Requirements**	**Demonstration of how requirements are met in EP**
	In conjunction with Chapter 4 of the *Navigation Act 2012*, the POTS Act gives effect to relevant requirements of the International Convention for the Prevention of Pollution from Ships, 1973/1978 (MARPOL) in Australia.		
Marine Order 91 – Marine pollution prevention — oil	Marine Order 91 implements Part II of the POTS Act, Chapter 4 of the *Navigation Act 2012*, and Annex I of MARPOL (oil pollution). The Marine Order provides standards for the discharge of certain oily mixtures or oily residues and associated equipment and include duties to manage bunkering and transfers of oil between vessels; to maintain Oil Record Books and Shipboard Oil Pollution Emergency Plans (SOPEPs); and to report oil pollution.	The MODU and support vessels ≥400 gross tonnes (GT) are required to maintain: • International Oil Pollution Prevention (IOPP) certificates to demonstrate that the vessel and onboard equipment comply with the requirements of Annex I of MARPOL (as applicable to vessel size, type and class). • Oil Record Books to record activities, such as fuel/oil bunkering and discharges of oil, oily water, mixtures and residues. • SOPEPs outlining the procedures to be followed during an oil pollution incident. Discharges must also comply with Annex I of MARPOL, and oil pollution incidents must also be reported to the Australian Maritime Safety Authority (AMSA).	Section 7.1.3 – Routine discharges Section 7.7.1 – Accidental release Section 8 - Emergency Conditions INPEX *Browse Regional OPEP* Implementation of the BMS.

Legislation	Description	Requirements	Demonstration of how requirements are met in EP
Marine Order 93 – Marine pollution prevention – noxious liquid substances	Marine Order 93 - Marine pollution prevention – noxious liquid substances (made under the *Navigation Act 2012* and the POTS Act and Annex II of MARPOL) specifies the requirements for the prevention of contaminating liquids and chemicals entering the marine environment. It also sets out guidelines for developing a Shipboard Marine Pollution Emergency Plan (SMPEP).	Requirements of Marine Order 93 include: • International pollution prevention certificates • reporting requirements • emergency plans, record books and tank cleaning. INPEX and MODU/vessel contractor will comply with the Marine Order 93 as appropriate to vessel class, in relation to the discharge to sea of any noxious liquid substances. Marine vessels >150 GT will carry SMPEPs approved under MARPOL Annex II, Regulation 17 if the vessel is carrying noxious liquid substances in bulk. (noting that the vessels SOPEP and SMPEP may be combined into a single document).	Section 7.7.1 – Accidental release Implementation of the BMS.
Marine Order 94 – Marine pollution prevention — packaged harmful substances	Marine Order 94, – Marine pollution prevention — packaged harmful substances, and the POTS Act relating to packaged harmful substances as defined by Annex III of MARPOL.	Requirements of Marine Order 94 include: • management of harmful substances in packaged form • considerations prior to washing substances overboard • notifying and reporting incidents. INPEX and MODU/vessel contractor will comply with Marine Order 94 as appropriate to vessel class, through reporting the loss or discharge to sea of any harmful materials.	Section 7.2 – Waste management. Implementation of the BMS.
Marine Order 95 – Marine pollution prevention — garbage	Marine Order 95 – Marine pollution prevention — garbage implements Part IIIC of the POTS Act, Chapter 4 of the *Navigation Act 2012*, and Annex V of MARPOL (garbage).	MODU and support vessels ≥100 GT, or vessels certified to carry 15 persons or more, are required to maintain a Garbage Management Plan. MODU and support vessels ≥400 GT are required to maintain a Garbage Record Book. The requirements will apply to the MODU and vessels (as appropriate to their size, type and class) at all times.	Section 7.2 – Waste Management Implementation of the BMS.

Legislation	**Description**	**Requirements**	**Demonstration of how requirements are met in EP**
	The Marine Order provides for the discharge of certain types of garbage at sea, waste storage, waste incineration, and the comminution and discharge of food waste. It also sets out requirements for garbage management and recording.		
Marine Order 96 – Marine pollution prevention — sewage	Marine Order 96 – Marine pollution prevention — sewage implements Part IIIB of the POTS Act, Chapter 4 of the *Navigation Act 2012*, and Annex IV of MARPOL (sewage). The Marine Order includes requirements for the treatment, storage and discharge of sewage and associated sewage systems, and for an International Sewage Pollution Prevention Certificate (ISPPC) to be maintained on board.	MODU and support vessels ≥400 GT are required to maintain an ISPPC to demonstrate that vessels and their onboard sewage systems comply with the requirements of Annex IV of MARPOL. Discharges of sewage must also comply with Annex I of MARPOL, and oil pollution incidents must also be reported to AMSA.	Section 7.1.3 – Routine discharges Implementation of the BMS.
Marine Order 97 – Marine pollution prevention — air pollution	Marine Order 97 – Marine pollution prevention — air pollution implements Part IIID of the POTS Act, Chapter 4 of the *Navigation Act 2012*, and Annex VI of MARPOL (air pollution).	MODU and support vessels ≥400 GT are required to have International Air Pollution Prevention (IAPP) certificates and Engine International Air Pollution Prevention (EIAPP) certificates to demonstrate that the vessel and onboard marine diesel engines comply with the requirements of Annex VI of MARPOL.	Section 7.1.2 – Atmospheric emissions. Implementation of the BMS.

Legislation	Description	Requirements	Demonstration of how requirements are met in EP
	The Marine Order sets requirements for marine diesel engines and associated emissions, waste incineration on board vessels, engine fuel quality, and equipment and systems containing ozone depleting substances (ODS).	Low-sulphur fuel oil / marine diesel with 0.5% mass for mass (m/m) sulphur content is required to be used. In accordance with Annex VI of MARPOL, the requirements do not apply to the following: • emissions resulting from the incineration of substances that are solely and directly the result of the exploitation and offshore processing of seabed mineral resources (i.e. hydrocarbons), including but not limited to flaring during well completion and testing operations and flaring arising from upset conditions • emissions associated solely and directly with the treatment, handling, or storage of seabed minerals (i.e. hydrocarbons) • emissions from marine diesel engines that are solely dedicated to the exploration, exploitation and associated offshore processing of seabed mineral resources (i.e. hydrocarbons). MODU/vessels ≥400 GT are required to have an International Maritime Organization (IMO)-approved waste incinerator, as confirmed by the IAPP certificate. MODU/vessels ≥400 GT with rechargeable systems containing ODS to maintain an ODS Record Book. MODU/vessels ≥400 GT to have an International Energy Efficiency (IEE) certificate (as applicable to the vessel and engine size, type and class). MODU/vessels ≥400 GT to have a Ship Energy Efficiency Management Plan (SEEMP) (as applicable to the vessel and engine size, type and class).	

Legislation	**Description**	**Requirements**	**Demonstration of how requirements are met in EP**
Biosecurity Act 2015 (Cwlth)	The *Biosecurity Act 2015* and its supporting legislation are the primary legislative means for managing risk of pests and diseases entering into Australian territory and causing harm to animal, plant and human health, the environment and/or the economy.	Of specific relevance to this EP, the *Biosecurity Act 2015 (Cwlth)* requires that ballast is managed within Australian seas. The *Biosecurity Act 2015* (Cwlth) now defines Australian seas as: • for domestic and international vessels whose Flag State Administration is party to the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention; IMO 2009)– the waters (including the internal waters of Australia) that are within the outer limits of the exclusive economic zone (EEZ) of Australia (all waters within 200 nm); or • for all other international vessels – the Australian territorial seas (all waters within 12 nm). The Biosecurity Amendment (Biofouling Management) Regulations 2021 entered into force on 15 June 2022. Operators of all international vessels will be required to provide information on how biofouling has been managed prior to arrival in Australian territorial seas. Requirements may include a biofouling management plan; or cleaning within 30 days prior to arrival; or implementation of alternative biofouling management methods.	Section 7.4.1 - Invasive marine species Implementation of the BMS.
Biodiversity Conservation Act 2016 (WA) *Animal Welfare Act 2002* (WA) *Animal Welfare Act 1999* (NT)	Ensures the protection of biodiversity and humane treatment of native fauna. Ensures appropriate treatment and management of wildlife in the event of a potential hydrocarbon spill and response activities.	Consult with WA and NT bodies to obtain relevant permit(s) before a wildlife hazing and post-contact wildlife response.	Section 8 – Emergency conditions INPEX *Browse Regional OPEP*.

Legislation	**Description**	**Requirements**	**Demonstration of how requirements are met in EP**
Biodiversity Conservation Regulations 2018 (WA)			
Fisheries Act 1988 (NT) Fisheries Regulations 1992 (NT)	The *Fisheries Act* is administered by the NT Department of Industry, Tourism and Trade (DITT) and provides for the long-term sustainable management of aquatic resources including the protection of the environment and economy from the introduction and spread of aquatic pests.	INPEX will manage its operations in accordance with the *Fisheries Act 1988* and the associated Fisheries Regulations (1992) with respect to managing potential invasive marine species (IMS) risks.	Section 7.4.1 - Invasive marine species Implementation of the BMS.
Underwater Cultural Heritage Act 2018 (Cwlth)	This Act replaced the *Historic Shipwreck Act 1976* and provides protection for shipwrecks, sunken aircraft and other types of underwater heritage including human remains that have been in Australian waters for at least 75 years.	The Act prohibits certain activities within protected zones (prohibited conduct) including but not limited to: • Entry of persons or vessels • Allowing a vessel to become stationary • Underwater activities • Anchoring or mooring vessels • Release or deposit of objects or materials. Any access to protected zones would only occur during oil spill response activities and this is exempt as per Section 29(3)C 'dealing with an emergency involving a serious threat to the environment'.	N/A

Legislation	Description	Requirements	Demonstration of how requirements are met in EP
Environment Protection (Sea Dumping) Act 1981 (Cwlth)	The *Sea Dumping Act* regulates the loading and dumping of waste at sea and the placement of artificial reefs within Australian Waters.	The Act prohibits the ocean disposal of material considered too harmful to be released into the marine environment. It also regulates permitted ocean waste disposal to minimise its environmental impacts. The Act applies to all vessels, aircraft and platforms in Australian Waters, and to all Australian vessels and aircraft in any part of the sea. Sea dumping is any: • deliberate disposal into the sea of wastes or other matter from vessels, aircraft, platforms, or other man-made structures at sea • deliberate disposal into the sea of vessels, aircraft, platforms, or other man-made structures at sea • storage of wastes or other matter in the seabed and the subsoil thereof from vessels, aircraft, platforms, or other man-made structures at sea • abandonment or toppling at site of platforms or other man-made structures at sea, for the sole purpose of deliberate disposal. Sea dumping does not include: • disposal derived from the normal operations of vessels, aircraft, platforms, or other man-made structures at sea such as sewage and galley scraps. These discharges are regulated by AMSA marine orders. • placing matter for a purpose other than disposal, provided that such placement is not contrary to the aims of the London Protocol.	N/A

Legislation	Description	Requirements	Demonstration of how requirements are met in EP
National Greenhouse and Energy Reporting Act 2007 (Cwlth; NGER)	The Act provides a single, national framework for the reporting and distribution of information related to greenhouse gas (GHG) emissions, GHG projects, energy production and energy consumption.	The Clean Energy Regulator administers the NGER Act, its legislative instruments, and related policies and processes. Reporting requirements under the NGER Act are made via the Emissions and Energy Reporting System (EERS) on an annual basis. EERS allows all NGER reporters to submit emissions and energy reports under sections 19, 22G and 22X of the NGER Act. MODU and vessel contractors are responsible for NGER reporting* for the proposed activity described within this EP as they have operational control under the NGER Act. *subject to exceeding the reporting threshold of 25 kt or more of GHG (scope 1 and 2 emissions).	Section 7.1.2 - Atmospheric emissions.

Table 2-2: Summary of applicable conventions, agreements, industry standards and guidelines

Guideline	Description
Australian and New Zealand guidelines for fresh and marine water quality (ANZG 2018)	These guidelines provide a framework for water resource management and state specific water quality guidelines for environmental values, and the context within which they should be applied.
International Convention for the Prevention of Pollution from Ships, 1973/1978 (MARPOL)	This convention is designed to reduce pollution of the seas, including dumping, oil and exhaust pollution. MARPOL currently includes six technical annexes. Special areas with strict controls on operational discharges are included in most annexes.
International Convention on the Control of Harmful Anti-fouling Systems	This convention prohibits the use of harmful organotins in anti-fouling paints used on ships and establishes a mechanism to prevent the potential future use of other harmful substances in anti-fouling systems.
International Convention for the Safety of Life at Sea 1974 (SOLAS)	In the event of an offshore emergency event that endangers the life of personnel, SOLAS may take precedence over environmental management.
Bonn Agreement for Cooperation in Dealing with Pollution of the North Sea by Oil and other harmful substances (Bonn Agreement)	The Bonn Agreement is the mechanism by which the North Sea states, and the European Union (the Contracting Parties), work together to help each other in combating pollution in the North Sea area from maritime disasters and chronic pollution from ships and offshore installations; and to carry out surveillance as an aid to detecting and combating pollution at sea. The Bonn Agreement Oil Appearance Code may be used during spill response activities.
The Australian Petroleum Production and Exploration Association (APPEA) *Code of Environmental Practice* (APPEA 2008)	Recognising the need to avoid or minimise and manage impacts to the environment, this code of environmental practice includes four basic recommendations to APPEA members undertaking activities: 1. Assess the risks to, and impacts on, the environment as an integral part of the planning process. 2. Reduce the impact of operations on the environment, public health and safety to ALARP and to an acceptable level by using the best available technology and management practices. 3. Consult with stakeholders regarding industry activities. 4. Develop and maintain a corporate culture of environmental awareness and commitment that supports the necessary management practices and technology, and their continuous improvement.
Australian Ballast Water Management Requirements, Version 8 (DAWE 2020)	Australian Ballast Water Management (BWM) 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*.

Guideline	Description
National Biofouling Management Guidelines for the Petroleum Production and Exploration Industry (Marine Pest Sectoral Committee 2018)	A voluntary biofouling management guidance document developed under the National System for the Prevention and management of Marine Pest Incursions. Its purpose is to provide tools to operators to minimise the amount of biofouling accumulating on their vessels, infrastructure and submersible equipment and thereby to minimise the risk of spreading marine pests.
International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention) (IMO 2009)	All vessels are required to manage their ballast water and sediments in accordance with the BWM Convention and *Biosecurity Act 2015*. The convention came into force on 8 September 2017 and Australia's ballast water policy and legislation align with the convention.
Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (IMO 2012)	The guidelines provide a globally consistent approach to the management of biofouling. They aim to reduce the risk of translocation of marine pests from biofouling present on immersed areas of vessels. It was adopted by IMO marine environment committee in the form of Resolution MEPC.207 (62) in 2011.
National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (DEE 2020)	The Guidelines provide best-practice industry standard for managing potential impacts of light pollution on marine fauna.
Minamata Convention on Mercury	The Convention covers all aspects of the life cycle of mercury, controlling and reducing mercury across a range of products, processes and industries. This includes controls on mercury mining, manufacture and trade of mercury and products containing mercury, disposal of mercury waste and emissions of mercury from industrial facilities. Australia ratified the Minamata Convention on 7 December 2021. Countries that have ratified the Convention are bound by international law to put controls in place to manage emissions, releases and disposal of mercury and mercury compounds.
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (London Convention) and London Protocol	The London Protocol aims to protect and preserve the marine environment from all human activities and take all practical steps to prevent pollution of the sea by the dumping of wastes and other matter. Australia became a Party to the London Protocol in 2000 and fulfils its international obligations under the London Protocol through the Sea Dumping Act.
United Nations Framework Convention on Climate Change (1992)	The objective of the Convention is to stabilise GHG 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.
Paris Agreement on Climate Change (2015)	The Paris Agreement's central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 °C.

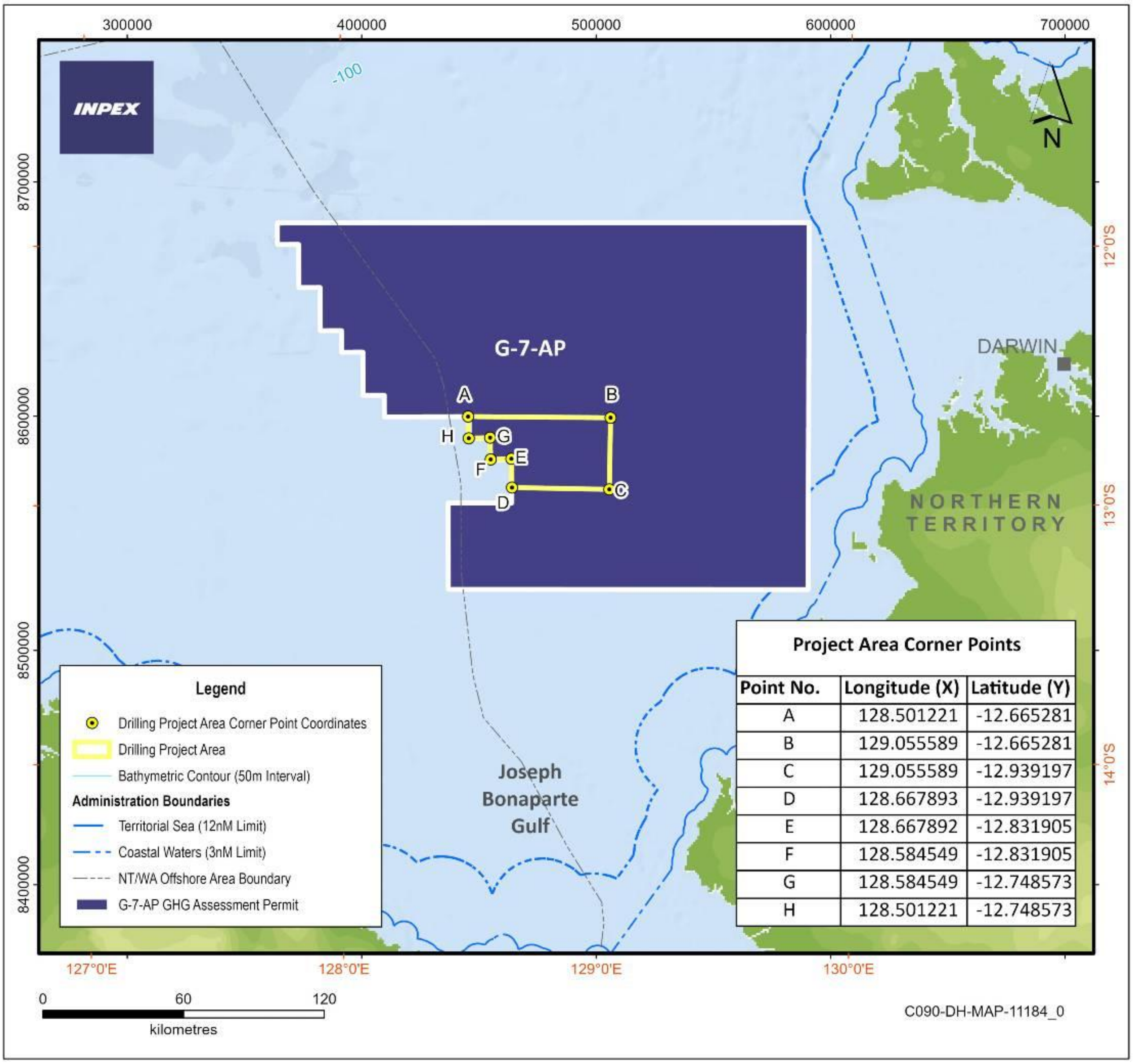
Guideline	Description
	The Paris Agreement provides the international framework and context around Australia's nationally determined contributions (NDC).
National disaster risk reduction Framework	In 2019, the Australian Government agreed to a National Disaster Risk Reduction Framework outlining foundational actions to be taken across all sectors to address existing disaster risk and minimise the creation of new risk. The framework recognises global climate change as an underlying driver of disaster risk.

3 ACTIVITY DESCRIPTION

3.1 Location and operational area

G-7-AP (herein referred to as the GHG assessment permit) is located in the Bonaparte Basin, to the north of the Joseph Bonaparte Gulf in Commonwealth waters offshore of the NT (Figure 1-1). It is situated approximately 100 km west of Darwin Harbour.

The exact location of the proposed wells is yet to be finalised; however, they will fall within the boundaries of the proposed project area, a small section of the broader GHG assessment permit (Figure 3-1) where water depths range from approximately 75 m to 100 m. For the purposes of this EP, the operational area is considered to be the 500 m safety zone that will surround the MODU while on location within the proposed project area.



Point No.	Longitude (X)	Latitude (Y)
A	128.501221	-12.665281
B	129.055589	-12.665281
C	129.055589	-12.939197
D	128.667893	-12.939197
E	128.667892	-12.831905
F	128.584549	-12.831905
G	128.584549	-12.748573
H	128.501221	-12.748573

Figure 3-1: Proposed project area within G-7-AP

3.2 Schedule

As a pre-cursor to drilling activities, a pre-drill site survey, lasting up to approximately 30 days, will be undertaken at the proposed well locations. The objective of the survey is to evaluate the environment at the planned drilling locations and confirm suitability for the MODU (jack-up or moored semi-submersible). The site survey for the initial exploration drilling campaign is planned to be undertaken in 2023; however, exact start dates are subject to vessel availability.

Drilling and evaluation activities for the initial exploration drilling campaign are expected to last for approximately 150 days for both wells and it is expected that the earliest commencement date will be in 2023. Noting that the exact timing for completion will be dependent upon INPEX obtaining all approvals, and MODU availability. However, for contingency purposes, this EP allows for the activities to occur within the calendar years 2023-2027 (5 years). Activities will be undertaken on a continual 24 hours per day basis.

Any additional wells and associated pre-drill site surveys (up to three within the life of this EP) will be undertaken after the initial exploration drilling campaign and would be located within the boundaries of the proposed project area (Figure 3-1).

3.3 Pre-drill site survey

The scope of the pre-drill site surveys is to obtain a range of geophysical and geotechnical data for the proposed well locations to enable the identification of any geohazards and allow completion of the required assessments for the MODU (jack-up or moored semi-submersible). The surveys may be performed across an area of up to approximately 50 km^2 centred on the proposed well locations.

The survey vessel contractor is yet to be confirmed; however, they will be selected in accordance with the INPEX contractor management requirements described in Section 9.9.

The geophysical elements of the surveys will be undertaken using a multi-purpose, survey vessel and are expected to last for approximately 10 days at each proposed well location. The geotechnical scopes may be undertaken by a separate survey vessel and are expected to take approximately 10 days to complete.

The survey vessels will use marine gas oil (MGO) fuel. Vessel speeds during geophysical survey data acquisition are expected to be low (typically <5 knots) and during the geotechnical scope the vessel will be stationary. Due to the relatively short duration of each survey (approximately 30 days in total), vessel refuelling, crew changes or anchoring are not anticipated to be required. The survey vessels are expected to be mobilised from Darwin.

3.3.1 Survey methodology

Multibeam echo sounder

Echo sounder surveys will enable the collection of bathymetry data and the correlation of depth information. This type of survey uses a sonar system to transmit short pulses of sound energy, analysing the return signal from the seafloor or other objects.

A multibeam echo sounder (MBES) transmits at frequencies between 200 kHz and 400 kHz with pulse lengths from 10 to 500 µs. Indicative sound output at the source is equipment dependent and may range from 163 to 190 dB re 1 µPa@1m.

Side-scan sonar

Use of side-scan sonar methods will enable INPEX to identify seabed obstructions or features. This type of survey is a hydro-acoustic technique, comprising a set of transducers mounted on either side of a towed vehicle. The transducers produce high frequency pulses (either 120 kHz or 410 kHz) which reflect seabed features. Indicative sound output at source may range from 137 to 200 dB re 1 μPa@1m.

Sub-bottom profiler

Acoustic sub-bottom profiling systems are based on ‘ping and chirp’ type equipment, used to determine the physical properties of the sea floor and to image and characterize the geological formations below the sea floor.

This equipment is low frequency (1—16 kHz) with an indicative sound output at source ranging from 142 to 200 dB re 1 μPa@1m.

Magnetometer

To check for the presence of any metal objects on the seabed a magnetometer will be attached to either a hull mounted or towed on a cable behind the vessel. The magnetometer measures the earth’s magnetic field and does not emit any sound pulses, therefore not presenting an environmental hazard or threat.

Seabed grab sampling

Samples of seabed sediments will be collected to validate and ground truth the geophysical survey data. Grab samples (approximately 16 depending on the variability of the seabed within the project area) will be collected using a Shipek (or similar) grab sampler deployed using either a crane or winch on board the survey vessel. The grab sampler will be lowered to the seabed where it will trigger shut upon making contact with the seabed. Upon triggering it retains approximately 0.13 m^3 of sediment. The sample is then brought back to the vessel where it is logged and stored for further analysis.

Geotechnical boreholes

One geotechnical borehole and/or several piezo-cone penetrometer tests may be completed at each proposed well location. The main purpose of this geotechnical survey is to obtain adequate soil data to assess jack-up rig spud can footing penetration and punch through analysis. Geotechnical investigation will extend to a depth of 30 – 45 m below the seabed. The boreholes will be drilled and/or penetrometer tests be performed using subsea coring equipment operated from a survey vessel. The duration to complete each borehole/ piezo-cone penetrometer tests will be approximately one day. Upon completion of the geotechnical boreholes/ piezo-cone penetrometer tests all equipment will be retrieved back to the vessel with nothing left on the seabed.

3.4 Drilling activities

As part of the initial exploration drilling campaign, one well will target the Sandpiper, Elang/Plover and Cape Londonderry Formations and is expected to reach a total depth (TD) of approximately 3,350 m TVDLAT (total vertical depth lowest astronomical tide). The main targets in the other well are the Sandpiper and Elang/Plover Formations where a TD of approximately 1,960 m TVDLAT is expected.

During drilling a comprehensive mud logging and measurement program will be conducted along with the sampling and collection of full-hole cores at each well. After reaching TD it is planned to conduct wireline evaluation program for each well, including a vertical seismic profile (VSP). Each of the initial exploration wells will also undergo additional tests to assess injectivity.

Any additional wells (up to three within the life of this EP) will be drilled after the initial exploration drilling campaign.

3.4.1 Indicative drilling method

Well design details are presented in Table 3-1.

Table 3-1: Well details

Well section description	Drilling fluid type	Volume of fluid disposed with cuttings (m^3)	Volume of cuttings discharged (m^3)
Conductor Hole Section Indicatively, 36" well-bore diameter. 30" conductor	Water based muds (WBM), sea water and high viscosity gel sweeps. At TD the hole will be displaced with high viscosity gel mud. While drilling this section, all returns will be to the seabed. Fluid remaining at the end of this hole section will be used on the next hole section.	~240	~60
Surface Hole Section Indicatively 17 ½" well-bore diameter. 13 3/8" casing	WBM, sea water and high viscosity gel sweeps. This hole section will drill through the Bathurst Island Group. To ensure wellbore stability and integrity an inhibitive WBM pill will be utilised at TD to prevent hydration, dispersion and instability. The primary inhibitor in the pill will be potassium chloride (KCl) and glycol.	~65	~45
Intermediate Hole Section Indicatively, 12 1/4" well-bore diameter. 9 5/8" casing/liner	WBM, KCl/Glycol/Amine. An inhibitive WBM will be used in this section. Inhibitive qualities will be further enhanced by addition of a polyamine to prevent damaging fines mobilisation within prospective reservoir and increase inhibitive quality while drilling the Frigate Shale sequence. A bespoke sandstone bridging package to protect the reservoir from excessive fluid loss will be designed utilising calcium carbonate as the base component.	~160	~130

Well section description	Drilling fluid type	Volume of fluid disposed with cuttings (m^3)	Volume of cuttings discharged (m^3)
	At the end of the section, the mud will be retained and used on the next hole section.		
Production Hole Section Indicatively, 8 ½" well-bore diameter.	WBM, KCl/Glycol/Amine. The inhibitive WBM used in the previous interval will be carried over and re-used in this section. A bespoke sandstone bridging package to protect the reservoir from excessive fluid loss will be designed utilising calcium carbonate as the base component.	~50	~30

The conductor hole section of each well (indicatively 36" in the case of the preferred jack-up rig type) will be drilled using sea water and high viscosity “sweeps” (comprising pre-hydrated bentonite, i.e. WBMs) to circulate drilled cuttings from the hole for discharge at the seabed. Pre-hydrated bentonite consists of up to 98% water, the remainder being drilling fluid additives that are either completely inert in the marine environment, or naturally occurring benign materials. Bentonite is a naturally occurring clay of low toxicity (World Health Organization 2005).

After the setting of the conductor (indicatively 30"), the surface hole section of each well (either 17 ½" or 12 $^1/_4$") will be drilled using sea water and high viscosity “sweeps” (comprising pre-hydrated bentonite, i.e. WBMs).

The surface casing (either 13 $^3/_8$" or 9 $^5/_8$") will then be cemented in place. Then after installation of the blowout preventer (BOP), the reservoir hole sections (either 12 $^1/_4$" or 8 ½”) will then be drilled using KCl/Glycol/Amine WBM and the casing or liner string (indicatively 9 $^5/_8$") may be set and cemented in place if reaching deeper targets is required. A liner (indicatively 9 $^5/_8$") might be set for conducting injectivity tests to check formation properties from the target reservoirs.

Drilling fluids and chemical selection

A description of the chemical selection procedure for drilling fluids is presented in Section 9.6.1. The proposed formulations and chemicals to be used are listed in Table 3-2. Only WBM will be used.

The listed products are only proposed and may change during the activity as new products are required. Indicative Offshore Chemical Notification Scheme (OCNS) or chemical hazard assessment and risk management (CHARM) hazard quotient (HQ) rankings have been included where possible. Any new products will be selected in accordance with the selection and approval process, and the list will be reviewed periodically and updated.

Table 3-2: Water-based formulation – provisional additives

Generic product name	Function	OCNS or CHARM HQ
Sea water	Continuous phase	n/a

Generic product name	Function	OCNS or CHARM HQ
Biocide	Bacteria control	Gold
Bentonite	Viscosifier	E
Caustic soda	Alkalinity control	E
Glycol low/medium Cloud Point	Clay inhibition	Gold
PAC Low Vis	Fluid loss control	E
PAC Hi Vis	Fluid loss control	E
Potassium chloride	Clay inhibition	E
Soda ash	Alkalinity control	E
Polyamine	Clay inhibition	Gold
Sized cellulose	Lost circulation	E
Calcium Carbonate	Bridging/Filtration	E
Xanthan gum	Viscosifier	E

Drill cuttings

WBM drill cuttings will either be discharged directly to the seabed (while drilling the conductor hole section) or brought up to the MODU (while drilling the subsequent hole sections). Cuttings brought up to the MODU will be directed over solids control equipment (SCE), which comprises vibrating screens (shale shakers), and to centrifuges, and then discharged overboard.

Shale shakers

Shale shakers primarily remove large amounts of cuttings from drilling mud by directing it from the well to flow over vibrating wirecloth screens. The screens remove the cuttings after which the mud is directed back to the MODU mud storage pits.

Centrifuges

Following the processing by shale shakers, the mud may be returned to the mud storage pits or directed to centrifuges which are used to separate barite and remove fine solids (those below 4.5 to 6 microns). Centrifuges use a rotating bowl to create high centrifugal forces to affect the separation of coarse and fine particles from the mud. Solids from the centrifuge are discharged to sea and the mud recirculated into the fluid system.

Cementing

Cementing operations are undertaken to ensure well integrity, through the following mechanisms:

- cementing the casing and conductors in place
- sealing the annulus between the casing string and the formation
- sealing lost circulation zones
- setting plugs in an existing well from which to sidetrack
- plugging and abandoning the well at the end of the activity.

Cement is transported as dry bulk to the MODU by support vessels and is mixed with water and additives in the cementing unit immediately before use to form a cement slurry which is then pumped down the well by high pressure pumps. CO_2 resistant cement will be used for some of the primary casing cement jobs and also for plug & abandonment operations, to improve long term integrity of cement, due to potential exposure to formation water saturated with CO_2.

It is standard practice to allow some excess cement slurry to overflow to the sea floor when cementing the top-hole section as this provides visual evidence that the annular space between the hole and the casing has been filled. This may extend a distance of up to 10 m from each well. Small volumes of cement slurry may also be discharged to the sea surface when testing the cementing unit or disposing of excess slurry before it sets at the end of a cementing job. Excess dry cement will be retained for use on the next well, at the end of the drilling campaign, should any bulk cement remain the remaining cement will be mixed and operationally discharged to the marine environment.

In accordance with the Section 9.6.1, cement products used will have an OCNS rating of D or E or a hazard quotient (HQ) rating of silver or gold. If not OCNS registered, all chemicals will be assessed as 'green' via the INPEX pseudo ranking system in line with the OCNS CHARM/non-CHARM criteria.

Blowout preventer

A BOP plays a critical role in assuring safe operations in the event of a loss of primary well control. As part of ongoing drilling operations, the BOP stack is required to be regularly function tested (typically weekly/fortnightly), as defined by the INPEX Well Operations Standard (0000-AD-STD-60004) and Well Operations Manual (0000-AD-MAN-60002). During testing, volumes of water-based BOP control fluid may be released to the marine environment dependent on MODU and BOP type.

Well abandonment

At the end of the drilling and evaluation activities both wells drilled during the initial exploration drilling campaign will be permanently plugged and abandoned with the conductor and casings cut below the sea floor (mudline) and all equipment removed. This will be done in accordance with the approved Well Operations Management Plan (WOMP). A two-barrier philosophy for permanent abandonment will be maintained in compliance with INPEX barrier standards (INPEX Well Integrity Standard (0000-AD-STD-60003) and INPEX Well Operations Manual (0000-AD-MAN-60002)).

Any additional wells drilled during the life of this EP may remain in place for future use. All well abandonment activities will be undertaken in accordance with the requirements of the OPGGS Act and the OPGGS (Resource Management and Administration) Regulations 2011.

Additionally, in accordance with Section 572 of the OPGGS Act (removal of property) and NOPSEMA's Section 572 Maintenance and removal of property policy (NOPSEMA 2020a) INPEX will remove all structures, equipment and other property associated with the activity.

3.4.2 Logging while drilling and wireline formation evaluation

A summary of the logging while drilling (LWD) and wireline (WL) logging tool types planned to be utilised is included below.

Dipole sonic tool (LWD and WL)

A Dipole Sonic Tool measures the travel time of an elastic wave, derived from a low energy pulse of sound, through the formation. Quantitatively, the sonic log can be used to evaluate porosity and provide direct geomechanical analysis input. As an aid to seismic interpretation it can be used to give interval velocities and velocity profiles and can be calibrated with the seismic section.

Gamma ray/spectral gamma ray tool (LWD and WL)

A gamma ray tool measures the natural gamma radiation emanating from a rock. This gamma radiation originates from the naturally occurring radioactive elements potassium, uranium and thorium. The spectral gamma ray tool measures both the total natural gamma radiation and each individual contribution from potassium, uranium and thorium. The gamma ray log is used quantitatively to derive a shale/clay volume and potentially clay type/s. Qualitatively, the gamma ray log can potentially be used to correlate formations, facies and depositional sequences.

Mechanical rotary sidewall core (WL)

A mechanical rotary sidewall core tool allows for the extraction of small rock samples from the drilled formation. A small electrically driven rotary coring tool extends from the wireline tool and penetrates the surrounding formation. The core, once cut, is snapped off and pulled into the body of the wireline tool for recovery to surface later. Core samples are used to evaluate mineralogy, porosity, permeability, fluid type/volume, rock strength and biostratigraphy.

Resistivity/conductivity tools (LWD and WL)

A resistivity tool measures the resistance to current passing through the formation which is used to infer the presence of hydrocarbons as opposed to water. Conductivity tools measure a rock's conductivity or its ability to conduct an electric current. Conductivity is the reciprocal of resistivity and is usually plotted as a resistivity log.

Density/neutron tools (LWD and WL)

A density tool produces a continuous record of a formation's bulk density by using a radioactive source which emits gamma rays into the borehole wall. The gamma rays are attenuated by the formation as a function of bulk density and are measured at multiple detectors on the tool at various distances from the source. The density log can be used to calculate porosity and indirectly, hydrocarbon and mineral density.

A neutron tool provides a continuous record of a rock's reaction to fast/high energy neutron interaction. The neutrons are either generated by a radioactive source in the tool or from a neutron accelerator. Neutron log data is used for porosity evaluation and fluid type identification (gas, oil and water).

Formation pressure test/fluid sample tools with dual packer and fluid analyser (WL)

A wireline formation pressure test tool measurement is acquired by inserting a small probe into the borehole wall and performing a mini pressure drawdown and build-up by withdrawing a small amount of formation fluid and then waiting for the pressure to build up to the formation pore pressure. This analysis provides a measure of in-situ fluid densities and fluid mobility/permeability. A dual packer can be applied to isolate a section of reservoir within which wellbore fluid is pumped into the formation and the pressure measured at which hydraulic microfracturing occurs. This information is used to understand the minimum in situ stress magnitude in the reservoir formations.

A wireline formation fluid sampling tool can take multiple samples of formation fluids. To acquire samples, a tool probe is mechanically pressed into the formation and then a fluid sample chamber is opened within the tool into which formation fluid flows. To ensure that the formation fluid is captured and not mud filtrate, a down-hole fluid analyser measures the properties of the incoming fluid including pH and resistivity in real-time. As the mud filtrate properties are known, once the properties change and stabilise, only then is a fluid sample taken. The retrieved formation fluid samples are sent to a laboratory for detailed pressure/volume/temperature and compositional analyses.

Borehole geological imaging tool/element measurement tool/dielectric tool/nuclear magnetic resonance tool (WL)

A borehole geological imaging tool consists of several retractable pads that are pushed onto the borehole wall. Each pad records formation voltage allowing for both sedimentary and structural features of the rock to be evaluated in detail by obtaining a precise borehole image to determine its shape and form.

An element measurement tool (spectroscopy) is used to measure rock elemental concentrations. The measured elements can be used for accurate quantitative mineralogy analysis and input into detailed petrophysical and geological property evaluation.

A dielectric tool provides a measurement of dielectric dispersion in the formation/rock. The principle of the dielectric dispersion measurement is the propagation of high frequency electromagnetic waves into the formation/rock and measuring the response to determine key petrophysical properties including porosity, water saturation and salinity.

A nuclear magnetic resonance wireline logging tool measures the induced magnetic moment of hydrogen nuclei (protons) contained within fluid-filled pore space of rocks and the bound water of certain minerals. This tool gives a measurement of the porosity and the range of pore sizes.

3.4.3 Vertical seismic profile (WL)

A vertical seismic profile (VSP) uses a sound source suspended in the water column and recorders located down-hole to provide a high-resolution seismic image of the immediate vicinity of the well. VSP measurements are used primarily for correlation of existing seismic data.

The sound source used for VSP is similar to, but much smaller than, those used during seismic surveys. Typically, an acoustic source with a total array volume of 0.012 m^3 (~750 cubic inches) is employed. The sound pressure level is 232 dB re 1 µPa@1m with a dominant frequency range of 5–125 Hz.

The airgun source array is discharged 5–8 m below the sea surface approximately five times at roughly 20 second intervals, with recordings taken down-hole at a specific depth. Additional recordings are made at 5–7 minute intervals as the down-hole tool is repositioned within the well. VSP is planned for all wells with the total duration of VSP activities (excluding soft starts) estimated to take approximately 18 hours per well (but will be dependent on the results of the well which is being profiled and the schedule of activities).

3.4.4 Water injectivity testing

A water injectivity test, lasting for approximately 24-48 hours, will be conducted to confirm injection capacity and estimate key formation parameters such as permeability thickness and skin factor. The injectivity tests shall verify localised porosity and permeability and further inform the dynamic modelling of the CO_2 plume performance. The test will involve injection of filtered seawater or fresh water into the formation at various flow rates and will not result in any discharges to sea. There is no intention or requirement to produce formation fluids to surface.

In the future development of the injection site, injection of CO_2 is currently planned to be in the Plover Formation. The Frigate Formation acts as the seal for the Plover Formation, thereby isolating any fluids injected in this horizon from other fluids in the shallower formations. Other suitable reservoirs may be utilised in future following thorough appraisal of the reservoir and seal properties.

3.4.5 Contingent drilling activities

A number of contingencies, detailed in Table 3-3, may be required in the event of operational or technical issues during the exploration drilling activity.

Table 3-3: Drilling contingencies

Contingency	Contingency establishment	Description	Environmental considerations
Well re-spud	In the event that operational or technical issues are encountered while drilling.	The process of beginning to redrill a new well. The location of the re-spud would typically be within the immediate area of the original well at a safe location.	The net environmental effect will be limited to an increase in the volume of cuttings generated. In a worst-case scenario, this could be a doubling of the estimated drill cuttings from the first two sections of the well-bore (Table 3-1). There may also be some additional temporary, localised damage to benthic habitat. Should a well re-spud be required, the original well will be permanently plugged and abandoned as described in Section 3.4.1 *Well abandonment*

Contingency	Contingency establishment	Description	Environmental considerations
Sidetrack	In some instances, the option of a sidetrack instead of a re-spud might be pursued when operational issues are encountered.	The process of drilling a secondary well-bore away from an original well-bore.	The net environmental effect will be limited to an increase in the volume of cuttings generated. The worst case would be equivalent to cuttings generated from a single section of the well.
Lost circulation	Circulation is said to be lost when the drilling fluid flows into one or more geological formations instead of returning up the annulus.	A number of contingencies are available when lost circulation occurs, depending on the severity: • minor losses may be controlled with the use of fluid loss control materials such as bentonite and/or polymers, or other additives • severe losses will require the use of fluid loss control materials such as bentonite and/or polymers and the addition of bridging agents such as ground calcium carbonate and fibrous material • pull back, cement the zone where the losses occurred, and drill through the cement and recommence drilling the well.	The net environmental effect would be a change in the water quality at the point of discharge. Depending on the volume of discharge, this could potentially form a temporary plume before it is dispersed back to ambient levels.

3.5 MODU, supporting vessels and aircraft

The MODU that will be contracted to undertake the drilling activities will either be a jack-up or semi-submersible MODU with an expected complement of approximately 150 personnel on board (POB).

For a jack-up, the MODU will be towed into position by one or two support vessels. The MODU may be 'soft pinned' (legs extended to be in contact with the seabed with no jacking load on the legs) approximately 100 m from location. At this time the tow vessels are configured to facilitate the final positioning. Once the tow vessels have been correctly positioned, the legs are raised clear of the seabed and the MODU is slowly moved onto location. During this time the spud can pins may drag intermittently along the seabed creating shallow furrows. Once in the desired location and with the MODU stationary, the legs are lowered to be in complete contact with the seabed and will penetrate the seabed sediments anywhere from 3 m to 25 m depth dependent on soil properties, creating a depression approximately 18 m in diameter in the footprint of each of the three legs as the MODU raises itself approximately 20 m above the sea surface. At this point, the drilling derrick is cantilevered over the edge of the MODU in readiness for drilling.

A moored semi-submersible MODU will typically have a minimum of eight anchors, deployed by Anchor Handling Supply Vessels (AHSVs) and lowered to the seabed. Anchors may be pre-laid in advance of the MODU arriving at each well location. Once in place, the MODU winches in the slack from the mooring lines to the required tension. Anchors are spread in a radial pattern extending from the MODU. The size of the anchor spread will be dependent on the MODU and the MODU specific mooring analysis conducted during the well planning stage. Typically, mooring lines extend approximately 2,000 m from the MODU with approximately 1,000 m of grounded chain. Each anchor typically occupies a total seabed area of approximately 30 m^2. Retrieval of anchors is the reverse of the deployment procedures.

While on location, a GHG safety zone with a 500 m radius will be maintained around the MODU at all times; to control activities, and to reduce the risk of marine collisions, as required under the OPGGS Act. Maritime Safety Information (MSI) notifications will be issued via AMSA, while the Australian Hydrographic Office (AHO) will issue a Notice to Mariners. The MODU will be powered by MGO with a typical usage of 30,000 L per day for a moored MODU.

The MODU will be supported by two to three vessels (i.e. AHSVs/tow vessels and Platform Supply Vessels (PSVs)), as well as regular helicopter flights from the mainland.

The AHSVs and the PSVs will be used to transport equipment, materials and fuel between the MODU and Darwin, the marine supply base for the activity. The AHSVs will be used to deploy and accurately position anchors in the case of a moored MODU. The vessels will also conduct safety lookouts for helicopter landings and take-offs; monitor the 500 m safety zone maintained around the MODU; and provide support in the event of emergencies. Vessels will remain outside of the safety zone unless undertaking duties and will maintain position using DP (no anchoring). Support vessels will be powered by MGO with a typical usage of 5,000 L per day when on standby (Gustavson Associates 2011) and 15,000 L per day when steaming. Each supply vessel will be crewed by up to 25 personnel.

Aviation support will be based at Darwin International Airport. Helicopters based in Darwin will be used to transfer personnel to and from the MODU several times per week. The transfer frequency may vary depending on MODU manning, the operational phase of the well, and the specification (capacity) of the helicopters contracted. Although not expected, vessels and helicopters may be refuelled in the project area if required during the drilling activities.

3.5.1 Remotely operated vehicle

The MODU and possibly other specialised vessels will be equipped with a remotely operated vehicle (ROV) for:

- pre-spud hazard surveys
- monitoring of conductor pipe

- monitoring of cementing operations
- monitoring shallow gas, and unplanned discharges.
- Camera systems (still and video) are also fitted to the ROV to capture permanent records of the environment and operations.

3.6 GHG emissions

Expected direct GHG emissions generated during the proposed activity are presented in Table 3-4. Noting that these direct emissions relate to MODU/vessel contractors who have operational control and are therefore required to report under the NGER Act (refer to Table 2-1). There are no INPEX scope 1 or 2 emissions associated with the exploration activities covered by this EP. The direct emissions are considered as scope 3 emissions for INPEX Australia.

Table 3-4: Expected direct GHG emissions associated with the Bonaparte Basin exploration drilling activities

Activity	GHG emissions (t-C0$_2$-e)		
Pre-drill site survey vessel	816		
Drilling support vessels	9,795		
Helicopters	1,225		
MODU	Jack-up: 4,270	Moored: 6,097	DP: 12,195
Total	16,106	17,933	24,031

Assumptions: Figures based on 3 drilling support vessels; 3 helicopter visits per week; operational durations of 30 days for pre-drill site survey; 150 days for drilling.

3.7 Summary of emissions, discharges and wastes

A summary of the emissions, discharges, and wastes resulting from the activities are described in Table 3-5, including indicative volumes where relevant. Relevant monitoring and measurement conducted on the emissions and discharges are detailed below and further described within the respective subsections of Section 7.

Table 3-5: Emissions (E), discharges (D) and wastes (W) generated during the planned activity

Activity/system	E, D, W	Description	
Pre-drill site surveys	E	Survey vessel	Combustion emissions from survey vessels and diesel-powered generators onboard emitted to the atmosphere. Approximately 816 t-C0$_2$-e. Noise emissions from survey vessel engines.
	E	Survey equipment	Noise emissions from echo sounders, side-scan sonar and sub-bottom profiling.

Activity/system	E, D, W	Description	
ROV operations	D	MODU or vessel based ROV	Routine subsea discharges of water-based hydraulic fluids (< 1 m^3).
BOP	D	MODU	Water-based BOP control fluids may be discharged to the marine environment depending on the MODU and BOP type.
Drilling	E	MODU	Noise emissions resulting from drilling.
Drilling fluids	D	MODU	WBM system uses low-toxicity drilling fluid that is benign to the environment.
Drill cuttings	D	MODU	While drilling riserless with a semi-submersible, and after running the conductor with a jack-up MODU, all returns will be to the seabed. Cuttings brought up to the MODU will be directed over solids control equipment (SCE), which comprises vibrating screens (shale shakers), and to centrifuges, and then discharged overboard.
Cementing	D	MODU	Seabed discharge of cement at each well location may extend up to 10 m from each well, in addition to surface discharge from tank cleaning. Any bulk cement remaining at the end of the campaign will be mixed and operationally discharged either down-hole or to the marine environment.
VSP	E	MODU	Noise emissions (pulses) from seismic source during VSP (approximate 18 hours duration). Typical total array volume of 0.012 m^3 (~750 cubic inches).
Power generation	E	MODU	Combustion emissions from MODU and diesel-powered generators onboard emitted to the atmosphere. Jack-up MODU approximately 4,270 t-C0$_2$-e Moored MODU approximately 6,097 t-C0$_2$-e DP MODU approximately 12,195 t-C0$_2$-e
	E	MODU	Noise emissions from power generation (and other topside activities).
	E	Vessels	Combustion emissions from support vessels and diesel-powered generators onboard emitted to the atmosphere. Approximately 9,795 t-C0$_2$-e.
	E	Vessels	Noise emissions from support vessel engines and propulsion systems (such as DP thrusters).

Activity/system	E, D, W	Description	
	E	Helicopter	Combustion emission from helicopters - aviation fuel emitted to the atmosphere. Approximately 1,225 t-$C0_2$-e.
Cooling water	D	MODU Vessels	Seawater used as heat-exchange medium for machinery engines. Return seawater containing residual heat and residual sodium hypochlorite is returned to sea.
Open drains system	D	MODU	The MODU main deck areas will have an open drains system. Deck drainage water may be discharged to sea. Note low toxicity rig wash will be used for washing the main deck of the MODU. MODU drill floor drainage may be routed for mud recovery and re-used in the active mud system.
Closed drains system	W	MODU	The MODU pump rooms and engine rooms are closed drainage areas. Oily waste material from the closed drains is collected in a holding tank and returned to shore for treatment and disposal.
Vessel deck drainage	D	Vessels	Vessel deck drainage water will be discharged to sea.
Bilge system	D	MODU Vessels	Treated contaminated bilge water with <15 ppm (v) oil in water (OIW) is discharged to sea.
Sewage, grey water and macerated food waste effluent	D	MODU Vessels	Treated effluent produced by sewage treatment plants is discharged to sea.
Ballast system	D	MODU Vessels	Return ballast is discharged to sea.
Foam fire extinguishing	D	MODU Vessels	Firefighting foam is routed to the open drains/deck drainage system and may be released to sea in the event of system deployment. Minor quantities of wind-blown foam may also be released.
Desalination brine	D	MODU Vessels	Brine produced from the Reverse Osmosis (RO) process will be diluted and discharged to sea.
Miscellaneous	E	MODU Vessels	Light emissions from deck and navigation lights on MODUs and vessels.
	W		Solid and liquid wastes from general maintenance operations, equipment replacement, etc., and domestic wastes are transported to shore for disposal.

4 EXISTING ENVIRONMENT

4.1 Regional setting

The project area is situated in the Bonaparte Basin, approximately 200 km west of Darwin in the NT (Figure 3-1). In the event of a worst-case unplanned oil spill, the area potentially exposed to hydrocarbons, hereafter referred to as the potential exposure zone (PEZ), covers a considerably larger area than the project area where planned activities will occur.

The spatial extent of the PEZ was determined from stochastic spill modelling using the low hydrocarbon exposure thresholds described in NOPSEMA Bulletin #1 (NOPSEMA 2019). This considered the worst-case credible hydrocarbon spill scenarios identified for the activity (refer Section 7.7, Table 7-16) for surface hydrocarbons, shoreline accumulations of oil, and entrained oil and dissolved aromatic hydrocarbons in the water column. The PEZ has been used to identify relevant values and sensitivities that may be affected and has been used as the basis for the EPBC Act Protected Matters database search (Appendix A). In the absence of confirmed operational areas/well locations, an EPBC Act Protected Matters database search was undertaken for the project area and is also presented in Appendix A[1].

The low thresholds that have been used to inform the extent of the PEZ are useful for oil spill response planning and scientific monitoring (water quality) purposes but may not be ecologically significant (NOPSEMA 2019). Therefore, in addition to the PEZ, an environment that may be affected (EMBA) has also been established from stochastic spill modelling using hydrocarbon exposure thresholds identified as having the potential to cause impacts to receptors such as fauna and habitats (refer Section 8, Table 8-2).

The resulting PEZ and EMBA from the oil spill modelling are the sum of overlaid stochastic modelling runs for the worst-case spill scenario, during all seasons (wet, transitional and dry) and under different hydrodynamic conditions (e.g. currents, winds, tides, etc.). As such, the actual area that may be affected from any single spill event would be considerably smaller than represented by the PEZ or EMBA. The PEZ and EMBA are both geographically represented in the figures throughout this section of the EP and in Figure 8-2.

4.1.1 Australian waters

Australia's offshore waters have been divided into six marine regions in order to facilitate their management by the Australian Government under the EPBC Act. The project area is located entirely within the North Marine Region. The PEZ intersects with the NMR and the Northwest Marine Region (NWMR). The relevant key features of the NMR and NWMR in the context of the project area and PEZ are further described in subsequent sections of this EP.

North-west Marine Region

The NWMR comprises Commonwealth waters, from the WA–NT border in the north, to Kalbarri in the south. The NWMR encompasses a number of regionally important marine communities and habitats which support a high biodiversity of marine life and feeding and breeding aggregations (DSEWPaC 2012a).

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[1] The EPBC Act Protected Matters Search Tool (https://pmst.awe.gov.au) uses a 32 km grid square for data across marine regions. Where boundaries of a Project Area, EMBA or PEZ overlap a 32 km^2 grid square, all protected matters that fall within that grid square are captured within the PMST report output, regardless of whether the Operational Area, EMBA or PEZ actually overlap the protected matter or not. This results in protected matters being included in the PMST, that may actually be >30 km away from a location.

North Marine Region

The NMR comprises Commonwealth waters from the WA–NT border to West Cape York Peninsula. This region is highly influenced by tidal flows and less by ocean currents. The marine environment of the NMR is known for its high diversity of tropical species but relatively low endemism, in contrast to other bioregions (DSEWPaC 2012b).

4.2 Key ecological features

The Australian Government has identified parts of the marine ecosystem that are of importance for a marine region's biodiversity or ecosystem function and integrity, referred to as key ecological features (KEFs). The project area does not overlap any KEFs (Appendix A). Three KEFs are located within the PEZ (Figure 4-1) as follows:

- Pinnacles of the Bonaparte Basin
- Carbonate bank and terrace system of the Sahul Shelf
- Carbonate bank and terrace system of the Van Diemen Rise.

4.2.1 Pinnacles of the Bonaparte Basin KEF

The Pinnacles of the Bonaparte Basin KEF is present within the NMR and NWMR. The Pinnacles of the Bonaparte Basin KEF consists of an area containing limestone pinnacles, up to 50 m high (above the surrounding seabed) and is located in the western Joseph Bonaparte Gulf on the mid-to-outer edge of the shelf (DSEWPaC 2012b). They represent 61% of the limestone pinnacles in the NWMR and 8% of limestone pinnacles in the Australian EEZ (Baker et al. 2008). There are no pinnacles present within the project area with the nearest pinnacle located approximately 16 km west at the closest point.

The Pinnacles of the Bonaparte Basin are thought to be the eroded remnants of underlying strata. It is likely that the vertical walls generate local upwelling of nutrient-rich water, leading to phytoplankton productivity that attracts aggregations of planktivorous and predatory fish, seabirds and foraging turtles (DSEWPaC 2012b).

As the pinnacles provide areas of hard substrate in an otherwise relatively featureless, soft sediment environment they are presumed to support a high number of species. Associated communities are thought to include sessile benthic invertebrates including hard and soft corals and sponges, and aggregations of demersal fish species such as snapper, emperor and grouper (Brewer et al. 2007). The pinnacles are thought to be a feeding area for flatback, loggerhead and olive ridley turtles, while green turtles may traverse the area. Humpback whales and green sawfish are also likely to occur in the Pinnacles of the Bonaparte Basin KEF (Donovan et al. 2008). However, due to their ecology, sawfish (generally estuarine rather than open-ocean species) are not expected to be present within open-ocean environments.

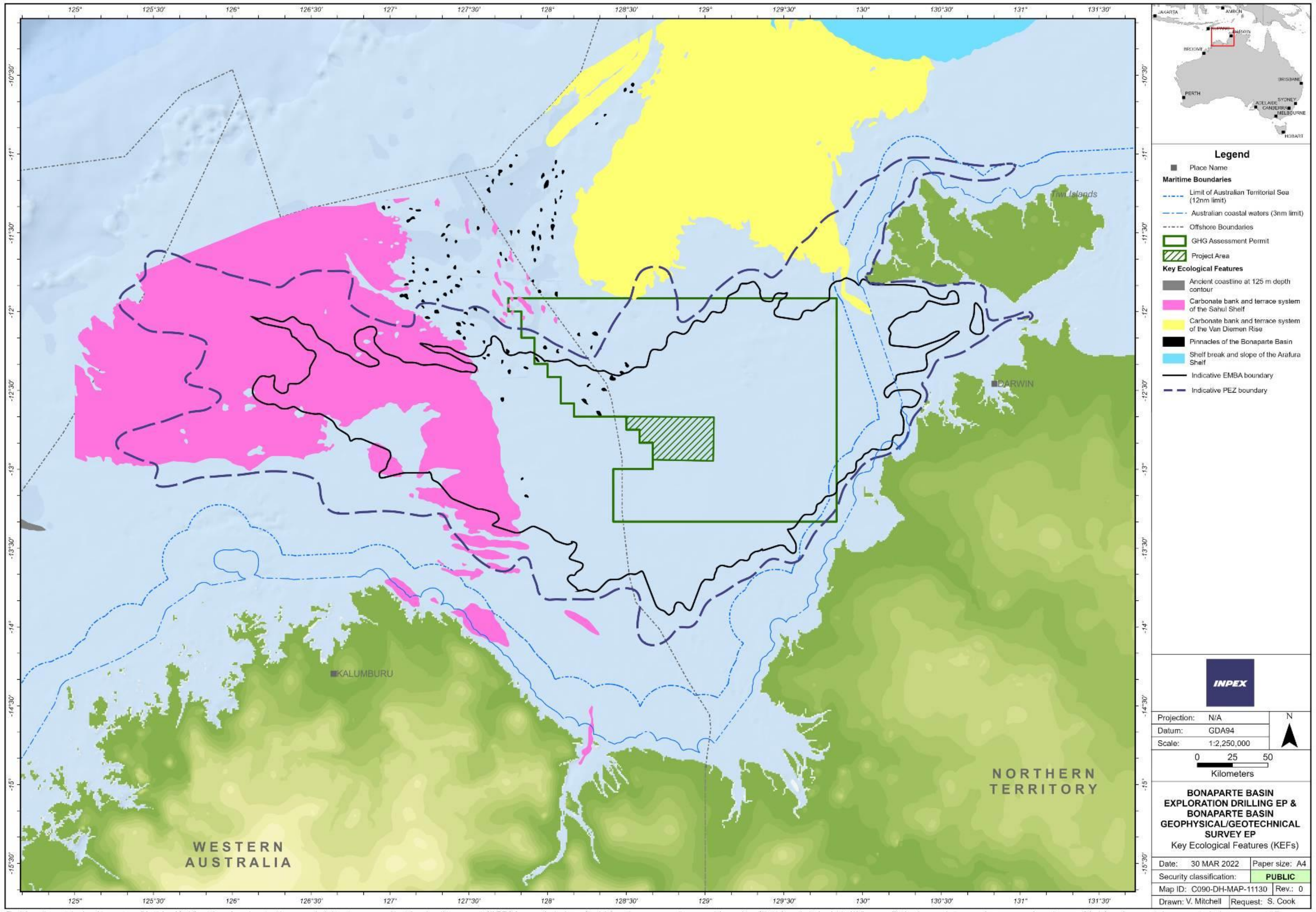

Figure 4-1: Key ecological features in north-west Australia

4.2.2 Carbonate Bank and Terrace System of the Sahul Shelf KEF

The carbonate bank and terrace system of the Sahul Shelf KEF is located in the western Joseph Bonaparte Gulf, approximately 85 km west of the project area, at its closest point. The carbonate bank and terrace system of the Sahul Shelf KEF is recognised for its biodiversity values (a unique seafloor feature with ecological properties of regional significance), which apply to both its benthic and pelagic habitats. The banks consist of a hard substrate with flat tops. Each bank occupies an area generally less than 10 km^2 and is separated from the next bank by narrow sinuous channels up to 150 m deep (DSEWPaC 2012a).

Although little is known about the bank and terrace system of the Sahul Shelf, it is considered to be regionally important due to its continuous and large expanse, as well as the ecological role it is likely to play in the biodiversity and productivity of the Sahul Shelf (DSEWPaC 2012a). The banks support a high diversity of organisms, including reef fish, sponges, soft and hard corals, gorgonians, bryozoans, ascidians and other sessile filter-feeders (Brewer et al. 2007). They are foraging areas for loggerhead, olive ridley and flatback turtles. Humpback whales and green and freshwater sawfish are also likely to occur in the carbonate bank and terrace system of the Sahul Shelf KEF (Donovan et al. 2008). However, due to their ecology, sawfish (generally estuarine rather than open-ocean species), are not expected to be present within open-ocean environments.

4.2.3 Carbonate Bank and Terrace System of the Van Diemen Rise KEF

The carbonate bank and terrace system of the Van Diemen Rise KEF is located approximately 80 km north of the project area at its closest point.

The carbonate bank and terrace system of the Van Diemen Rise KEF supports a complex system of shallow carbonate banks and shoals over a limestone terrace, strongly dissected by tidal channels and paleo-river channels (including the >150 m deep Malita Shelf Valley). Shallow, clear waters provide for a deep euphotic zone, the depth to which sufficient light for photosynthesis penetrates into the ocean. Therefore, enhanced benthic primary production and localised upwellings generated by interactions between the complex topography and tidal currents encourage phytoplankton productivity and aggregations of fish. The banks, shoals and channels offer a heterogeneous environment of shallow to deep reef, canyon, soft sediment and pelagic habitats to a diverse range of tropical species of predominantly Western Australian affinities (DSEWPaC 2012b).

4.3 Australian marine parks

A network of AMPs has been established around Australia as part of the National Representative System of Marine Protected Areas (NRSMPA). The primary goal of the NRSMPA is to establish and effectively manage a comprehensive, adequate and representative system of marine reserves to contribute to the long-term conservation of marine ecosystems and protect marine biodiversity.

Established AMPs under the EPBC Act, and any zones within them, must be assigned to an International Union for Conservation of Nature (IUCN) Protected Area Category (Environment Australia 2002). The IUCN categories that are present within the AMPs intersected by the PEZ, as shown in Table 4-1, include:

- IUCN Category Ia – Strict nature reserve – Protected area managed mainly for science.
- IUCN Category II – National Park – Protected area managed mainly for ecosystem conservation and recreation.

- IUCN Category IV – Habitat/species management area – Protected area managed mainly for conservation through management intervention.
- IUCN Category VI – Managed resources protected areas – Protected area managed mainly for the sustainable use of natural ecosystems. Area containing predominantly unmodified natural systems, managed to ensure long term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.

The Director of National Parks (DNP) may make, amend and revoke prohibitions, restrictions and determinations under regulations 12.23, 12.23A, 12.26, 12.56 and 12.58 of the EPBC Regulations where it is considered necessary to:

- protect and conserve biodiversity and other natural, cultural and heritage values; or
- to ensure human safety or visitor amenity; or
- where it is otherwise necessary to give effect to the management plan.

The Commonwealth DNP has issued a general approval under Section 359B of the EPBC Act allowing a range of activities to occur within these AMPs. The activities approved including 'mining operations' which, as defined under the EPBC Act, also includes all GHG activities, including associated emergency response activities. No other approvals relating to this activity are required from the DNP.

Actions to respond to oil pollution incidents (including environmental monitoring and remediation) in AMPs, can be undertaken without an authorisation issued by the DNP, provided that the actions are undertaken in accordance with an EP that has been accepted by NOPSEMA. However, the DNP is to be notified of the pollution event or proposed spill response actions within AMPs prior to the activity being undertaken where practicable. The project area does not overlap any AMPs (Figure 4-2; Appendix A). The AMPs that overlap the PEZ and their IUCN categories are shown in Figure 4-2 and outlined in Table 4-1, with a further description provided in subsequent sections.

Table 4-1: AMP and IUCN categories

AMP*	Sanctuary Zone (IUCN Ia)	(Marine) National Park Zone (IUCN II)	Habitat Protection Zone (IUCN IV)	Recreational Zone (IUCN IV)	Multiple Use Zone (IUCN VI)	Special Purpose Zone (IUCN VI)	Special Purpose Zone (Trawl) (IUCN VI)
Oceanic Shoals			X		X		X
Joseph Bonaparte Gulf					X	X	

* While the Kimberley MP is included in the EPBC Act Protected Matters database search of the PEZ (Appendix A) it is located approximately 15 km from the boundary of the PEZ at its closest point (Figure 4-2) and therefore does not overlap.

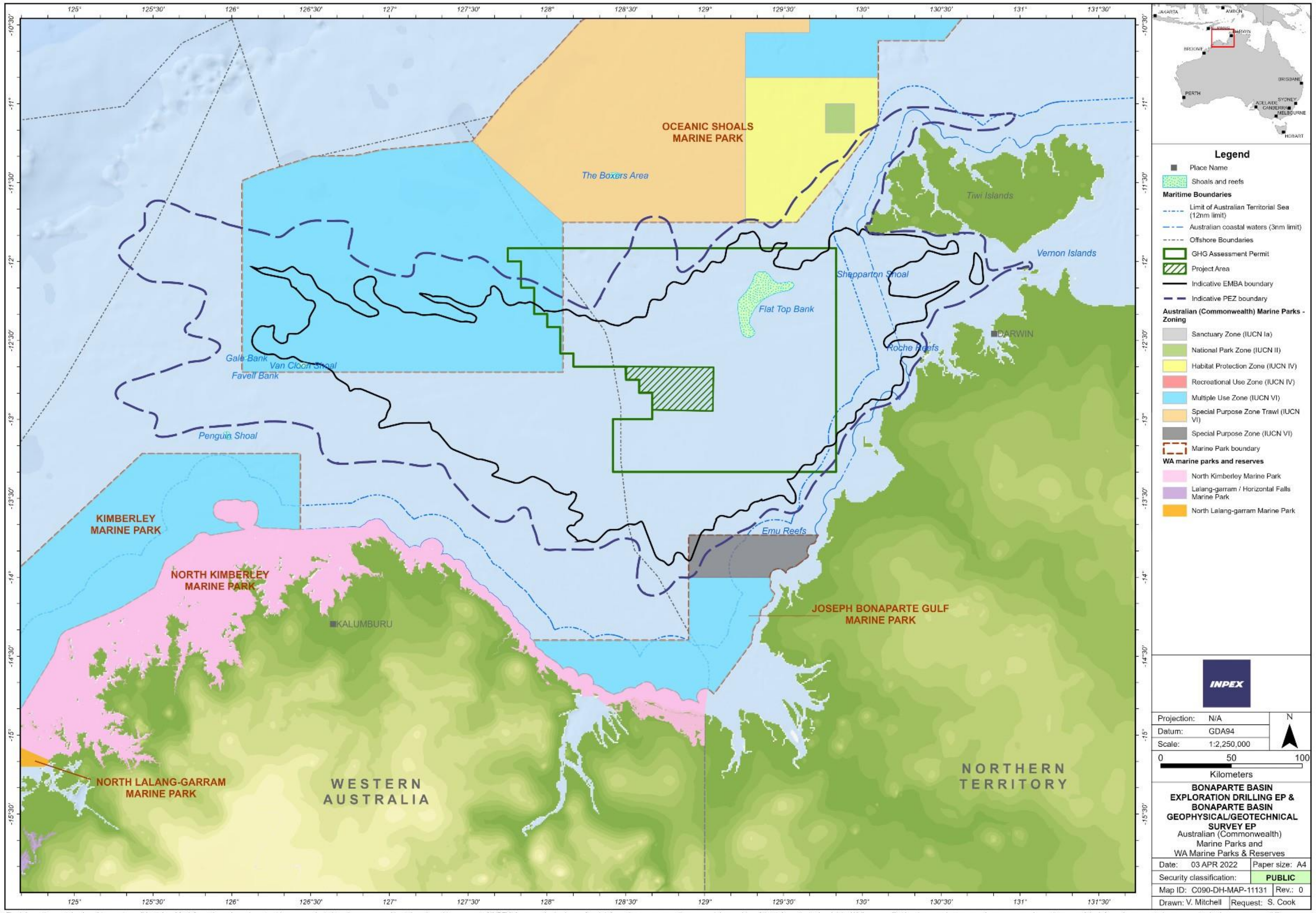

Figure 4-2: Australian and State/Territory marine parks, reserves, banks and shoals

4.3.1 Oceanic Shoals MP

The project area is located approximately 40 km from the Oceanic Shoals MP at its closest point. The Oceanic Shoals MP occupies an area of approximately 72,000 km^2 with water depths from less than 15 m to 500 m (Parks Australia 2022a). The Oceanic Shoals MP is the largest marine park in the NMR and includes important sea country for the Tiwi people (TLC 2021) (refer to Section 4.9.5).

The Oceanic Shoals MP is an important resting area for turtles (internesting) for the threatened flatback turtle and olive ridley turtle. It is also an important foraging area for the threatened loggerhead turtle and olive ridley turtle (DNP 2018b).

4.3.2 Joseph Bonaparte Gulf MP

The Joseph Bonaparte Gulf MP is located in the NMR, approximately 90 km south of the project area at its closest point. It occupies an area of approximately 8,600 km^2 with water depths ranging from less than 15 to 75 m (Parks Australia 2022b; Galaiduk et al, 2018). As detailed in Section 4.9.5, areas of the coastline within the Joseph Bonaparte Gulf MP are home to many Aboriginal groups each with their own cultural values. The Miriuwung, Gajerrong, Doolboong, Wardenybeng and Gija and Balangarra people have responsibilities for sea country in the marine park (Parks Australia 2022b).

The Joseph Bonaparte Gulf MP experiences some of the highest tides in northern Australia (up to 7 m) which, together with a wide intertidal zone near the Joseph Bonaparte Gulf MP, create a physically dynamic and turbid environment characterised by a high level of primary productivity (Galaiduk et al, 2018). Key conservation values of the reserve include (Parks Australia 2022b; DNP 2018b):

- important foraging area for threatened and migratory marine turtles (green and olive ridley), and the Australian snubfin dolphin
- examples of the shallow water ecosystems and communities of the North West Shelf Transition Province, the second largest of all the provincial bioregions on the shelf, which includes the extensive banks that make up the Sahul Shelf, broad shelf terraces and the shallow basin in the Joseph Bonaparte Gulf (including the Cambridge-Bonaparte, Anson Beagle and Bonaparte Gulf mesoscale bioregions).

The carbonate bank and terrace system of the Sahul Shelf KEF (enhanced productivity, high biodiversity, and unique seafloor feature) is partly located within the Joseph Bonaparte Gulf MP.

4.4 State and Territory reserves and marine parks

No State or Territory marine parks/reserves including indigenous protected areas are located within the project area or the PEZ (Appendix A). The PEZ extends to the Tiwi islands but does not include any IPAs and there is no shoreline contact.

4.5 Wetlands of conservational significance

There are no Ramsar sites within the project area or the PEZ (Appendix A). One nationally important wetland the Finniss Floodplain and Fog Bay System, is located adjacent the south eastern boundary of the PEZ on the NT coastline.

4.5.1 Finniss Floodplain and Fog Bay System

The Finniss Floodplain and Fog Bay System is an example of a beach-fringed curved bay with continuous intertidal mudflats (DAWE 2022a). It is located approximately 1.5 km from the outer boundary of the PEZ at its closest point.

The site is a major breeding area for the magpie goose (*Anseranas semipalmata*) and during the dry season acts as a refuge area for water birds. It is also a migration stop-over area for shorebirds and a major breeding area for saltwater crocodile (DAWE 2022a). This site is also recognised as an important bird area (IBA) with the intertidal mudflats of Fog Bay reported to support many species of shorebird and waterbird colonies (BirdLife International 2022a).

4.6 Physical environment

4.6.1 Climate

Air temperature

Air temperatures recorded at Channel Point, the closest Bureau of Meteorology (BOM) climatological station to the project area, shows a mean temperature range of 17.2 degrees Celsius (°C) to 32.3 °C (BOM 2022).

Winds

The Joseph Bonaparte Gulf is characterised by a tropical climate with a dry (winter) season from May to August, a wet (summer) season from October to March and transitional months of April and September. During the dry (winter) season, east to southeast winds blow constantly, and an anticlockwise sea circulation exists (Lees 1992), while during the wet (summer) season wind and sea circulation are reversed, and tropical cyclones are common.

During the wet (summer) season the weather in northern Australia is largely determined by the position of the monsoon trough, which can be in either an active or an inactive phase. The active phase is usually associated with broad areas of cloud and rain, with sustained moderate to fresh north-westerly winds on the north side of the trough. Widespread heavy rainfall can result if the trough is close to, or over, land. An inactive phase occurs when the monsoon trough is temporarily weakened or retreats north of Australia. It is characterised by light winds, isolated showers, and thunderstorm activity, sometimes with gusty squall lines.

Tropical cyclones can develop off the coast in the northern wet (summer) season, usually forming within an active monsoon trough. Heavy rain and strong winds, sometimes of destructive strength, can be experienced along the coast within several hundred km of the centre of the cyclone. The Bonaparte Basin is prone to tropical cyclones, mostly during the wet (summer) season from December to March. Under extreme cyclone conditions, winds can reach 300 km/h.

Ambient wind-driven currents are generally directed from west to east during the wet (summer) season (December to March) and east to west during the trade wind season (April to November), while an offshore westward current persists throughout the year.

Rainfall

Rainfall data collected at Channel Point shows the mean monthly rainfall to range from 0.1 mm (dry/winter season) to 459.8 mm (wet/summer season) with the highest rainfalls occurring between December to March (BOM 2022). Heaviest rainfall is typically associated with tropical cyclones

Air quality

There is currently no air quality data recorded within the vicinity of the project area. However, given the distance from land, air quality is expected to be relatively high. Potential sources of air pollution associated with anthropogenic influences are expected to be emissions generated by shipping, and oil and gas activities, and therefore considered to be localised in relation to the regional setting.

4.6.2 Oceanography

Currents

Broad-scale oceanography in the north-west Australian offshore area is complex, with major surface currents influencing the region, including the Indonesian Throughflow, the Leeuwin Current, the South Equatorial Current, and the Eastern Gyral Current (Figure 4-3). The Indonesian Throughflow current is generally strongest during the south-east monsoon from May to September (Qiu et al. 1999). The Indonesian Throughflow is a key link in the global exchange of water and heat between ocean basins. It brings warm, low-nutrient, low-salinity water from the western Pacific Ocean, through the Indonesian archipelago, to the Indian Ocean. It is the primary driver of the oceanographic and ecological processes in the region (DSEWPaC 2012a).

Cyclone events generate the strongest currents in the Gulf, with current speeds in some areas expected to reach 1.4 m/s; whereas ambient, noncyclonic wind-driven current speeds are generally less than 0.1 m/s (Przeslawski et al. 2011).

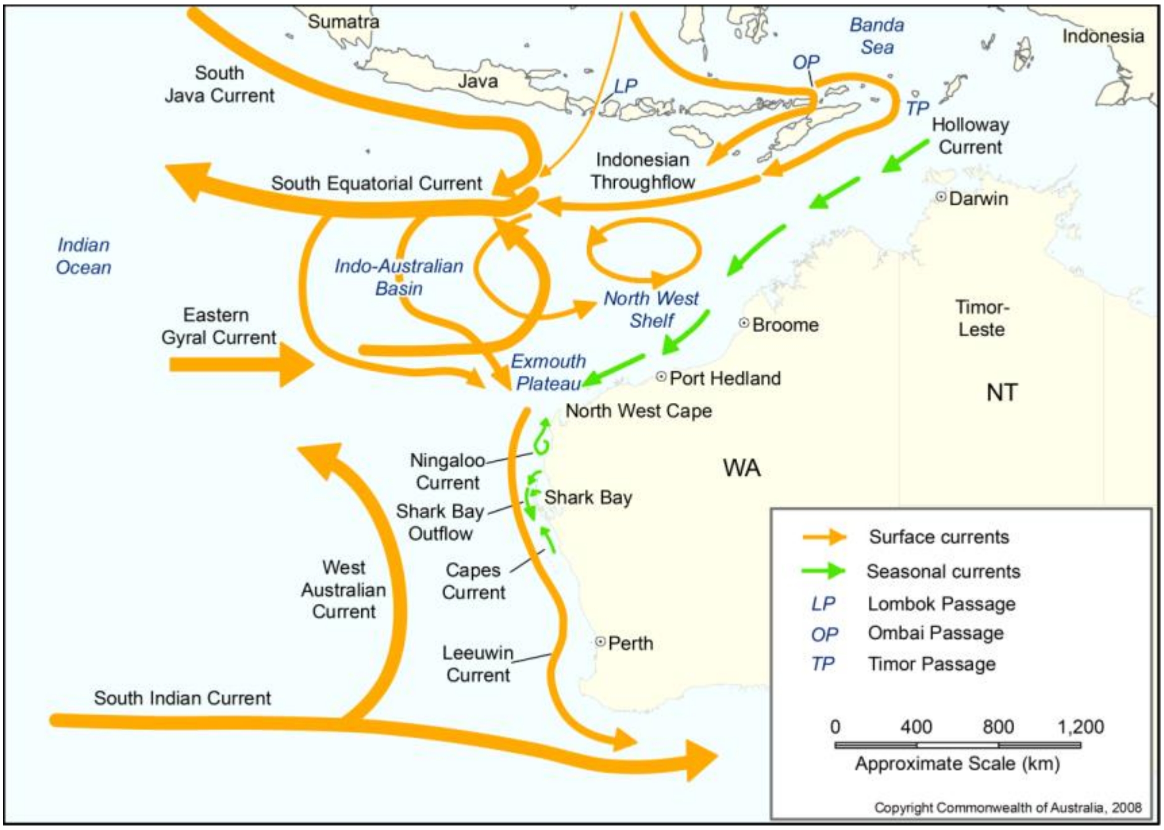

Figure 4-3: Surface currents for Western Australian waters

Tides

The Joseph Bonaparte Gulf experiences a mixed semidiurnal tide with a very large range in tidal elevations and correspondingly strong tidal currents, recording some of the highest tides in northern Australia (up to 7 m) (Przeslawski et al. 2011; Galaiduk et al. 2018).

Waves

Summertime tropical cyclones generate waves propagating radially out from the storm centre. Depending upon the storm size, intensity, relative location and forward speed, tropical cyclones may generate swell with periods of 6–10 seconds (s) from any direction and with wave heights of 0.5–9.0 m.

4.6.3 Bathymetry and seabed habitats

The geomorphology of Joseph Bonaparte Gulf is characterised by a large basin, inner shelf, banks and shoals, terraces and pinnacles (Carroll et al. 2012; Galaiduk et al. 2018). The seabed is generally flat to gently sloping and is smooth, although pinnacles exist (refer to Section 4.2.1) with the nearest pinnacle located 16 km west from the project area at its closest point. Water depths within the project area ranges from approximately 75 m to 100 m below AHD.

A collaborative study between Geoscience Australia and the Australian Institute of Marine Science (AIMS) was undertaken to assess the Petrel sub-basin of the Bonaparte Basin as a potential CO_2 storage site (Nicholas et al. 2015). The study involved collection of baseline geological data and ecological information on the seabed environments and habitats. The assessment of seabed environments and habitats focussed on two areas, one of which (Area 1) partially overlaps the project area and therefore provides relevant information on the seabed habitats to be expected.

The seabed in Area 1 (in water depths of 78 m to 102 m) is characterised by shallow palaeochannels, plains, low-lying ridges and fields of shallow pockmarks (Nicholas et al. 2015). Plains were reported to comprise approximately 88% of the seafloor of the area, and were dissected by branching and discontinuous channels, which covered approximately 11% of the area (Nicholas et al. 2015). Channels ranged in size from tens of centimetres deep and tens of metres wide, to six metres deep and up to one kilometre wide. Low-lying ridges were identified on the plains and reported to be approximately 0.5 m high and 150 m to 200 m wide (Nicholas et al. 2015). Shallow depressions were numerous on the plains and in palaeochannels of the area, many of which were identified as pockmarks. On the plains these were generally less than 1 m deep.

Seabed sediment samples collected from the area during the study were dominantly poorly to very poorly sorted, gravelly to muddy sand. A total of 953 individual infauna representing more than 100 species were collected from 21 grabs at ten sampling stations within the area. Crustaceans dominated assemblages with 66% of individuals, followed by polychaetes with 25% of individuals. The remaining taxa included nematodes, echinoderms, and molluscs as well as epifaunal organisms such as cnidarians, sponges, and bryozoans. Infaunal assemblages were not statistically different across the geomorphic features (Nicholas et al. 2015).

Seabed habitats were reported to include barren sediments, bioturbated sediments, and mixed patches with octocorals and sponges. Benthic assemblages generally corresponded with geomorphic features where low-lying ridges supported mixed patches of octocorals and sponges, reflecting stable substrate for their colonisation and growth (Nicholas et al. 2015). In contrast, plains and palaeochannels supported lower densities of epifauna and a higher occurrence of bioturbation from mobile surface sediments. Depressions on the seabed (pockmarks) had no distinctive epifauna associated with these features.

Environmental Resources Management Australia Pty Ltd undertook marine baseline studies in 2010 and 2011 within the Joseph Bonaparte Gulf for the GDF SUEZ Bonaparte LNG Project in the Petrel and Tern gas fields (ERM 2011). The included surveys over petroleum titles, WA-6-R, WA-27-R and NT/RL1. NT/RL1 and WA-6-R (Petrel field) which are located immediately west of the project area in water depths of approximately 85 m to 100 m (refer Table 4-5 and Figure 4-10). ERM (2011) describes the seabed as mainly comprised of sand, coarse shell fragment and silt with sparse (~2%) coverage of heterotrophic filter feeders such as octocorals (soft corals and sea pens) and sponges, and hydrozoa (11-30% coverage at all sites). Infauna comprised mainly polychaete worms, gastropods, shrimps and crabs.

4.6.4 Water quality

Offshore surface waters are typically oligotrophic. This has been confirmed by studies recording low nitrate concentrations and low phytoplankton abundance (Hallegraeff 1995). In general, the region experiences an influx of comparatively nutrient-rich waters at depth in summer (wet season) and a variety of processes, such as tidal currents, internal waves and cyclone mixing, are known to carry these nutrients into the bottom waters of the shelf (Hallegraeff 1995).

With a large load of terrestrial sediment input to the Joseph Bonaparte Gulf, the strong semi-diurnal tidal currents present induce strong water column mixing and sediment resuspension, which results in higher turbidity (e.g. suspended sediment concentrations in excess of 100 mg/L) and enhanced nutrient levels (Galaiduk et al. 2018).

The surface waters in the Joseph Bonaparte Gulf MP, located approximately 90 km south of the project area, are characterised by very high primary productivity. The long-term annual mean surface chlorophyll-a concentrations range from 0.6 - 27 mg/m^3 with levels in the dry season (winter) often higher than other the wet season (summer). However, these values are likely over-estimates due to the dissolved and suspended materials brought in by rivers and the contamination of the remote sensing satellite imagery resulting in bottom reflectance in shallow water areas (Galaiduk et al. 2018).

Sea temperatures and salinity in the region are heavily influenced by the Indonesian Throughflow, which transports warm, low salinity water from the western Pacific Ocean through to the Indian Ocean (DSEWPaC 2012a).

Marine baseline studies undertaken by ERM 2010 and 2011 measured water quality during the wet season and dry season in the Joseph Bonaparte Gulf in the Petrel and Tern gas fields (ERM 2011), located south-west of the project area. Water quality was found to be relatively pristine with results typical of nutrient poor offshore northern Australian waters. Dissolved oxygen (DO) concentrations ranged from a minimum of 3.6 mg/L (49.8%) near the seabed to 7.8 mg/L (117.2%) at the sea surface. DO was consistently found to decrease with depth (ERM 2011). This is often linked to higher photosynthetic activity at the seawater surface and wave/wind generated mixing. These values are typical of unpolluted seawater (ERM 2011).

ERM (2011) found total suspended solids (TSS) levels were low across the area during the time of sampling, as would be expected for offshore waters in the region. Concentrations of nutrients (nitrogen and phosphorous) were also found to be low, as is expected for oligotrophic offshore waters (ERM 2011).

Seawater temperature is well mixed through the water column in the Joseph Bonaparte Gulf and tidal currents restrict formation of a thermocline. ERM (2011) reported that temperature remained consistent throughout the 100 m sampled water column, with a mean temperature of 29.5 °C recorded during the 2010 wet (summer) season and a mean of 27.9 °C recorded during the 2011 dry (winter) season. The seawater pH was found to range from a minimum of 7.67 to a maximum of 8.37, with basic to slightly alkaline properties (ERM 2011).

Benzene, Toluene, Ethylene, Xylene (BTEX), Polycyclic Aromatic Hydrocarbons (PAH) and Total Petroleum Hydrocarbons (TPH) were all below levels of detection in water samples (ERM 2011). Concentrations of the metals were all below their respective trigger values as defined by the Australia and New Zealand Environment and Conservation Council (ANZECC/ARMCANZ) guidelines (ERM 2011).

4.6.5 Sediment quality

Sampling of seabed sediments by Lees (1992) across an area of the Joseph Bonaparte Gulf MP (located approximately 90 km south of the project area) recorded a complex pattern of mixed silt, sand and gravel of terrestrial and biogenic extending from the rivers. Further offshore, seabed sediments become silty sand and clayey sand across mostly flat to rippled seabed (Galaiduk et al, 2018).

The marine baseline studies undertaken within the Joseph Bonaparte Gulf by ERM (2011) found low concentrations of metals in sediments from the area with mean concentrations of all metals found to be below the trigger values defined by ANZECC/ARMCANZ (2000) guidelines (ERM 2011). TPH, BTEX, PAH and tributyltin were not detected in the area (ERM 2011).

4.7 Biological environment

4.7.1 Planktonic communities

Plankton communities comprise phytoplankton and zooplankton, including fish eggs and larvae. Phytoplankton and zooplankton are a source of primary and secondary productivity, and key food sources for other organisms in the oceans (Brewer et al. 2007). Eggs and larvae may be dispersed throughout the water column and throughout the region, playing an important role in species recruitment.

Plankton abundance and distribution is patchy, dynamic and strongly linked to localised and seasonal productivity (Evans et al. 2016). The mixing of warm surface waters with deeper, more nutrient-rich waters (i.e. areas of upwelling) generates phytoplankton production and zooplankton blooms. In the offshore waters of north-western Australia, productivity typically follows a 'boom and bust' cycle. Productivity booms are thought to be triggered by seasonal changes to physical drivers or episodic events, which result in rapid increases in primary production over short periods, followed by extended periods of lower productivity.

The Indonesian Throughflow has an important effect on biological productivity in the northern areas of Australia. Generally, its deep, warm and low nutrient waters suppress upwelling of deeper, comparatively nutrient-rich waters, thereby forcing the highest rates of primary productivity to occur at depths associated with the thermocline (generally 70 – 100 m depth). When the Indonesian Throughflow is weaker, the thermocline lifts, and brings deeper, more nutrient-rich waters into the photic zone, which results in conditions favourable to increased productivity. Consequently, plankton populations have a high degree of temporal and spatial variability. In tropical regions, higher plankton concentrations generally occur during June to August (Brewer et al. 2007).

Phytoplankton assemblages recorded by ERM in 2010 and 2011 in the Joseph Bonaparte Gulf were typically characteristic of offshore tropical waters. Phytoplankton assemblages were mainly dominated by cyanobacteria during the 2010 wet season survey, which comprised 99.7% of identified algal cells. During the 2011 dry season survey, diatoms (Bacillariophyceae) dominated the phytoplankton assemblage. Overall, phytoplankton densities were typical of offshore oceanic waters and indicative of a classically oligotrophic (low nutrient) system as is the case across offshore WA and the Timor Sea, which feeds the Leeuwin Circulation in the NWMR (ERM 2011).

Zooplankton sampling indicated that copepods represented the most dominant group within the macro-zooplankton assemblage in both the 2010 wet season and 2011 dry season (ERM 2011). The density of these macro-zooplankton varied significantly among seasons, with an overall greater density of these animals recorded during the 2010 wet season. The greater density of macro-zooplankton may be indicative of higher primary productivity in the summer months fuelling population increases of the zooplankton (secondary productivity) at this time.

Larval fishes during both seasons were dominated by the Serranidae (cods) and Lutjanidae (snappers), both of which are species of interest targeted by commercial fisheries in the region. Larval fish density also varied seasonally with the 2011 dry season (May 2011) recording the highest densities of larval fishes in the zooplankton (ERM 2011). This seasonal effect is consistent with the notion of an extended spawning season (and possibly planktonic larval duration) of the reef species dominating the larval fish assemblage in the study area at this time (ERM 2011).

4.7.2 Benthic communities

Banks and shoals

A number of banks, shoals and reefs exist within the Bonaparte Basin (Figure 4-2). There are no banks, shoals, reefs or pinnacles within the project area. The closest pinnacle feature, part of the Pinnacles of the Bonaparte Basin KEF, is located approximately 16 km west of the project area. The closest bank feature is Flat Top Bank located approximately 35 km north-east of the project area at its closest point.

Other representative banks and shoals within the PEZ, with approximate distances from the project area include:

- Shepparton Shoal (130 km north-east)
- the Boxers Area (135 km north)
- Baldwin Bank (230 km west)
- Van Cloon Shoal (210 km west)
- Favell Bank (240 km west)
- Gale Bank (250 km west)
- Penguin Shoal (280 km west).

The shoals and banks within the PEZ are characterised by abrupt bathymetry, rising steeply from the surrounding shelf to horizontal plateau areas typically 20–30 m deep (AIMS 2012). Substrate types tend to differ from patches of coarse sand, to extensive fields of rubble and rocks, limited areas of consolidated reef and occasional isolated rock or live coral outcrops.

The submerged shoals within the PEZ can support diverse tropical ecosystems, including phototrophic benthos typical of tropical coral reefs. The shoals support a diverse biota, including algae, reef-building corals, hard corals and filter-feeders. The shoals and banks of the area may act as 'stepping stones' for enhanced biological connectivity between the reef systems of the region. Shoal and bank habitats are thought to provide additional regional habitat for marine fauna, including sharks and sea snakes (AIMS 2012).

The community structure of the banks and shoals is likely to be influenced by a number of processes, including disturbance resulting from storms and cyclones, and localised recruitment due to the limited larval dispersal of some invertebrate species (AIMS 2012). It is unknown how interconnected the individual banks and shoals are in regard to larval recruitment. The majority lie in the path of a south-westerly flowing current originating in the Indonesian Throughflow. However, seasonal reversals of current flow suggest larval recruitment can be supplied from outside this process.

Coral reefs

There are no coral reefs located in the project area. Coral reefs within the NMR/NWMR regions can be categorised into three general groups: fringing reefs, large platform reefs, and intertidal reefs. Corals are significant benthic primary producers that play a key ecosystem role in many reef environments and have an iconic status in the environments where they occur.

No platform reefs are present within the PEZ. Fringing and intertidal coral reefs within or adjacent to the PEZ boundary are listed below where * denotes overlap with the EMBA, noting that many coastal islands in the PEZ also support fringing coral reefs:

Roche Reefs* (140 km east)

- Vernon Islands (225 km east-north-east)
- Tiwi Islands* (140 km north-east)
- Emu Reefs (105 km south-east).

Observations throughout the world indicate that coral spawning on most reefs extends over a few months during the spawning period, typically between late spring and autumn (Stoddart & Gilmour 2005, cited in INPEX 2010). Spawning of corals in the NT Aquarium has been observed around the full moon period in October and November (TWP 2006, cited in INPEX 2010). Research into coral larval dispersal (Gilmour et al. 2009, 2010, 2011; Underwood et al. 2009, 2017; Cook et al. 2017; Waples et al. 2019) has indicated that dispersal and recruitment is predominately local and limited to within a few kilometres to a few tens of kilometres from natal reef patches.

Seagrass

There is no seagrass within the project area due to water depth (approximately 75 m to 100 m) and lack of suitable habitat.

Seagrasses do occur within the PEZ at the Tiwi Islands and Vernon Islands. Seagrass at the Tiwi Islands are predominantly located on the northern coastlines of Bathurst and Melville islands (Roelofs et al. 2005). The furthest northern extent of the EMBA overlaps a portion of the southern coastline of Bathurst Islands and does not overlap Melville Island. A survey of intertidal seagrasses carried out by the WA Museum did not record any seagrasses in the Joseph Bonaparte Gulf (Walker et al. 1996).

Coastal shallow-water seagrass habitats are generally rare in the region, accounting for only 11.5 km or 0.2% of the total coastline surveyed by Duke et al. (2010). The regionally dominant genera in Australia are *Halophila* and *Halodule*.

Demersal fish communities

ERM (2011) deployed baited remote underwater video systems in the Joseph Bonaparte Gulf to characterise the demersal fish communities. The survey recorded a total of 22 genera, representing 17 families associated with soft sediment habitats in water depths of approximately 85 m to 100 m. The most common families by density were Terapontidae (grunters) Nemipteridae (threadfin breams), and Lutjanidae (snappers). Lutjanid species, targeted by commercial and recreational fishers in tropical Australia, included goldband snapper (*Pristipomoides multidens*) and saddletail snapper (*Lutjanus malabaricus*).

4.7.3 Shoreline habitats

There are no islands within the project area. Adjacent to the eastern boundary of the PEZ are the Tiwi Islands and the Vernon Islands.

Tiwi Islands

The Tiwi Island group consists of two large, inhabited islands (Melville and Bathurst), and nine smaller uninhabited islands (Buchanan, Harris, Seagull, Karslake, Irritutu, Clift, Turiturina, Matingalia and Nodlaw). Melville Island is Australia's second largest island (after Tasmania), while Bathurst Island is fifth largest. Bathurst Island is approximately 2,600km^2 and Melville Island is approximately 5,785 km^2. The main islands are separated by Apsley Strait, which connects Saint Asaph Bay in the north and Shoal Bay in the south. The islands have been identified as an IBA as they support populations of many migratory shorebirds (BirdLife International 2022b) and they provide nesting habitat for marine turtles (DEE 2017a). The southern coast of Melville Island is predominantly characterised by sand–mud tidal flats with some mangroves and coral communities. The south-east of Melville Island has extensive tidal mudflats which provide an extensive habitat for shorebirds (INPEX 2010). The south coast of Bathurst Island has less extensive intertidal habitats than Melville Island. The islands' shorelines also feature numerous mangrove-lined bays and inlets. Melville and Bathurst islands are approximately 220 km and 140 km, respectively, from the project area.

Seagrasses have been recorded along the northern coastlines of both Bathurst and Melville islands (Roelofs et al. 2005).

Vernon Islands

The Vernon Islands are located in the Clarence Straight, north of Darwin, 225 km from the project area at its closest point. Three major islands make up the Vernon Islands group, plus a large reef and numerous lesser reefs and sand islands (TLC 2013). The islands are low lying, with a maximum height of 4 m above mean sea level. The islands are generally fringed with mangroves and surrounded by mud flats and rocks/reefs exposed at low tides.

Sediments around the Vernon Islands are gravel-dominated, due to the very strong tidal currents, experienced every day in the Clarence Straight.

Significant coral reefs are established within the intertidal and subtidal zone of the Vernon Islands, dominated by *Acropora* and *Montipora* spp. Extensive coralline algal terraces have also developed at the Vernon Islands reef complex. Extensive mangrove forests are present along the Vernon Islands coastline (Smit et al. 2000; KBR 2003) as well as seagrass and algal beds (TLC 2013).

The waters surrounding the Vernon Islands support populations of dugong and turtles, and studies have shown that dugong spend a considerable amount of time on intertidal rocky reefs at the Vernon Islands (Whiting, 2002).

Sandy beaches

Sandy beaches are the dominant shoreline habitat on the offshore islands such as the Tiwi Islands within or adjacent to the PEZ and provide significant habitat for turtles and seabird nesting above the high tide line (Section 4.7.4).

Generally, sands are highly mobile and therefore do no support a high level of biodiversity. Fauna within sandy beach habitats usually consists of polychaete worms, crustaceans and bivalves. These faunas provide a valuable food source for resident and migratory sea and shorebirds (DECMPRA 2005). Natural processes tend to supply fresh sediments and larval stock (food source) with each tidal influx.

Mangroves

Mangrove communities make up a common shoreline habitat along the northern WA and NT coastlines. There are extensive mangrove communities at the Tiwi and Vernon islands within the PEZ. Mangroves play an important role in connecting the terrestrial and marine environments and reducing coastal erosion. They also play an important ecosystem role in nutrient cycling and carbon fixing (NOAA 2010).

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

4.7.4 Marine fauna

Species of conservation significance

Species of conservation significance within the PEZ were identified through a search of the EPBC Act Protected Matters database.

The search identified a total of 26 "listed threatened" species and 57 "listed migratory" species that potentially use or pass through the PEZ. In addition, 105 "listed marine" species were identified, of which 25 are "whales and other cetaceans" that may occur at, or immediately adjacent to, the area. The full search results are contained in Appendix A.

Table 4-2 presents the marine species that are "listed threatened" species or "listed migratory species". Note that true terrestrial species have not been listed in Table 4-2.

Table 4-2: Listed threatened and/or migratory species under the EPBC Act potentially occurring within the PEZ

Species	Common name	Conservation status	Migratory
Marine mammals			
Balaenoptera borealis	Sei whale	Vulnerable	Migratory
Balaenoptera edeni	Bryde's whale	N/A	Migratory
Balaenoptera musculus	Blue whale	Endangered	Migratory
Balaenoptera physalus	Fin whale	Vulnerable	Migratory
Megaptera novaeangliae	Humpback whale	N/A	Migratory

Species	Common name	Conservation status	Migratory
Orcinus orca	Killer whale	N/A	Migratory
Physeter macrocephalus	Sperm whale	N/A	Migratory
Dugong dugon	Dugong	N/A	Migratory
Orcaella heinsohni	Australian snubfin dolphin	N/A	Migratory
Sousa sahulensis/chinensis	Indo-Pacific humpback dolphin	N/A	Migratory
Tursiops aduncus	Spotted bottlenose dolphin	N/A	Migratory
Marine reptiles			
Caretta caretta	Loggerhead turtle	Endangered	Migratory
Chelonia mydas	Green turtle	Vulnerable	Migratory
Dermochelys coriacea	Leatherback turtle	Endangered	Migratory
Eretmochelys imbricata	Hawksbill turtle	Vulnerable	Migratory
Lepidochelys olivacea	Olive ridley turtle	Endangered	Migratory
Natator depressus	Flatback turtle	Vulnerable	Migratory
Crocodylus porosus	Saltwater crocodile	N/A	Migratory
Aipysurus foliosquama	Leaf-scaled seasnake	Critically Endangered	N/A
Sharks, fish and rays			
Rhincodon typus	Whale shark	Vulnerable	Migratory
Carcharodon carcharias	Great white shark	Vulnerable	Migratory
Glyphis garricki	Northern river shark	Endangered	N/A
Glyphis glyphis	Speartooth Shark	Critically Endangered	N/A
Pristis clavata	Dwarf sawfish	Vulnerable	Migratory
Pristis pristis	Northern sawfish, Freshwater sawfish, Largetooth sawfish	Vulnerable	Migratory
Pristis zijsron	Green sawfish	Vulnerable	Migratory
Anoxypristis cuspidata	Narrow sawfish	N/A	Migratory
Carcharhinus longimanus	Oceanic whitetip shark	N/A	Migratory

Species	Common name	Conservation status	Migratory
Sphyrna lewini	Scalloped hammerhead	Conservation dependent	N/A
Isurus oxyrinchus	Shortfin mako	N/A	Migratory
Isurus paucus	Longfin mako	N/A	Migratory
Manta alfredi	Reef manta ray	N/A	Migratory
Manta birostris	Giant manta ray	N/A	Migratory
Marine avifauna			
Anous tenuirostris melanops	Australian lesser noddy	Vulnerable	N/A
Calidris canutus	Red knot	Endangered	Migratory
Calidris ferruginea	Curlew sandpiper	Critically Endangered	Migratory
Calidris tenuirostris	Great knot	Critically Endangered	Migratory
Charadrius leschenaultii	Greater sand plover	Vulnerable	Migratory
Charadrius mongolus	Lesser sand plover	Endangered	Migratory
Limosa Lapponica baueri	Bar-tailed godwit	Vulnerable	Migratory
Numenius madagascariensis	Eastern curlew	Critically Endangered	N/A
Rostratula australis	Australian painted snipe	Endangered	N/A
Anous stolidus	Common noddy	N/A	Migratory
Apus pacificus	Forktailed swift	N/A	Migratory
Calonectris leucomelas	Streaked shearwater	N/A	Migratory
Fregata ariel	Lesser frigatebird	N/A	Migratory
Fregata minor	Great frigatebird	N/A	Migratory
Sternula albifrons	Little tern	N/A	Migratory
Thalasseus bengalensis	Lesser crested tern	N/A	Migratory
Acrocephalus orientalis	Oriental reed-warbler	N/A	Migratory
Actitis hypoleucos	Common sandpiper	N/A	Migratory
Arenaria interpres	Ruddy turnstone	N/A	Migratory
Calidris acuminata	Sharp-tailed sandpiper	N/A	Migratory

Species	Common name	Conservation status	Migratory
Calidris alba	Sanderling	N/A	Migratory
Calidris melanotos	Pectoral sandpiper	N/A	Migratory
Charadrius veredus	Oriental plover	N/A	Migratory
Glareola maldivarum	Oriental pratincole	N/A	Migratory
Limnodromus semipalmatus	Asian dowitcher	N/A	Migratory
Limosa limosa	Black-tailed godwit	N/A	Migratory
Numenius phaeopus	Whimbrel	N/A	Migratory
Pandion haliaetus	Osprey	N/A	Migratory
Pluvialis squatarola	Grey plover	N/A	Migratory
Thalasseus bergii	Greater crested tern	N/A	Migratory
Tringa nebularia	Common greenshank	N/A	Migratory

Conservation management plans

In addition to species being identified as threatened or migratory and Matters of National Environmental Significance (MNES), depending on the threat classification, the Department of Climate Change, Energy, the Environment and Water (DCCEEW) has established management policies, guidelines, plans and other materials for threatened fauna, threatened flora (other than conservation-dependent species) and threatened ecological communities listed under the EPBC Act.

In particular, the objectives of DCCEEW recovery plans and conservation advice, seek to support the long-term recovery of various species outlining research and management measures that must be undertaken to stop the decline of, and support the recovery of a species, including the management of threatening processes.

Species identified during the EPBC Act Protected Matters database search that have a conservation advice or a recovery plan in place, as well as any particular relevant actions to assist their recovery and conservation, including threat abatement plans, are summarised in Appendix A.

Biological important areas

The DCCEEW has, through the marine bioregional planning program, identified, described and mapped biologically important areas (BIAs) for protected species under the EPBC Act. BIAs spatially and temporally define areas where protected species display biologically important behaviours (including breeding, foraging, resting or migration), based on the best available scientific information. These areas are those parts of a marine region that are particularly important for the conservation of protected species.

Table 4-3 provides an overview of the EPBC Act-listed species, identified by the EPBC Act Protected Matters database search, that are associated with a BIA either within the PEZ or adjacent to the PEZ boundary. The only BIAs that overlap the project area relate to two turtle foraging BIAs. They both overlap the southern portion of the project area and relate to green and olive ridley turtles in the Joseph Bonaparte Gulf. The locations of relevant BIAs for EPBC Act-listed species are shown in Figure 4-4 to Figure 4-7.

Table 4-3: BIAs intersecting the PEZ

Species	Foraging	Internesting	Breeding
Whale shark	X		
Avifauna: Lesser frigatebird Lesser crested tern Crested tern			 X X X
Flatback turtle	X	X	
Olive ridley turtle	X	X	
Green turtle	X	X	
Loggerhead turtle	X		

Marine mammals

Marine mammals that could potentially use or pass through the PEZ are identified in Table 4-2 and the locations to the closest marine mammal BIAs are presented in Figure 4-4. There are no identified BIAs for marine mammals within the project area, EMBA or PEZ.

Whale species such as humpback, sei, Bryde's and fin whales may occur in the project area occasionally, although the project area does not provide any unique or significant habitat for these species. At their closest points, the migration, calving and resting BIAs for humpback whale are located over 410 km south-west from the project area and so only occasional individuals are expected to travel the additional distance towards the Joseph Bonaparte Gulf and waters offshore from the NT. Blue whales, specifically the sub-species pygmy blue whale, are also unlikely to occur in the project area; the project area and PEZ are outside of the known distribution and core range for the species, and the pygmy blue whale migration BIA is located 320 km north-west of the project area at its closest point.

Although not listed as a listed threatened or migratory species under the EPBC Act, the Omura's whale (*Balaenoptera omurai*) may also occur in the project area. Limited information is available on Omura's whales but current data includes detections across north-western Australia between Exmouth and Darwin including in the Joseph Bonaparte Gulf and the Timor Sea (McCauley 2009, 2014, cited in Cerchio et al. 2019; McPherson et al. 2016, 2017), as well as off north-east Queensland (Cerchio et al. 2019).

The coastal waters of the Joseph Bonaparte Gulf and Darwin Harbour are BIAs for coastal dolphin species, including Indo-Pacific humpback dolphin, Australian snubfin dolphin and spotted bottlenose dolphin. The BIAs are not located within the PEZ; however, these species represent important populations in region. Given their coastal distribution, the dolphin species are unlikely to occur in the deep offshore waters of the project area but may occasionally occur in the waters of the PEZ. These species are described further below.

Indo-Pacific humpback dolphin

The Indo-Pacific humpback dolphin (*Sousa sahulensis/chinensis*) [2] occurs along the northern coastline of Australia down to western Shark Bay on the WA coastline (DAWE 2022b). Humpback dolphins live in warm waters, generally warmer than 15 °C, and at an average depth of 20 m, rarely traveling to waters deeper than 25 m (Napier 2011). As they live in close proximity to the shore, they are at risk of getting tangled in fishing nets and destruction of habitats is most likely the greatest threat to this species. They feed mainly on fishes associated with coastal-estuarine waters (DAWE 2022b). Indo-Pacific humpback dolphins breed once yearly, and births typically occur in the spring and summer (Napier 2011).

In the NT, the species is mainly found in water less than 20 km from the nearest river mouth, and in water depths of less than 15 m to 20 m; however, a few animals have been observed in waters up to 30 m to 50 m deep, but these remained in close proximity (within 5 km) to the coast (DAWE 2022b). Therefore, they would not be expected to be present in the project area located approximately 160 km west of the breeding BIA with water depths ranging from 75 m to 100 m.

The species does not appear to undergo large-scale seasonal migrations, although seasonal shifts in abundance have been observed (DAWE 2022b). A recent study of snubfin and humpback dolphins in the Kimberley region of WA (Waples et al. 2019) confirmed these species are present at low densities and occur as relatively small populations across the Kimberley.

Australian snubfin dolphin

The Australian snubfin dolphin (*Orcaella heinsohni*) occurs in waters off the northern half of Australia from Broome on the west coast to the Brisbane River on the east coast. The Australian snubfin dolphin occurs almost exclusively in protected shallow waters close to the coast and close to river and creek mouths (estuarine), preferring shallow waters, less than 20 m deep, although there are records of Australian snubfin dolphins in waters out to 23 km offshore (DAWE 2022f). Therefore, they would not be expected to be present in the project area located approximately 100 km offshore and in water depths ranging from 75 m to 100 m.

Breeding, calving, resting and foraging BIAs are located in coastal waters of the Joseph Bonaparte Gulf (outside of the PEZ), including near Cape Londonderry, King George River, Ord River, Cambridge Gulf, and Darwin Harbour.

Spotted bottlenose dolphin

Spotted bottlenose dolphins (*Tursiops aduncus*) occur in tropical and subtropical coastal and shallow offshore waters of the Indian Ocean, Indo-Pacific region and the western Pacific Ocean (DAWE 2022g). The species is typically found close to shore, within approximately 1 km from the nearest land or oceanic islands, or in water depths of less than 30 m. BIAs identified for foraging and breeding between April and November, include Darwin Harbour and are located outside of the PEZ.

Given the species preference for shallow water and close proximity to shore, the presence of the species within the project area, located approximately 100 km offshore and in water depths ranging from 75 m to 100 m, is likely to be limited.

[2] Previously recognised as the Indo-Pacific humpback dolphin (*S. chinensis*), which it is still listed as under the EPBC Act, the species was recognised as a separate species, Australian humpback dolphin (*S. sahulensis*), in 2014 (Jefferson & Rosenbaum 2014). However, this EP continues to refer to Indo-Pacific humpback dolphin, consistent with the current EPBC Act listing and PMST database search results.

Omura's whales

The Omura's whale is not listed as threatened or migratory under the EPBC Act, and therefore was not identified in Appendix A. Omura's whale is a relatively recently described species, found to be distinct from similar species, Bryde's whales, sei whale and the larger fin whale (Wada et al. 2003; Cerchio et al. 2019). The Omura's whale is widely distributed in primarily tropical and warm-temperate locations, between 35°S and 35°N (Cerchio et al. 2019).

In Australia, acoustic detections, photographic accounts and a single stranding record has documented Omura's whales from Exmouth to the Great Barrier Reef (Cerchio et al. 2019). Acoustic recordings documented in Australia between 2010 and 2013 (McCauley 2009, 2014) were previously attributed to Bryde's whales before the description of Omura's whale song by Cerchio et al. (2015). The attribution of the detections as potential Omura's whales by Erbe et al. (2017) was based on a review of spectrograms. The data from McCauley (2009, 2014) indicates the potential year-round presence of Omura's whales near Scott Reef, north-west of Broome, and in the Joseph Bonaparte Gulf.

Additionally, McPherson et al. (2017) examined recordings from the Pilbara, west Kimberley, Browse Basin and Timor Sea for the period 2010 to 2015. The Joseph Bonaparte Gulf was not included in the study. Water depths at the recording stations ranged from 130 m to 500 m. In the Timor Sea, to the north of the Joseph Bonaparte Gulf, Omura's whales were detected year-round, but more commonly between April and September, with a peak in the winter months of June and July. Based on the recordings, the whales seem to enter and leave the Timor Sea from the south-west, leaving the area by the start of November (McPherson et al. 2016, 2017). Fewer calls were detected in the Timor Sea between October and March (McPherson et al. 2017). Conversely, there were fewer detections in the Pilbara, west Kimberley and Browse Basin between May and December (McPherson et al. 2017). The results indicate presence across north-west Australian continental shelf, with potential seasonal movements across the region; however, McPherson et al. (2017) state that more data and analysis are needed to understand coastal/oceanic basin movements and population structure.

It is believed that some Omura's whale populations may be non-migratory, and therefore, foraging, breeding, calving and resting are likely to occur in waters where the population is distributed (Cerchio et al. 2019). However, habitat use and movements across north-western Australia are still unknown.

Given the year-round detection of potential Omura's whale vocalisations in the Joseph Bonaparte Gulf and across north-western Australia, the Omura's whale may be encountered within the project area and PEZ.

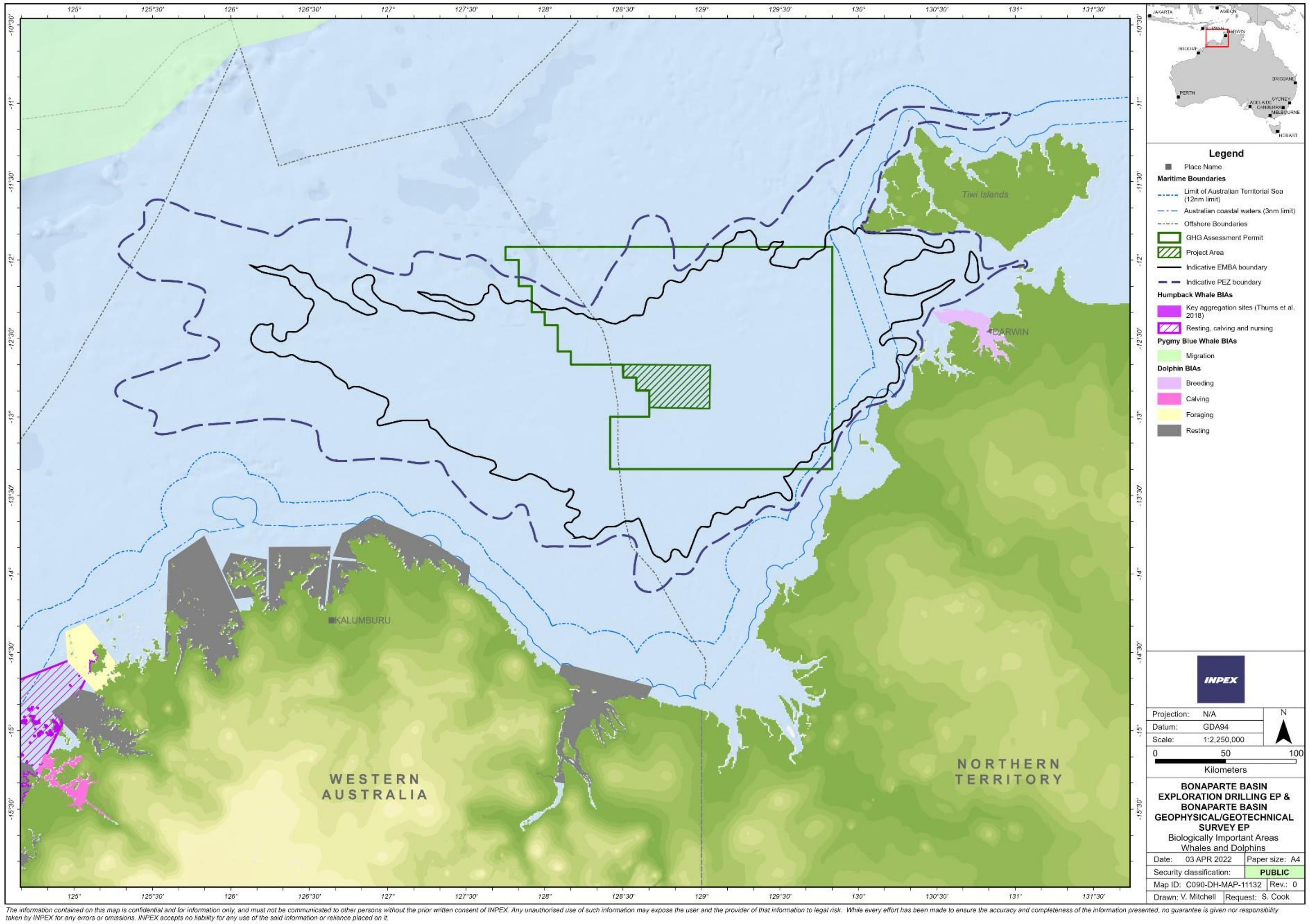

Figure 4-4: Biologically important areas associated with whales and dolphins

Marine reptiles

Turtles

The EPBC Act Protected Matters database search identified six species of marine turtle which may occur within the PEZ: the green turtle (*Chelonia mydas*), loggerhead turtle (*Caretta caretta*), leatherback turtle (*Dermochelys coriacea*), flatback turtle (*Natator depressus*), hawksbill turtle (*Eretmochelys imbricate*) and olive ridley turtle (*Lepidochelys olivacea*). A range of BIAs and habitats critical to survival for turtles overlap the PEZ (Figure 4-5).

Satellite tracking data reviewed in recent studies (Ferreira et al. 2020; Thums et al. 2021) concluded that although the spatial extent of marine turtle internesting areas (habitat critical to survival) was adequately covered by the defined internesting buffers and therefore afforded an appropriate level of protection, it was not the same for foraging areas. The spatial extents of foraging BIAs are considered to potentially underestimate the distribution of foraging turtles.

A marine turtle foraging BIA relating to green and olive ridley turtles overlaps the project area. Although overlapping, it is unlikely that the project area is the predominant foraging area for these particular species. Water depths in the project area range from 75 m to 100 m and the seabed in the project area comprises predominantly bare substrates, whereas the most recent study in this area indicates that green turtles predominantly forage over more complex substrates and habitats in coastal areas, and olive ridley turtle foraging is not common in the offshore waters of the project area (Thums et al. 2021).

In addition, Northern Prawn Fishery (NPF) bycatch records (Poiner & Harris 1996) indicate that all species of turtle found off northern Australia are most common in water depths less than 40 m. Dietary samples of olive ridley turtles from the eastern Joseph Bonaparte Gulf also indicate foraging depths of less than 14 m (Conway 1994 reported in Whiting et al. 2007). Most foraging by green and olive ridley turtles is therefore expected to be associated shallower waters.

A foraging BIA is also defined for flatback turtles and loggerhead turtles, located approximately 20 km west of the project area at the closest point. However, flatback turtles are reported to forage in areas of the Joseph Bonaparte Gulf with bare substrate, including those found in the project area (Thums at al. 2021).

The closest turtle nesting beaches and internesting habitat is located at the Tiwi Islands approximately 140 km from the project area including internesting habitat critical to the survival of flatback and olive ridley turtles. Therefore, marine turtle species are likely to be present in the waters of the PEZ and EMBA year-round as it encompasses several locations that support turtle foraging, nesting and internesting behaviours. Those turtle species with BIAs or habitats critical to survival that overlap the PEZ are further described below.

Flatback turtles

There are five genetically distinct populations of flatback turtles currently described around Australia. These are known as the: eastern Queensland, Arafura Sea, Cape Domett, south west Kimberley and Pilbara stocks (DEE 2017a). Additional genetic analysis is underway to provide better resolution of geographic boundaries for flatback turtles. Flatback turtles forage across the Australian continental shelf and into the continental waters off Indonesia (DEE 2017a). Breeding occurs along the NT coastline, Joseph Bonaparte Gulf and Kimberley coastline at all times of the year, with a reported peak between June to September (DEE 2017a).

At the Tiwi Islands (approximately 140 km from the project area and adjacent to the PEZ boundary), nesting beaches are surrounded by an 80 km internesting BIA and a 60 km habitat critical internesting buffer for flatback turtles. Nesting and internesting activities occur within these areas on a year-round basis (DEE 2017a), with peak nesting occurring between June – September. Another notable flatback turtle nesting beach is Cape Domett (approximately 200 km south of the project area). The Cape Domett nesting population appears to be one of the largest known nesting populations of this species, with an estimated yearly population in the order of several thousand turtles (Whiting et al. 2008). Nesting beaches are surrounded by an 80 km internesting BIA and a 60 km habitat critical internesting buffer for flatback turtles. Nesting and internesting activities occur within these areas on a year-round basis (DEE 2017a), with peak nesting occurring between July – September.

NPF bycatch data indicates that flatback turtles are more commonly part of bycatch in water depths of 10 m to 40 m than in deeper waters (Poiner & Harris 1996). However, more recently, core foraging activity for flatback turtles in northern Australia has been found to overlap deeper waters and bare substrates with much lower contributions of hard corals, seagrass, mixed benthic communities, macroalgae and turfing algae habitat (Thums et al. 2021). Therefore, bare substrate appears to be important foraging habitat for flatback turtles (Thums et al. 2021).

Although a BIA for foraging flatback turtles is defined to the north-west of the project area, Thums et al. (2021) identifies areas utilised for foraging activity by flatback turtles that include the deep-water, bare substrate areas as found both within the project area and to the north-west.

Flatback turtles display highly complex and connected networks across the NMR and NWMR (Thums et al. 2021). Movements between the NMR and NWMR show the Oceanic Shoals MP to the north of the project area, and Kimberley MP to the west of the project area are important nodes in the connectivity network, connecting movements between flatback stocks across the two marine regions (Thums et al. 2021).

Olive ridley turtles

There are two olive ridley turtle stocks in Australia, one in the NT (NT stock) and one on western Cape York near Weipa (Cape York Peninsula stock) (DEE 2017a). Low density nesting has also been described on the Kimberley coast, but genetic relatedness is currently unknown. Breeding of olive ridley turtles in the NT has been reported all year around, with peaks between April to August while the Kimberley stock nesting is reportedly year-round, with a peak around May to July (DEE 2017a). The majority of nesting occurs from the Arnhem Land coast (including Bathurst Island with a 20 km internesting buffer) to the north-western coast of Cape York Peninsula (DAWE 2022c).

Limited tagging data indicates that olive ridley turtles remain on the Australian continental shelf into waters off Indonesia (DEE 2017a). After nesting, olive ridley turtles are known to migrate up to 1,050 km to various foraging areas (DAWE 2022c) including the pinnacles of the Bonaparte Basin and the carbonate bank and terrace system of the Sahul Shelf KEFs (DEWHA 2008).

Core foraging activity by olive ridley turtles was found to overlap predominantly bare substrate with much lower contributions of hard corals, seagrass, mixed benthic communities, macroalgae and turfing algae habitat (Thums et al. 2021). Therefore, bare substrate appears to be important foraging habitat for olive ridley turtles (Thums et al. 2021). Olive ridley turtles are reported to eat predominantly gastropod molluscs, which are expected in sandy habitats (Conway 1994 reported in Whiting et al. 2007). However, olive ridley turtles could also be targeting prey on patchy hard substrate among sand habitat or foraging in the water column on species such as jellyfish (Guinea et al. 1995).

Although a BIA for foraging olive ridley turtles overlaps the project area, Thums et al. (2021) did not identify the project area as being a location utilised by the species for foraging. Instead, Thums et al. (2021) identified areas in the western Joseph Bonaparte Gulf and the Oceanic Shoals MP in the Timor Sea as being utilised for foraging.

Olive ridley turtles display highly fragmented and separate movements across the NMR and NWMR with limited connectivity, likely due to having fewer genetic stocks compared to other species (Thums et al. 2021). Olive ridley turtle movements include some foraging in the western Joseph Bonaparte Gulf, but are typically north of the project area, moving between East Timor, the Oceanic Shoals MP, and near the Tiwi Islands to the east (Thums et al. 2021).

Green turtles

Green turtles nesting in Australia are distributed across nine genetically distinct stocks with other green turtles known to feed in Australian waters that are part of stocks that breed in other countries (e.g. Indonesia, Papua New Guinea and New Caledonia) (DEE 2017a). Green turtles are predominantly found in Australian waters off the NT, Queensland and WA coastlines. A 20 km internesting buffer associated with green turtles has been identified for Melville Island (Tiwi islands) between November and March.

The pinnacles of the Bonaparte Basin KEF is located to the north-west of the project area (Section 4.2.1). The KEF is thought to provide important habitat for green turtles traversing between foraging and nesting grounds. The species primarily forages in shallow benthic habitats (<10 m) such as tropical tidal and subtidal coral and rocky reef habitat or inshore seagrass beds, feeding on seagrass beds or algae mats (DAWE 2022d).

Green turtle core foraging activity was found to overlap hard coral, macro algae, seagrass, filter feeder habitats, turfing algae and bare substrate habitats, typically in coastal areas, as their main diet is seagrass and algae (Thums et al. 2021).

Although a BIA for foraging green turtles overlaps the offshore waters of Joseph Bonaparte Gulf, including the project area, Thums et al. (2021) did not identify the project area as being a location utilised by the species for foraging. Instead, foraging activity was found to be localised in relatively small areas, sparsely distributed along the coastline, including around Cobourg Peninsula and the Tiwi Islands to the north-east of the project area (Thums et al. 2021).

Green turtles display highly complex and connected networks across the NMR and NWMR (Thums et al. 2021) indicating significant use of coastal waters and both AMPs and State MPs. Green turtles were found to move between the North Kimberley MP and Kimberley MP to the west of the project area, into the Joseph Bonaparte Gulf MP and offshore to the Oceanic Shoals MP. Based on the findings of Thums et al. (2021), the project area is unlikely to provide significant foraging habitat for green turtles, but green turtles may be transient within the project area as they move between areas.

Loggerhead turtles

In Australia, there are two unique breeding populations of loggerhead turtles. The eastern Australian population nests on the southern Great Barrier Reef and adjacent mainland Queensland coastal areas. Major nesting areas for the WA population include Muiron Islands, Ningaloo Coast and islands near Shark Bay (DEE 2017a). Satellite tagging of nesting female loggerhead turtles from the Ningaloo/Pilbara coast have shown dispersal north-west as far as Indonesia and southern Borneo, north-east as far as the Tiwi Islands and south as far as the Great Australian Bight (Waayers et al. 2015; Whiting et al. 2008). Loggerhead turtle breeding in WA reportedly occurs between November to May (DEE 2017a). Loggerhead turtles are known to forage around the pinnacles of the Bonaparte Basin and the carbonate bank and terrace system of the Sahul Shelf KEFs with a foraging BIA located approximately 20 km west of the project area.

Sea snakes

The EPBC Act Protected Matters Database search identified 21 sea snakes which may occur both within the project area and the PEZ. There are no reported BIAs for sea snakes. Most of the knowledge of sea snakes in Australian waters comes from trawler bycatch (Milton et al. 2009; Ward 1996). These studies indicate that sea snakes in northern regions of Australia tend to breed in shallow embayments and estuaries which are only represented in the PEZ. Therefore, these species may be seen in the open waters of the project area, but their presence is unlikely to be common. There is only a single specific occurrence of a sea snake reported in the Joseph Bonaparte Gulf MP (*Hyrdophis hardwickii*) (Galaiduk et al, 2018), which is located 90 km south of the project area; however there have been occurrences reported adjacent to the MP. Further supporting the assumption that sea snakes although no common they may be present in low numbers.

Crocodiles

The salt-water crocodile has a tropical distribution that extends across the northern coastline of Australia, where it can be found in coastal waters, estuaries, freshwater lakes, inland swamps and marshes, as well as far out to sea (Webb et al. 1987). There are no reported BIAs for crocodiles. Due to the species preference for estuaries and swamps and coastal waters it is unlikely to occur in the open waters of project area and is more likely to be observed in the PEZ where these preferred habitats occur.

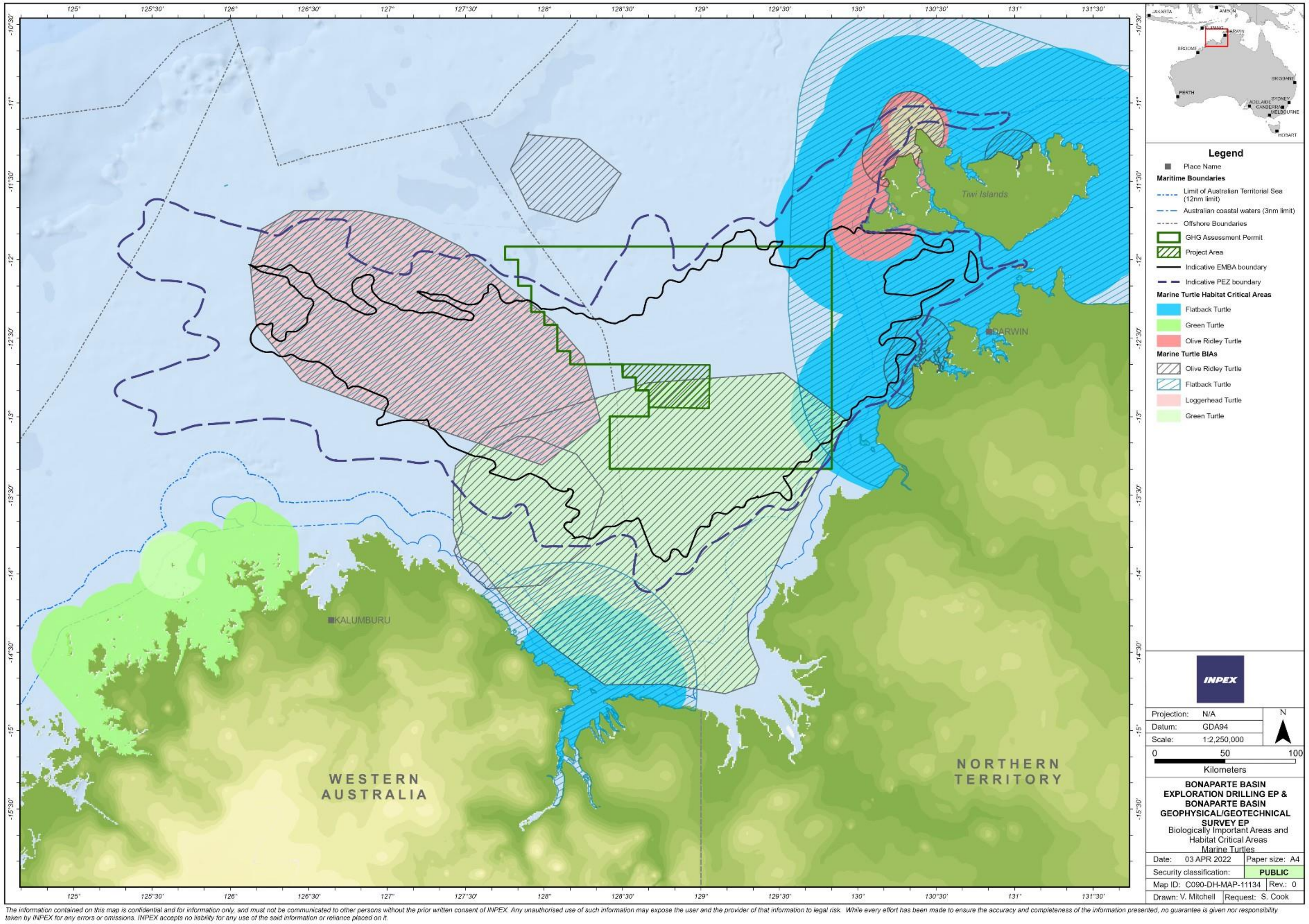

Figure 4-5: Biologically important areas associated with marine turtles

Fishes and sharks

While there are no BIAs for fishes and sharks within the project area, the furthest western extent of the PEZ overlaps a foraging BIA for whale sharks as shown in Figure 4-6. Although not specifically identified as BIAs, the KEFs within the PEZ, as described in Section 4.2, are also known to provide important habitat for diverse fish assemblages.

Whale shark

The whale shark is a solitary planktivorous species that spends the greater part of its foraging time at water depths above 100 m, often near the surface (Brunnschweiler & Sims 2011; Wilson et al. 2006). However, whale sharks are also known to engage in mesopelagic and even bathypelagic diving when in bathymetrically unconstrained habitats (Brunnschweiler et al. 2009; Wilson et al. 2006).

Whale sharks appear to prefer different locations at different times of year, and despite a reasonable understanding of the various whale shark aggregation locations and timings, little is known about the large-scale transoceanic movements in response to seasonal abundance of planktonic prey species (Eckert & Stewart 2001). The relatively limited number and dispersed origin of dietary studies of whale sharks mean it is difficult to determine general patterns in the trophic ecology of these animals in coastal ecosystems and the degree to which they act as links between oceanic and reef environments (Marcus et al. 2019). Patterns suggest that their foraging behaviour and role in oceanic and coastal ecosystems, is likely to vary both in space and time (Marcus et al. 2019).

Whale sharks can travel over vast distances between aggregation sites. One whale shark tagged in the Seychelles was relocated after 42 days having travelled 3,000 km to south of Sri Lanka and then located again four months later, a further 5,000 km away in the waters of Thailand (Hsu et al. 2007). Therefore, it is possible that whale sharks may transit through the PEZ in both Australian and Indonesian waters.

Whale sharks are widely distributed in tropical Australian waters. Within WA, whale sharks aggregate seasonally (March–June) to feed in coastal waters off Ningaloo Reef (Wilson et al. 2006). Ningaloo is the nearest aggregation to the project area and is located over 1,800 km to the south west. Whale sharks from Ningaloo Reef fitted with satellite trackers were observed to travel either north-east towards Timor Leste, or north-west towards the Indonesia islands of Sumatra and Java, with some individuals passing through the broad vicinity of Scott Reef (McKinnon et al. 2002, Wilson et al. 2006, Meekan & Radford 2010; Sleeman et al. 2010). Aerial (Jenner & Jenner 2009a; RPS Environment and Planning Pty Ltd 2010, 2011) and vessel (Jenner et al. 2008; Jenner & Jenner 2009b) surveys conducted in 2008 and 2009, involving over 1,000 hours of observer effort, recorded one whale shark in 2008 and two whale sharks in 2010 in the Browse Basin (Jenner et al. 2008 and RPS Environment and Planning Pty Ltd 2011 respectively).

The whale shark foraging BIA slightly overlaps of the western boundary of the PEZ approximately 300 km west of the project area. Based on the low levels of whale shark abundance observed in the studies listed above from the Browse Basin, the likelihood of whale shark presence within this BIA is considered very low, with no specific seasonal pattern of migration.

Sawfish

Four species of sawfish (largetooth/freshwater/northern, narrow, dwarf and green sawfish) were identified in the EPBC Act Protected Matters database search (Table 4-2). While sawfish are identified as being found within the project area and the PEZ, due to their ecology (generally estuarine rather than open-ocean species) it is expected that they will only be present on the periphery of the PEZ (Figure 4-7). Sawfish are not expected to occur within the open ocean location of the project area.

As described in Section 4.3, environments found in the PEZ provide protection for shallow shelf habitats that are important foraging, nursing and pupping areas for freshwater, green and dwarf sawfish. The range of sawfish species overlaps with popular recreational fishing locations in some parts of the NMR (DSEWPaC 2012b) and adjacent areas. Observations of dead discarded sawfish species from recreational fishing highlights that mortality occurs as a direct result of capture and discarding (DSEWPaC 2012b).

Pipefish and seahorses

The EPBC Act Protected Matters database search identified 34 species of the family Syngnathidae which potentially may be present both within the project area and the PEZ. Syngnathidae is a group of bony fishes that includes seahorses, pipefishes, pipehorses and sea dragons. Seahorses and pipefishes are a diverse group and occupy a wide range of habitats. However, the species identified in the EPBC Act Protected Matters database search (Appendix A) generally display a preference for shallow water habitats such as seagrass and macroalgal beds, coral reefs, mangroves and sponge gardens that can be found in the shallower areas of the PEZ (Foster & Vincent 2004; Lourie et al. 1999; Scales 2010). Therefore, pipefish and seahorses are only expected to occur in the PEZ in areas where suitable habitats are present.

Sharks and rays

Eight shark species (including whale shark described above) and two ray species were identified as having the potential to occur within the PEZ (Table 4-2; Appendix A).

It is considered possible that larger pelagic sharks such as the great white, oceanic whitetip, whale and mako sharks may transit through the project area/PEZ. However, sharks with known coastal habitats, such as the Northern River Shark (*Glyphis garricki*) are not expected to occur within the open ocean location of the project area, and therefore are only likely to be present in coastal habitats on the periphery of the PEZ. Similarly, the critically endangered, speartooth shark (*G. glyphis*) inhabits tidal rivers and estuaries in the NT and Queensland and is therefore only likely to be present in the PEZ (DAWE 2022e).

Listed manta rays have been observed within the PEZ, but for the same reasons as the large pelagic sharks, are unlikely to be common or resident within the project area.

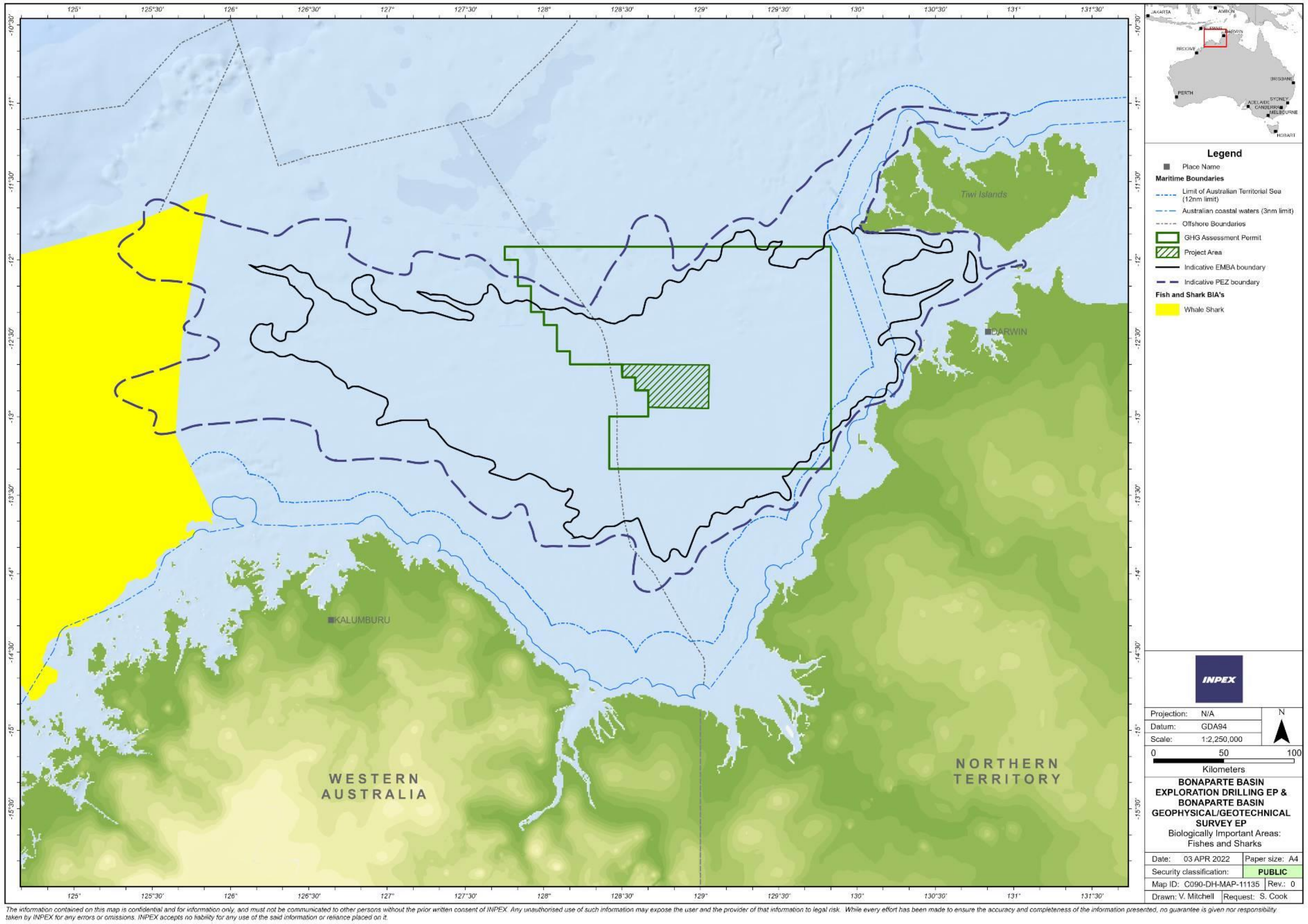

Figure 4-6: Biologically important areas associated with fishes and sharks

Marine avifauna

The project area is located within what is known as the East Asian-Australasian (EAA) Flyway an internationally recognised migratory bird pathway that covers the whole of Australia and its surrounding waters. 'Flyway' is the term used to describe a geographic region that supports a group of populations of migratory waterbirds throughout their annual cycle. There are 54 species of migratory shorebirds that are known to specifically follow migration paths within the EAA Flyway (Bamford et al. 2008). Migratory shorebird species are mostly present in Australia during the non-breeding period, from as early as August to as late as April/May each year. After arrival in Australia at the end of long migrations, they disperse throughout the country to a wide variety of habitats including coastal wetlands, mudflats, reefs and sandy beaches (DEE 2017b).

There are no BIAs for marine avifauna within the project area or the EMBA. However, the PEZ overlaps three BIAs for different marine avifauna species (Figure 4-8). The BIAs relate to crested tern (*Thalasseus bergii*) breeding in high numbers at the Tiwi Islands centred on the northern coast of Melville Island (which overlaps a portion of the PEZ in the north east approximately 220 km from the project area at its closest point). Lesser crested tern (*Thalasseus bengalensis*) and lesser frigatebird (*Fregata ariel*) breeding BIAs with associated foraging areas are also present overlapping the far south west of the PEZ with the outer boundaries of the BIAs approximately 175 km and 200 km away from the project area at the closest points. No Ramsar sites overlap the PEZ; however, a nationally important wetland (Finniss Floodplain and Fog Bay Systems) is present within the PEZ (refer to Section 4.5). This site provides important habitat for marine avifauna including migratory species which could be expected to be encountered in low numbers as they are likely to transit through the project area and the PEZ.

In addition to seabirds, the search of the EPBC Act Protected Matters database identified 22 species of migratory wetland bird species potentially present within the PEZ. These species may migrate through the PEZ to wetland habitats on the mainland and/or larger coastal islands (DEE 2017b). It is considered unlikely that project area would provide any significant resources to support these species given the lack of suitable habitat.

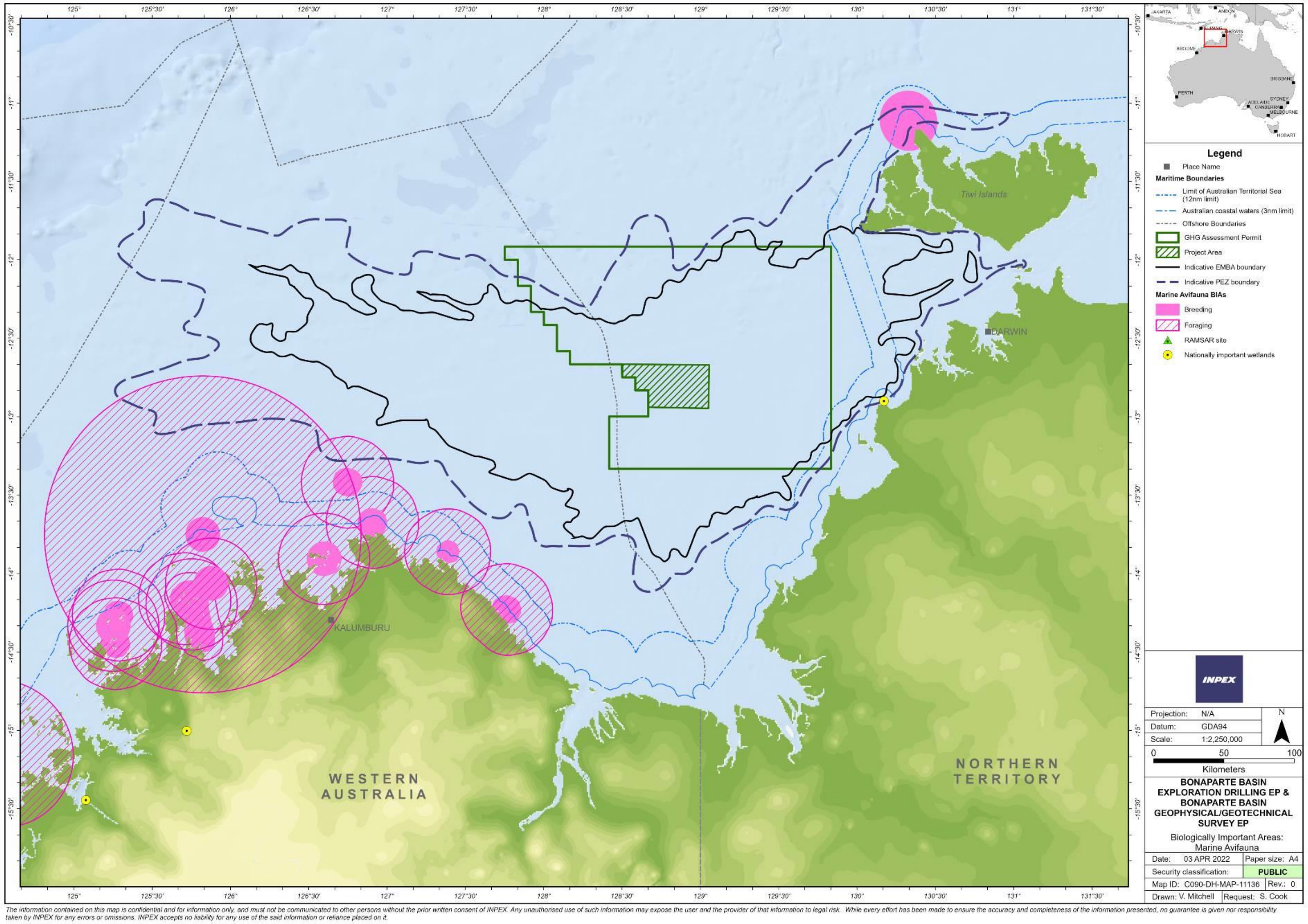

Figure 4-7: Biologically important areas associated with marine avifauna

4.8 Marine pests

Marine pests, or IMS, are defined as non-native marine plants or animals that harm Australia’s marine environment, social amenity or industries that use the marine environment; or have the potential to do so if they were to be introduced, established (that is, forming self-sustaining populations) or spread in Australia’s marine environment (DAWR 2018). There are 60 known non-native marine species that have become established in WA waters. Most are temperate species, with only six that are exclusively tropical. The greatest number of introduced species is found in the south-west corner of WA (DoF 2016).

Not all marine species introduced into a new area become pests as not all of them will survive or may not manage to reproduce and establish a viable population. Many IMS that establish self-sustaining populations cause no detectable harm. However, others have the potential to cause significant long-term economic, ecological and health consequences for the marine environment (DoF 2016).

Marine pests pose a major threat to the environment, economy and social amenity by disrupting ecological processes both directly (through predation or competition with native plants and animals) or indirectly (through habitat alteration). Once established, marine pests can rarely be eradicated, and their impacts are often long lasting (DAWR 2018).

Shallow water, coastal marine environments are most susceptible to the establishment of invasive populations, with most IMS associated with artificial substrates in disturbed shallow water environments such as ports and harbours (e.g. Glasby et al. 2007; Dafforn et al. 2009a, 2009b). The supply base supporting the activity is Darwin Port described in Section 4.9.7 including a summary of the IMS status.

Within WA and NT waters the marine pest, *Didemnum perlucidum* (white colonial sea squirt) is widely established in many ports, marinas and other locations (Smale & Childs 2012; Dias et al. 2016; DPIRD 2021). *D. perlucidum* has been recorded in natural and artificial marine environments in WA from Busselton to Broome and the NT in Darwin and surrounding coastal waters (Muñoz & McDonald 2014.) This ascidian can survive temperatures between 15 and 30 °C and has been recorded at depths of up to 8 m, however, it is commonly found in the upper 1–3 m of the water column (Muñoz & McDonald 2014).

4.9 Socioeconomic and cultural environment

4.9.1 World heritage areas

World heritage areas are locations that represent the best examples of the world’s cultural and natural heritage. The EPBC Act Protected Matters database search (Appendix A) identified no world heritage areas occurring within the project area or the PEZ.

4.9.2 Commonwealth heritage areas

The Commonwealth Heritage List contains places with Indigenous, historic and natural value and are protected under provisions of the EPBC Act. No Commonwealth heritage places including indigenous protected areas occur within the project area or PEZ.

4.9.3 National heritage places

The National Heritage List contains places of natural, historic and Indigenous significance to the nation. No National Heritage Places were identified as overlapping the project area or the PEZ.

4.9.4 Underwater heritage

Underwater cultural heritage sites are recognised as a part of the marine environment ecosystem. Under the *Underwater Cultural Heritage Act 2018* there are two sites within the PEZ that have protection zones declared around them, the SS Florence D (DAWE 2022h) and the submarine, I-124 (DAWE 2022i), located in a north-easterly direction approximately 195 km and 130 km away respectively from the project area. The protection zones extend to an 800 m radius surrounding the wrecks and are in place to limit disturbance of the cultural heritage and also the surrounding environment.

4.9.5 Cultural values

Aboriginal and Torres Strait Islander peoples have been sustainably using and managing their sea country for tens of thousands of years, in some cases since before rising sea levels created these marine environments (DNP 2018b). Sea country refers to the areas of the sea that Aboriginal and Torres Strait peoples are particularly affiliated with through their traditional lores and customs. Sea country is valued for Indigenous cultural identity, health and wellbeing (DNP 2018b).

The PEZ broadly spans the coastline from Kalumburu (WA) to the Coburg Peninsula and Tiwi Islands (NT). This coastline is the home of many Aboriginal groups, each with their own cultures, customs, languages and laws (AIATSIS 1996). Each group has its own recognised connections to land and sea country, through customary fishing, cultural practises, foraging, harvesting and hunting. These connections are formalised in some areas through the establishment of Indigenous Protected Areas (IPAs, i.e. TLC 2018), and Aboriginal ranger groups for the management of country.

Aboriginal land in the NT is defined by the *Aboriginal Land Rights Act (NT) 1976*, which affords Traditional Owners sovereign rights to country. In WA, recognition of Aboriginal rights is afforded by the *Native Title Act 1993* and *Land Administration Act 1997*, which give rights to access, live upon, forage, harvest and hunt upon and carry out traditional cultural practises on country. For the PEZ, three land councils represent the communities, the Kimberly Land Council for WA, and the Northern and Tiwi Land Councils in NT. There are also a number of Prescribed Bodies Corporate that represent Aboriginal people both in the NT and WA.

The NT coastline also contains evidence of Macassan people, who sailed from Indonesia in the early 1700s until the early 1900s and interacted with Aboriginal people. Evidence of these visits include the remains of stone fireplaces and smoke houses, tamarind trees planted by Macassan people, fragments of earthenware and porcelain. Although not marine based, Aboriginal and Macassan archaeological places are important to Aboriginal people as part of their continuing culture and identity.

INPEX maintains a reconciliation action plan (RAP[3]) which outlines the company's engagement with the Aboriginal and Torres Strait Islander communities that it works within. In implementing this EP and the RAP, INPEX acknowledges the national and international rights and cultural interests of Aboriginal and Torres Strait Islander peoples and the deep understanding and experience that they contribute.

[3] Available online at reconciliation-action-plan-a4-brochure-2019_fa_hr_web.pdf (inpex.com.au)

4.9.6 Fishing

Commercial fisheries – Australian waters

The Australian Fisheries Management Authority (AFMA) manages Australian Commonwealth fisheries within the Australian fishing Zone (AFZ). AFMA carry out objectives that are listed in the *Fisheries Administration Act 1991* and the *Fisheries Management Act 1991*. NT fisheries are managed by the NT DITT. Wild harvest fisheries are managed under the NT *Fisheries Act 1988* and Fisheries Regulations 1992. WA fisheries are managed by the WA Department of Primary Industries and Regional Development (DPIRD) under the *Fish Resources Management Act 1994* and Fisheries Resources Management Regulations 1995.

The licence and management areas of four Commonwealth-managed commercial fisheries, two joint authority commercial fisheries, 13 NT-managed commercial fisheries, six WA-managed commercial fisheries, and occur within the PEZ. These fisheries are:

- Commonwealth Northern Prawn Fishery (NPF)
- Commonwealth Western Skipjack Tuna Fishery
- Commonwealth Southern Bluefin Tuna Fishery
- Commonwealth Western Tuna and Billfish Fishery
- WA Joint Authority Northern Shark Fishery
- NT Joint Authority Northern Finfish Fishery (comprises the NT Demersal Fishery, NT Offshore Net and Line Fishery and the NT Timor Reef Fishery)
- NT Demersal Fishery
- NT Spanish Mackerel Fishery
- NT Offshore Net and Line Fishery
- NT Jigging Fishery
- NT Aquarium Fishery
- NT Pearl Oyster Managed Fishery
- NT Coastal Line Fishery
- NT Coastal Net Fishery
- NT Barramundi Fishery
- NT Trepang Fishery
- NT Development Fishery (Small Pelagic)
- NT Mud Crab Fishery
- NT Bait Net Fishery
- WA Northern Demersal Scalefish Managed Fishery
- WA Mackerel Managed Fishery
- WA Pearl Oyster Managed Fishery (Zone 4)
- WA Marine Aquarium Fish Managed Fishery
- WA Specimen Shell Managed Fishery
- WA Beche-de-Mer Managed Fishery.

Not all of the above fisheries are active within the project area or PEZ. INPEX has analysed commercial fishing catch and effort data from the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), NT DITT and WA DPIRD to further understand the fisheries that are active in waters overlapping and adjacent to the project area.

Commonwealth fisheries data, available from ABARES for the period 2010—2020, confirmed that the only Commonwealth-managed fishery that actively fishes in the Joseph Bonaparte Gulf is the NPF. According to the AFMA website, the Western Skipjack Tuna Fishery is not currently active, and no Australian boats have fished for skipjack tuna since 2009; as confirmed by the ABARES fishing effort data. The Western Tuna and Billfish Fishery has consistently fished off the west coast of WA and off South Australia, while the Southern Bluefin Tuna Fishery operates off South Australia and New South Wales.

The project area does not overlap WA offshore waters and so no WA-managed fisheries operate in the project area. The fishing effort data provided by WA DPIRD also indicates limited fishing effort in the WA offshore waters to the west of the project area.

NT fishing effort data for the period 2016—2020 provided by NT DITT demonstrates that the main fishery that operates in the project area is the NT Demersal Fishery. The NT Offshore Net and Line Fishery also reports low-level fishing effort near to the project area. The NPF and NT-managed fisheries that have previously been active in the project area are described in Table 4-4.

Table 4-4: Commonwealth and NT-managed commercial fisheries operating near the project area

Fishery	Licence area description	Gear types and usage	Target species	Summary of fishing activities	Fishing effort in the project area
Commonwealth-managed fisheries					
Northern Prawn Fishery	The NPF extends from the Joseph Bonaparte Gulf across the top end to the Gulf of Carpentaria (AFMA 2022).	The NPF uses otter trawl gear. Most vessels have transitioned from using twin gear to using a more efficient quad rig comprising four trawl nets.	White banana prawn Redleg banana prawn Tiger prawns By-product species include endeavour prawns, scampi, bugs and saucer scallops.	The NPF operates during two seasons. The first season is from 1 April to 15 June, and during this time banana prawns are mainly caught. In the second season (1 August – 1 December) tiger prawns are predominantly caught. Either season has the potential to end early if catch rates fall below pre-set trigger levels. Closures in between these seasons protect / allow recovery of the stocks (Patterson et al. 2021). The Joseph Bonaparte Gulf fishery comprises less than 5% of the area of the NPF; however, it contributes most of the NPF's red-leg banana prawn catch (Patterson et al. 2021). Since 2021, a closure area has applied to the whole of the Joseph Bonaparte Gulf south of latitude 13°S. The closure area excludes fishing in the Joseph Bonaparte Gulf during the first 1 April to 15 June fishing season for better management of the red-leg banana prawn stock of the Joseph Bonaparte Gulf (AFMA 2022a).	Based on 2010 to 2020 fishing data, fishing intensity within the Joseph Bonaparte Gulf in any given year is usually low (<0.1 days/km^2) although in some years it has been or medium (0.1-0.25 days/km^2) or high (0.25-0.55 days/km^2). Most fishing effort in the Joseph Bonaparte Gulf has historically occurred >50 km south-west of the project area. Due to the presence of the new closure area, these key fishing grounds will now only be accessible during the tiger prawn fishing season. The project area is located to the north of the closure area but overlaps waters where <5 vessels have historically fished during any year. Fishing effort data provided by the Northern Prawn Fishery Industry during stakeholder consultation for the EP is consistent with the ABARES data and confirms limited or no fishing effort within the project area each season.

Fishery	Licence area description	Gear types and usage	Target species	Summary of fishing activities	Fishing effort in the project area
NT-managed fisheries					
NT Demersal Fishery	Demersal fishing is allowed from 15 nm from the low water mark to the outer boundary of the AFZ, excluding the area of the Timor Reef Fishery (NTG 2022a).	Vertical lines, drop lines, finfish long-lines, baited fish traps and semi-demersal trawl nets in two multi-gear areas. The project area is located in a multi-gear area where trawling is permitted	Saddletail snapper Crimson snapper Goldband snapper Red snapper	There are currently 18 active licences (NTG 2022a) and in 2017, the reported catch was 3,389 tonnes, including, red snapper (70.8 %) and goldband snapper (10.1 %) (NT DPIR 2019). The majority of fishing activity that takes place in the multi-gear area overlapping the project area is trawling, with very limited trap and line activity. Fishing occurs year-round (NT DPIR 2019).	A review of historic fishing effort data (2016 – 2020) provided by NT DITT indicates that the project area overlaps an area of consistent trawl effort with approximately 130 – 350 hours of effort per year within the project area. Further review of Global Fishing Watch automatic identification system (AIS) and vessel monitoring system (VMS) data, indicates that trawl vessels consistently operate in the project area as well as waters located to the north of the project area. Stakeholder consultation with a Demersal Fishery licence holder has confirmed that trawling takes place within the project area and further north, throughout the year.
NT Offshore Net and Line Fishery	The Offshore Net and Line extends from the low water mark to the outer boundary of the AFZ to the extent the waters are relevant to the NT (NTG 2022b).	Demersal long lines, pelagic long lines, longlines and pelagic nets.	Grey mackerel Black-tip shark	The fleet operates with an average of 10 vessels per year, and the fishery harvested 632 tonnes in 2018-19, including grey mackerel (510 tonnes) and combined finfish (58 tonnes) (NTG 2020).	A review of historic fishing effort data (2016 – 2020) provided by NT DITT indicates that fishing by the Offshore Net and Line Fishery within the project area is infrequent, with 15 hours of effort in 2016, 3 hours of effort in 2019 and no effort within the project area in 2017, 2018 and 2020.

Recreational fishing

A wide range of recreational activities occur within the NWMR and NMR. Recreational fishing activities peak in winter and are concentrated in coastal waters along the Kimberley and NT coastlines, generally around the population centres of Broome, Wyndham and Darwin. Some of the recreationally important species of the coastal areas include barramundi, mangrove jack, jewfish and bream.

Annual expenditure by recreational fishers and the guided fishing industry in the NT was estimated at $52 million in 2019 (NT DITT 2022). Estuarine waters attract just over half (51%) of the total recreational fishing effort in the NT, followed by coastal waters (31%), rivers (10%), offshore marine waters (5%) and lakes/dams (3%) (NT DITT 2022). A review of historic fishing effort data (2016 – 2020) indicates that fishing tour operators occasionally access waters within the eastern half of the project area, although waters closer to the coast and nearer Darwin are more frequently fished.

Recreational fishing occurs throughout the year, with peak fishing effort occurring from approximately October to December and April to June (NT DITT 2022).

Traditional fishing

Dugong, fish and marine turtles are important components of Aboriginal culture and diet. Aboriginal people continue to actively manage their sea country in coastal waters of the NT and WA in order to protect and manage the marine environment, its resources and cultural values. Customary subsistence fishing is recognised in the NT and managed under Aboriginal coastal licences under the NT *Fisheries Act 1988* and Fisheries Regulations 1992 for fishing in coastal waters within 3 nm of the coastline (NT DITT 2021). The offshore waters of the project area are not understood to be of specific value or interest for traditional fishing practices.

Aboriginal communities on the Tiwi Islands, such as Wurrumiyanga on Bathhurst Island have been actively involved in managing their own sea turtle stocks in consultation with the NT government, forming an Indigenous marine ranger program. Anecdotal evidence indicates that green turtles are harvested in the water, while eggs of any turtle species are taken periodically. Dugongs are also sometimes taken (DEWR 2006). While the outer boundary of the PEZ reaches the Tiwi Islands it does not overlap any indigenous protected areas.

Hunting, subsistence fishing and shell collecting are recognised as occurring in the North Kimberley Marine Park and wider Kimberley region (DNP 2018a; Smyth 2007). As stated in Section 4.3, several Aboriginal groups have responsibility for sea country in areas covered by the PEZ. The land and sea country of the Balanggarra people extends from Napier-Broome Bay to Cambridge Gulf and Wyndham in the Joseph Bonaparte Gulf, inshore from the project area and PEZ. In the past, the Balanggarra people speared fish along the rocky shoreline and in shallow waters. Saltwater fish, turtles, dugong, mud crabs and cockles continue to be important food sources for the Balanggarra people today (DPaW 2016). The Miriuwung Gajerrong land and sea country extends from the Cambridge Gulf to the NT. In the past, the Miriuwung Gajerrong people would hunt, fish and gather bush tucker in tidal areas such as mangroves. Fishing and hunting are still practiced today (DPaW 2016).

Pearling and aquaculture

The Kimberley region is of significance to the WA pearling industry, which is the world's top producer of silver-white South Sea Pearls, which come from the silver-lipped pearl oyster, *Pinctada maxima* (Hart et al. 2016). However, WA pearling activities do not occur within the PEZ. All WA pearl farms and holding sites occur in coastal waters outside of the PEZ.

In the NT, historic fishing effort data (2016 – 2020) provided by NT DITT indicate that a limited amount of pearl oyster fishing (diving and hand collection) was undertaken by a single licence holder in the years 2018 and 2019. The areas fished include some limited fishing effort in 2019 at Flat Top Bank, between approximately 40 km and 90 km north-east of the project area. The reported fishing effort was less than 20 minutes in each block for the whole of 2019 and there was no fishing in any other year. The NT DITT data also indicate that fishing effort occurred at shoals located to the west of the Tiwi Islands, at the most northern extent of the PEZ. Fishing effort was typically less than 1 hour per 10 nm block per year in this area. Limited effort (up to 4 hours per 10 nm block per year) was also reported in waters offshore from Cobourg Peninsula and Arnhem Land, located outside of the PEZ. Overall, pearl oyster fishing effort is infrequent and appears to be exploratory. Pearl farm leases in NT waters are limited to the coastal waters around Bynoe Harbour and Beagle Gulf near Darwin, as well as Cobourg Peninsula and Nhulunbuy further to the east (NTG 2021 and confirmed by NT DITT during stakeholder consultation).

Other aquaculture activities in the Kimberley region of WA and in the NT are also understood to be limited to land-based projects (e.g. the Darwin Aquaculture Centre and Project Sea Dragon prawn hatchery development near Darwin), barramundi farming and other activities in shallow coastal waters (NTG 2021), which are outside of the PEZ.

4.9.7 Shipping and ports

The proximity of Darwin Port to south-east Asia makes the surrounding area a key shipping region. Vessel tracking data from AMSA‘s Craft Tracking System (CTS) for February 2022 is presented in Figure 4-8. The CTS collects vessel traffic data from a variety of sources, including terrestrial and satellite shipborne AIS data sources.

Figure 4-8 shows high traffic shipping volumes in close proximity to Darwin Port and along key shipping routes to and from south-east Asia. Vessel traffic predominantly avoids the project area with vessels passing east/west between Darwin and the northern Kimberley coastline.

Darwin Port

Darwin Port, located in Darwin Harbour in the NT, is a major service centre for the mining and energy sectors. Darwin Port operations consist of marine traffic of non-commercial vessels (e.g. recreational anglers) and trading vessels, including commercial ships carrying cargo and passengers, PSVs and AHSVs, tankers and bulk-cargo vessels.

A number of targeted marine pest monitoring programs have been executed in Darwin Port since 2010 (Cardno 2015, Golder Associates 2010), and through the course of these programs the following IMS have been detected; however, none of these are listed as noxious species by the NT Government (NTG): *Magallana gigas* (presence of one shell valve) and *Caulerpa racemosa var. lamourouxii* (Golder Associates 2010) *Amphibalanus amphitrite* (barnacle), *Bugula neritina* (bryozoan) and the ascidians *Botryllus schlosseri, Botrylloides leachi* and *D. perlucidum* (Cardno 2015). While *M. gigas* was detected during a survey, as this was based on the presence of one shell valve, Golder Associates (2010) determined it was likely to be a discarded shell from oysters imported and purchased for human consumption and therefore its presence did not confirm this species had established in Darwin Port. *C. racemosa var. lamourouxii* is common in tropical and warm temperate seas and has previously been recorded in warmer waters in Australia including Darwin Harbour (Golder Associates 2010).

A marine pest monitoring program managed by NT Aquatic Biosecurity officers is currently ongoing. Artificial settlement units are located throughout Darwin Port, including on the INPEX Ichthys liquified natural gas and liquified petroleum gas jetties. These settlement units are photographed monthly and collected, replaced and analysed every four months.

In addition to monitoring program outcomes, in 1999 an outbreak of black stripped mussels was recorded in three Darwin Port marinas. Following, a national response to the outbreak this species was successfully eradicated from invaded locations (Ferguson 2000).

In summary, numerous IMS monitoring studies have been undertaken at Darwin Port with IMS identified. Therefore, Darwin Port is considered to be an operationally active environment rather than a pristine environment.

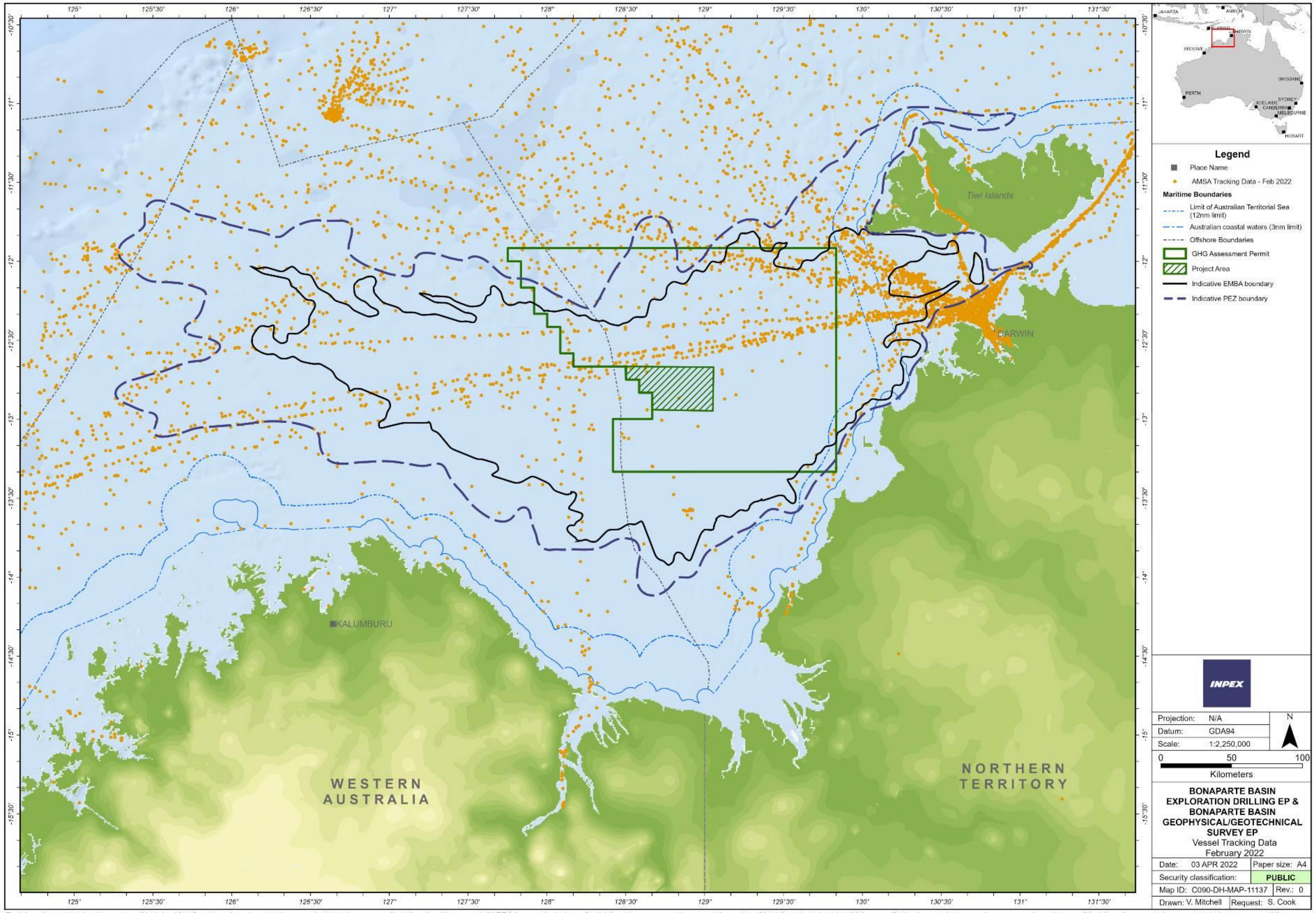

Figure 4-8: Vessel tracking data in the Bonaparte Basin (February 2022)

4.9.8 Defence

Australian Border Force and Australian Defence Force vessels undertake civil and maritime surveillance within the region with the primary purpose of monitoring the passage of illegal entry vessels and illegal fishing activity within these areas.

The project area overlaps with practice and training areas that comprise the North Australian Exercise Area (NAXA), a maritime military zone administered by the Australian Defence Force, as well as restricted airspace (Figure 4-9). The NAXA is used by the Royal Australian Air Force and the Royal Australian Navy for military operations including live weapons and missile firings.

From consultation with the Department of Defence, Operation Talisman-Sabre is a major international activity undertaken within the NAXA and is scheduled to occur in mid-2023, but exact timing is not confirmed. The NAXA is also the primary location of the KAKADU training exercise that operates biennially. The exercise involves numerous naval ships from various countries participating in the waters off Darwin and Northern Australia. Exercise KAKADU is understood to be planned for September 2022 and then again in 2024. Exercise Singaroo is conducted immediately following KAKADU in the same areas. During these exercises, access to NAXA may be restricted to all vessels and aircraft.

In addition to major training exercises, patrol boats regularly conduct training in the NAXA area that includes live firings; however, these are not usually programmed until six to eight weeks prior.

Unexploded ordinance (UXO) may be present on and in the sea floor of the project area. According to the Defence UXO Database, the project area is located within a former air-to-air weapons range (shared boundary with the Defence training area shown in Figure 4-9) and may be affected by UXOs (Department of Defence 2022). A search of the Department of Defence's UXO map confirmed ten areas of potential UXO exist within the PEZ, categorised[4] as follows (Department of Defence 2022):

- 1111 – Darwin Area. This area was a former air-to-air weapons range. (UXO Category: Other)
- 1110 Darwin Area. This area was a former air-to-air weapons range. (UXO Category: Other)
- 1091 – Timor Sea. This area was used for Naval Gunnery during the 1980's (UXO Category: Other)
- 1098 – Melville Is / SS Don Isidro. The SS Don Isidro was used for practice bombing mast head attack during WW2. (UXO Category: Other).

[4] Defence classify areas of UXO risk according to the following categories:

- Substantial potential – Sites have a confirmed history of military activities that often results in numerous residual hazardous munitions, components or constituents. There will be a history of numerous UXO finds or heavy residual evidence such as fragmentation.
- Slight potential – Sites have a confirmed history of military activities that often results in numerous residual hazardous munitions, components or constituents; but where confirmed UXO affected areas cannot be defined. Alternatively, sites categorised as Slight may have a confirmed history of military activities of a type that sometimes results in occasional residual UXO. UXO or explosive ordnance fragments / components may have occasionally been recovered from the site.
- Remote potential – Sites have records which confirm that the area was used for military purposes, however the activity is of a nature that makes it unlikely that UXO would exist. UXO or explosive ordnance fragments / components have not been recovered from the site.
- Other – Defence records confirm that the area was used for military training but do not confirm that the site was used for live firing. UXO or explosive ordnance fragments / components have not been recovered from the site. These sites have been included for general information purposes only.
- Sea Dumping Area – These areas have been used for historical sea-dumping of waste material which may include explosive ordnance.

- 1100 Quail Island – This area was declared as an RAAF Bombing Range. (UXO Category: Other)
- 1096 – Lanyer Swamp Air Weapons Range. This area was a RAAF Bombing and Gunnery Area. Sections of it have undergone UXO remediation. (UXO Category: Substantial Potential)
- DEP036 – Potential Depth Charge UXO - Timor Sea. This site was an area where Depth Charges were used in WW2 and where some depth charges failed to function. Detail is contained in Notice To Mariners NTM/12/Aus 318. (UXO Category: Sea Dumping of Depth Charges).
- DEP037 – Potential Depth Charge UXO - Timor Sea. This site was an area where Depth Charges were used in WW2 and where some depth charges failed to function. Detail is contained in Notice To Mariners NTM/12/Aus 315. (UXO Category: Sea Dumping of Depth Charges).

The EPBC Act Protected Matters database search identified the Quail Island Bombing Range as Commonwealth land overlapping with the PEZ (Appendix A).

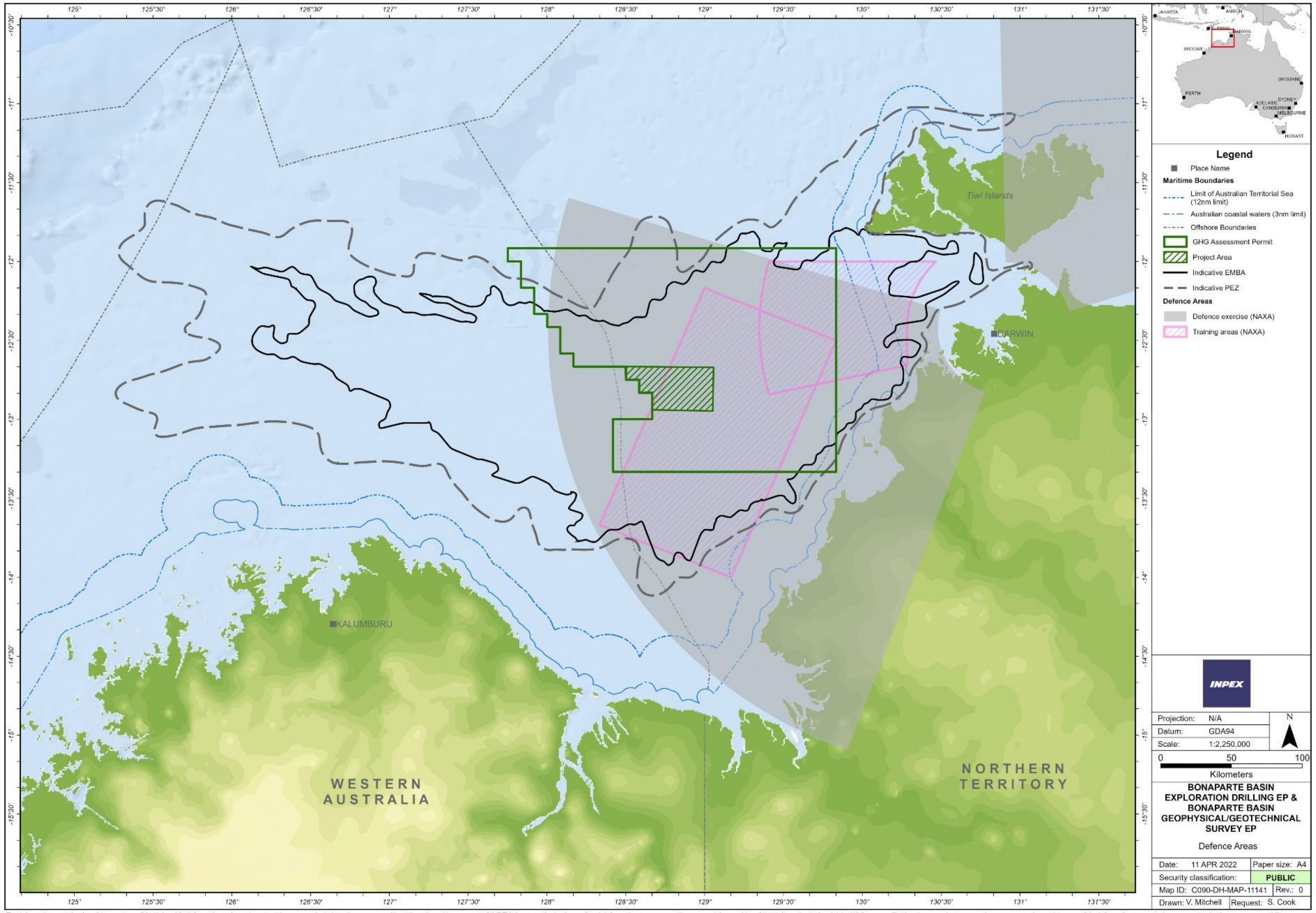

Figure 4-9: Defence exercise and training areas

4.9.9 Oil and gas industry

The Bonaparte Basin is an established hydrocarbon province with a number of commercial operations (Figure 4-10). There are no operating petroleum assets in proximity to the project area with the closest production facility located approximately 100 km south (ENI Blacktip). Petroleum permits which overlap the GHG assessment permit and/or project area are listed in Table 4-5.

Table 4-5: Overlapping or adjacent oil and gas permits

Permit	Permit type	Titleholder contact	Distance from the GHG assessment permit
NT/P88	Exploration permit	Neptune Energy Bonaparte Pty Limited	Overlaps GHG assessment permit and project area
WA-6-R	Retention lease	Neptune Energy Bonaparte Pty Limited	Overlaps GHG assessment permit but not the project area
NT/RL1	Retention lease	Neptune Energy Bonaparte Pty Limited	Overlaps GHG assessment permit but not the project area
WA-548-P	Exploration permit	Neptune Energy Bonaparte Pty Limited	Overlaps GHG assessment permit but not the project area

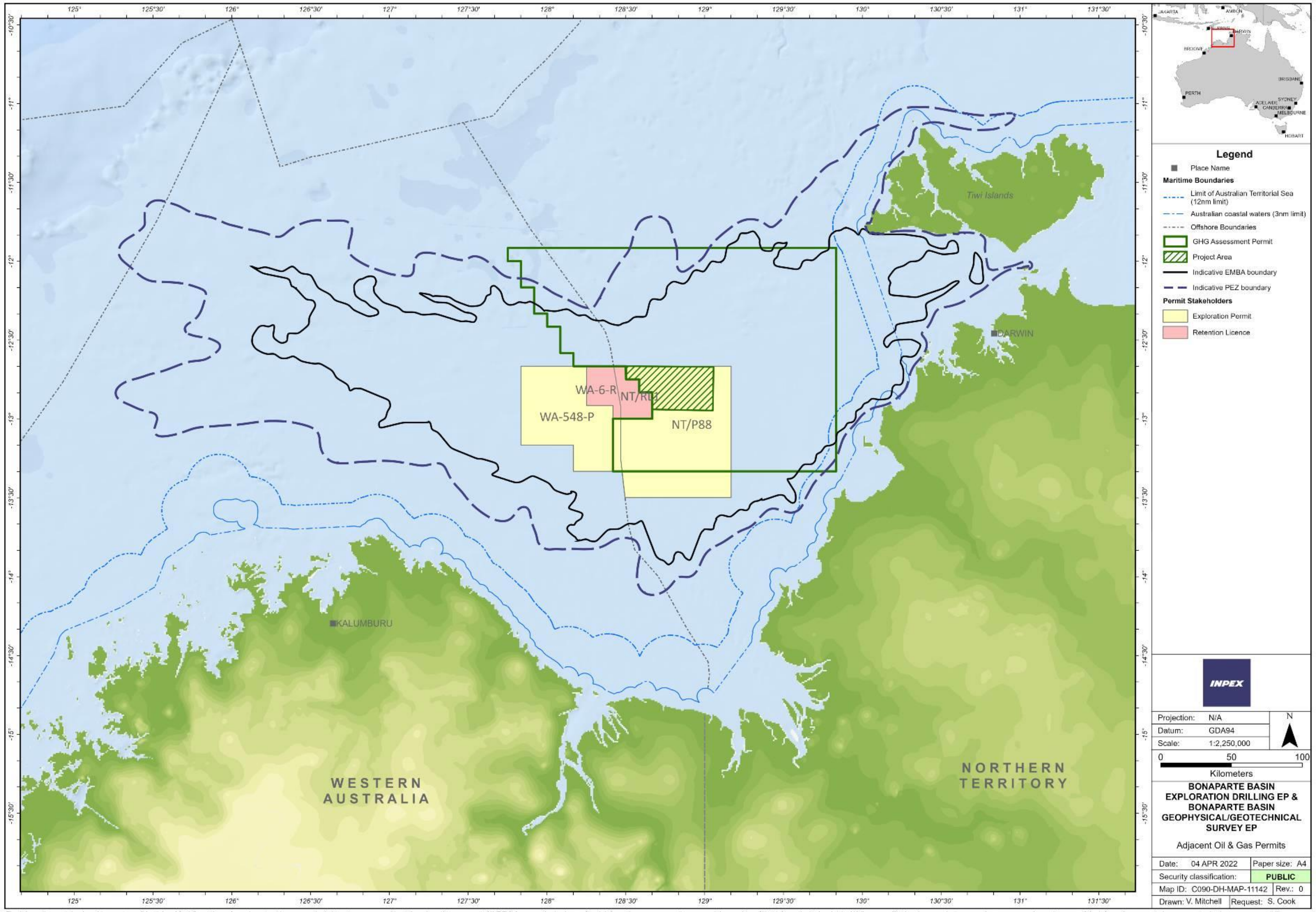

Figure 4-10: Oil and gas permits overlapping or adjacent to the GHG assessment permit

4.9.10 Telecommunications

No submarine cables intersect the project area. There are three submarine telecommunication cables within the PEZ each approximately 150 km north-east of the project area at the closest point including:

- The North-west Cable System (NWCS)
- Asia Connect Cable 1
- Hawaiki Nui.

The NWCS is a 2,000 km fibre optic cable between Port Hedland (WA) and Darwin (NT) that connects offshore oil and gas facilities in the Browse, Bonaparte and Carnarvon basins to onshore locations including Darwin and the Tiwi Islands (Vocus Group 2022). The NWCS system is managed by Vocus Communications and was built as a cooperation between the telecommunications industry and oil and gas industries.

4.9.11 Tourism

Most recreational and tourism activities in the region occur predominantly in State/Territory waters adjacent to population centres, such as Darwin. Tourism in the region typically peaks during the dry season (May to October), which includes activities such as recreational fishing, diving, snorkelling, wildlife watching and boating (DEWHA 2008).

Tourism NT identifies the Daly River area, located south of Darwin and 130 km south-east from the project area, as a popular location for camping and fishing with bush camps and riverside fishing lodges in the area. The Tiwi Islands are also identified as a tourism location for Aboriginal arts culture and fishing.

A number of luxury cruise operators access Kimberley coastal waters to the south-west of the project area and PEZ, including Kimberley Quest, Silversea and True North, which operate from late February/March to October/early November to avoid the wet season. Some Kimberley cruises extend to the coastal waters of the Joseph Bonaparte Gulf, sailing from Wyndham and visiting coastal locations such as Cambridge Gulf, Berkeley River, Reveley Island, King George River and Cape Bernier, all of which are approximately 180 km or more from the project area. Activities are either land-based, or take place in rivers, estuaries or within a few kilometres from the coast. Cruise itinerates do not include offshore waters, although operators may occasionally transit through the project area between Darwin and the Kimberley coastline (Kimberley Quest 2021; Silversea 2021; True North 2021).

Onshore tourism operations in the Kimberley include Berkeley River Lodge, Faraway Bay Lodge, Honeymoon Bay and Kimberley Coastal Camp. All camps close during October and reopen during March, following the wet season. Charter fishing, sightseeing tours and other excursions are located within a few kilometres from the coast, and mainly in estuarine waters.

No scuba diving or snorkelling sites have been identified in the Joseph Bonaparte Gulf as the presence of saltwater crocodiles and other potentially dangerous fauna generally makes these waters unsuitable for such activities.

4.10 Summary of values and sensitivities

4.10.1 Project area

Table 4-6: Particular values and sensitivities potentially within the project area

<table>
<tr><th colspan="2">Value and sensitivity</th><th>Description</th></tr>
<tr><td colspan="2">Receptors that are considered socially important as identified during stakeholder engagement (including social and cultural heritage).</td><td>Fisheries:
• Primarily the NT Demersal Fishery (trawl)
• Some limited fishing effort by the NPF (Cwlth) and NT Offshore Net and Line Fishery within or near to the project area.</td></tr>
<tr><td colspan="2">Benthic primary producer habitat, defined by the Western Australian Environmental Protection Authority (WA EPA) Environmental Assessment Guideline No. 3 Environmental Assessment Guidelines for Protection of Benthic Primary Producer Habitat in Western Australia's Marine Environment as functional ecological communities that inhabit the seabed within which algae (e.g. macroalgae, turf and benthic microalgae), seagrass, mangroves, corals, or mixtures of these groups, are prominent components.</td><td>None identified within project area.</td></tr>
<tr><td colspan="2">Regionally important areas of high diversity (such as shoals and banks).</td><td>None identified within project area.</td></tr>
<tr><td colspan="2">World heritage values of a declared World Heritage property within the meaning of the EPBC Act.</td><td>None identified within project area.</td></tr>
<tr><td colspan="2">National heritage values of a National Heritage place within the meaning of the EPBC Act.</td><td>None identified within project area.</td></tr>
<tr><td colspan="2">Ecological character of a declared Ramsar wetland within the meaning of the EPBC Act.</td><td>None identified within project area.</td></tr>
<tr><td colspan="2">Presence of a listed threatened species or listed threatened ecological community within the meaning of the EPBC Act.</td><td rowspan="2">A number of threatened species or migratory species have been identified as having the potential to transit through the project area.
These have been categorised as marine fauna:
• marine mammals
• marine reptiles
• fishes and sharks
• marine avifauna.
Also refer to Appendix A (EPBC Act Protected Matters Report).</td></tr>
<tr><td colspan="2">Presence of a listed migratory species within the meaning of the EPBC Act.</td></tr>
<tr><td rowspan="2">Any values and sensitivities that exist in, or in relation to, part or all of:</td><td>a Commonwealth marine area within the meaning of the EPBC Act.</td><td>Productivity and diversity associated with planktonic communities and benthic communities.</td></tr>
<tr><td>Commonwealth land within the meaning of the EPBC Act.</td><td>None identified within project area.</td></tr>
<tr><td colspan="2">BIAs associated with EPBC-listed species.</td><td>A turtle foraging BIA intersects the project area, relating to green and olive ridley turtles in the Joseph Bonaparte Gulf.</td></tr>
</table>

4.10.2 PEZ

Table 4-7: Particular values and sensitivities potentially within the PEZ

Value and sensitivity	Description
Receptors that are considered socially important as identified during stakeholder engagement (including social and cultural heritage).	Commercial, traditional and recreational fisheries as identified in Section 4.9.6.
Benthic primary producer habitat, defined by the Western Australian Environmental Protection Authority (WA EPA) Environmental Assessment Guideline No. 3 *Environmental Assessment Guidelines for Protection of Benthic Primary Producer Habitat in Western Australia's Marine Environment* as functional ecological communities that inhabit the seabed within which algae (e.g. macroalgae, turf and benthic microalgae), seagrass, mangroves, corals, or mixtures of these groups, are prominent components.	Benthic primary producer habitats are described in Section 4.7.2 and include the Commonwealth marine parks and KEFs listed below.
Regionally important areas of high diversity (such as shoals and banks).	KEFs: • Pinnacles of the Bonaparte Basin • Carbonate bank and terrace system of the Sahul Shelf • Carbonate bank and terrace system of the Van Diemen Rise. Benthic habitats: • various banks and shoals, and coral reefs (Section 4.7.2) • seagrasses at the Tiwi Islands and Vernon Islands. Shoreline habitats: • islands, mangroves and sandy beaches (Section 4.7.3).
World heritage values of a declared World Heritage property within the meaning of the EPBC Act.	None identified.
National heritage values of a National Heritage place within the meaning of the EPBC Act.	None identified.
Ecological character of a declared Ramsar wetland within the meaning of the EPBC Act.	None identified.
Presence of a listed threatened species or listed threatened ecological community within the meaning of the EPBC Act.	A number of threatened species or migratory species have been identified as having the potential to transit through the PEZ. These have been categorised as marine fauna (Section 4.7.4): • marine mammals • marine reptiles • fishes and sharks • marine avifauna. Also refer to Appendix A (EPBC Act Protected Matters Report).
Presence of a listed migratory species within the meaning of the EPBC Act.	

<table>
<tr><th colspan="2">Value and sensitivity</th><th>Description</th></tr>
<tr><td rowspan="2">Any values and sensitivities that exist in, or in relation to, part or all of:</td><td>a Commonwealth marine area within the meaning of the EPBC Act.</td><td>Productivity and diversity associated with planktonic communities and benthic communities.</td></tr>
<tr><td>Commonwealth land within the meaning of the EPBC Act.</td><td>Quail Island Bombing Range.</td></tr>
<tr><td colspan="2">BIAs associated with EPBC-listed species.</td><td>A number of BIAs are present within the PEZ. These are mainly associated with coastlines and the adjacent shallow waters and include:
Marine reptiles
• turtle nesting, internesting and foraging BIAs for flatback turtle, olive ridley turtle, green turtle and loggerhead turtles.
Fish and sharks
• whale shark foraging BIA.
Marine avifauna
• breeding and associated foraging BIAs for crested tern, lesser crested tern and lesser frigate bird.</td></tr>
</table>

5 STAKEHOLDER CONSULTATION

INPEX has been a member of the Australian business community since 1986 and during this time has engaged on a regular basis with stakeholders in the NT, WA and federal jurisdictions on a broad range of activities.

INPEX actively engages with a broad cross section of community, industry and government stakeholders in its key areas of operations which include Broome and the Kimberley region of WA and in Darwin in the NT. INPEX provides regular updates on its business activities through meetings with stakeholders, community forums and various communication collaterals.

INPEX also participates in industry forums, conferences and community meetings in order to facilitate opportunities for meaningful engagement about current and future activities that may have the potential for social and environmental impacts.

Through its corporate webpage (http://www.inpex.com.au), social media and publications, INPEX provides company and project-related information on business activities including employment and business opportunities and community investment programs for local and Aboriginal and Torres Strait Islander communities.

INPEX's awareness of the functions, interests or activities of relevant persons supports the development of management plans that consider and address any environmental, social or economic objections or claims about the proposed activity.

INPEX's process for stakeholder engagement (consultation) in the development and implementation of an EP and relevant management plans is shown in Figure 5-1 and further described in this section.

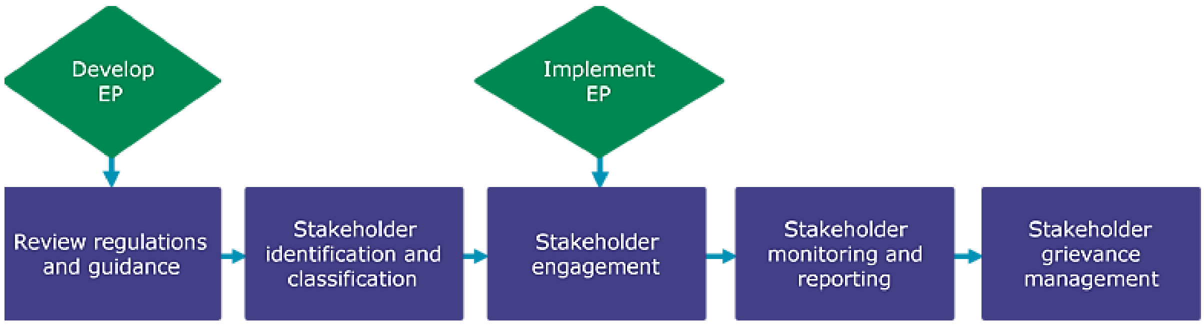

Figure 5-1: Process for stakeholder engagement (consultation) for development and implementation of an EP

5.1 Regulatory requirements and guidelines

As a first step in EP development, INPEX reviewed the following documents to prepare for stakeholder consultation on the proposed activity:

- Offshore Petroleum Greenhouse Gas Storage (Environment) Regulations
- NOPSEMA policies, guidance and information papers related to environment plan development, including:
  - PL1347 – Environment plan assessment policy – 19 May 2020 (NOPSEMA 2020c)
  - GL1721 - Environment plan decision making – 10 June 2021 (NOPSEMA 2021a
  - GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area – 3 July 2020 (NOPSEMA 2020d)

  - GN1344 - Environment plan content requirements - 11 September 2020 (NOPSEMA 2020e)
  - GN1488 - Oil pollution risk management - 7 July 2021 (NOPSEMA 2021a)
  - GN1847 – Responding to public comment on environment plans – 11 September 2020 (NOPSEMA 2020f)
- Guidance issued by relevant stakeholders (as known or provided to INPEX), including:
  - Australian Government Guidance: Offshore Petroleum and Greenhouse Gas Activities: Consultation with Australian Government agencies with responsibilities in the Commonwealth Marine Area
  - AFMA: Petroleum industry consultation with the commercial fishing industry
  - WA DPIRD: Guidance statement for oil and gas industry consultation with the Department of Fisheries
  - WA Department of Transport (WA DoT): Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements
- INPEX stakeholder engagement procedures and guidelines developed in line with IFC Stakeholder Engagement: A Good Practice Handbook for Companies doing Business in Emerging Markets (2007) and the International Association for Public Participation (IAP2) public participation spectrum.

5.2 Stakeholder identification and classification

With an understanding of the general requirements and expectations for consultation, INPEX conducted stakeholder identification and classification activities.

A list of all the potential stakeholders, taken from INPEX Australia's corporate stakeholder register was used as the starting point and formed the basis for identification of various groups of stakeholders. This list includes authorities, business and civil society in an attempt to not overlook or exclude any particular type of stakeholder. Specific to this activity, 'relevant persons' were then identified and classified, to determine a suitable engagement priority and method.

Considerations during the initial identification exercise covered legislative and regulatory consultation requirements and contractual obligations. Additionally, the following aspects were considered when identifying stakeholders and assigning a level of interest:

- HSE concerns and sensitivities
- financial and economic relationships
- social investment/impact
- socio-cultural concerns and sensitivities
- employment/local content.

Key INPEX personnel, including subject matter experts (SMEs) from business areas such as team members in public affairs, corporate affairs, environment, government affairs and Aboriginal affairs undertook a collaborative discussion to outline the requirement for engagement and establish the context of the proposed activities. The identification of relevant persons was completed in accordance with Regulation 11A(1) of the OPPGS (E) Regulations and INPEX's stakeholder engagement procedures and guidelines.

The following questions were considered during the identification of relevant persons to prompt collaborative discussions between SMEs and inform a decision which was then recorded in an activity specific register specific:

- Can the stakeholder provide information or assistance in the design or development of the activities?
- Is the stakeholder directly or indirectly adversely affected by the activities including flow-on impacts? (this covers planned and unplanned activities)
- Does the stakeholder have the ability to directly or indirectly influence the scope or performance of the activities?
- Does the stakeholder have a specific interest in the activities or has INPEX committed to keep the stakeholder informed on such activities?
- Would the stakeholder’s opposition to the activities be detrimental to the successful execution of the activities?
- Has the stakeholder previously expressed a desire not to be consulted in unplanned activities or planned activities?

INPEX treats stakeholder identification (and subsequent activities) as an iterative process whereby INPEX may become aware of relevant persons both during the process of consultation and also after the development and submission of an EP. INPEX acknowledges that relevant persons may be identified during an EP assessment period and also during the proposed activity.

Supplementary to INPEX’s own stakeholder identification process outlined above, all exploration activities are required to complete a period of public comment, where the activity is advertised, and the EP made publicly available for a period of 30 days on NOPSEMA’s website. Upon completion of the public comment period, INPEX is required to provide a written report on the consultation outcomes and engage with stakeholders as required.

5.2.1 Definition of ‘relevant persons’/relevant stakeholders

In identifying relevant persons to be consulted on the proposed activity, INPEX prescribes to the definition provided under Subregulation 11A(1) of the OPGGS (E) Regulations, being:

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 a State or the Northern Territory to which the activities to be carried out under the environment plan, or the revision of the environment plan, may be relevant*

c. *the Department of the responsible State Minister, or the responsible Northern Territory Minister*

d. *a person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the environment plan, or the revision of the environment plan*

e. *any other person or organisation that the titleholder considers relevant.*

5.2.2 Relevant activity

In determining who is a relevant stakeholder, it was necessary for INPEX to determine what constitutes a relevant activity, and for which activities a stakeholder should be engaged.

Greenhouse gas activity (planned activity)

The OPGGS (E) Regulations require that consultation be undertaken to ensure that persons who may be affected by a greenhouse gas activity are given the opportunity to inform the titleholder how they may be affected and to allow the titleholder to assess and address any objections or claims about that activity in the preparation of environment submissions.

Regulation 4 of the OPGGS (E) Regulations defines a greenhouse gas activity as:

"operations or works in an offshore area undertaken for the purpose of:

a. *exercising a right conferred on a greenhouse gas titleholder under the Act by a greenhouse gas title; or*

b. *discharging an obligation imposed on a greenhouse gas titleholder by the Act or a legislative instrument under the Act."*

When identifying relevant persons, INPEX considers which stakeholders perform a function in the relation to – or have a function, activity or interest that may be impacted by – the planned activity.

The planned activity for this EP is exploration drilling to be undertaken in Commonwealth waters. Therefore, in determining who is a relevant person for engagement, INPEX sought to identify and engage with stakeholders whose functions, interests or activities could be affected by the exploration drilling activities described in Section 3 of this EP.

Unplanned event/activity (emergency conditions)

INPEX undertakes a more targeted approach to consultation with stakeholders in relation to unplanned emergency conditions, e.g. a loss of containment of hydrocarbons during the exploration drilling activity.

Stakeholders who may perform a function in INPEX's planning for, or management of an unplanned activity, and whose information is integral to the development of those management plans, are engaged during the development of this EP and the INPEX *Browse Regional OPEP*.

Stakeholders whose functions, interests or activities otherwise overlap the PEZ for the unplanned activity are not engaged during the development of those plans but may be engaged in the event of an unplanned emergency condition.

This approach has been adopted to reduce consultation fatigue for stakeholders who will not be impacted by the planned activity.

INPEX will engage contrary to this approach where a stakeholder has expressed a significant (high to very high) level of concern about unplanned loss of containment events and wishes to understand more about the potential impact and planned response activities.

INPEX maintains an extended stakeholder list which includes stakeholders who may have a function, activity or interest that falls within the PEZ, but for the purpose of the development of these plans, engages with stakeholders as outlined in Table 5-1.

Table 5-1: Classification and method of engagement with stakeholders in relation to an unplanned oil spill event and oil spill response

Stakeholder category	Method of engagement	Stakeholders
Government departments, agencies or organisations with functions or roles directly relevant to emergency and oil spill preparedness and response	Involve / consult regarding the proposed activity and potential unplanned emergency conditions during the preparation of the EP and INPEX *Browse Regional OPEP*.	• AMSA • WA DoT • WA DPIRD • WA Department of Biodiversity, Conservation and Attractions (DBCA) • NT Department of Infrastructure, Planning and Logistics (DIPL) • Australian Marine Oil Spill Centre (AMOSC)
Stakeholders where land access is required to be agreed prior to a response to an unplanned event being executed.	Involve and consult (in conjunction with the Control Agency) in the event of an unplanned emergency condition (i.e., oil spill) that has the potential to affect their functions, activities or interests.	• Landowners • Native title holders • Aboriginal and Torres Strait Islander communities
Stakeholders whose level of interest (or expectation) in relation to a potential oil spill and oil spill response for the planned activity is high or very high.	Inform regarding the proposed activity and potential unplanned emergency conditions during the preparation of the EP and INPEX *Browse Regional OPEP*.	As determined during stakeholder identification process.
Stakeholders whose level of interest (or expectation) in relation to a potential oil spill and oil spill response for the planned activity is low or medium.	To be informed only in the event of an unplanned emergency condition (i.e. oil spill) that has the potential to affect their functions, activities or interests.	As determined during stakeholder identification process.

5.2.3 Commercial fishery stakeholder identification and classification

In addition to the process outlined above for planned activities and unplanned events, identification of relevant commercial fishing stakeholders distinguishes between:

- fisheries that overlap the planned activity; and
- fisheries that overlap the PEZ but not the location of the planned activity.
- INPEX used a variety of resources (e.g. data files and fishery reports) to identify and classify stakeholders according to these criteria.

With the view to minimise stakeholder fatigue, INPEX restricted engagement activities to licence holders in fisheries that overlap the area (location) of the planned activity. INPEX also considered if and where licence holders are active (or potentially active) within a fishery to assess whether that licence holder should be engaged.

In summary, identification of and engagement with commercial fishing stakeholders was conducted as follows:

- Government authorities (AFMA, DCCEEW, WA DPIRD and NT DITT) were engaged regarding the proposed activity and engagement with commercial fishing stakeholders. Materials made available by government authorities, e.g. WA FishCube (fishing effort) data files and fishing reports, were used in fisheries determinations.

- Fishing industry associations that represent fisheries with licence areas that overlap the proposed activity (e.g. Commonwealth Fisheries Association, etc.) were consulted regarding the proposed activity and engagement with their members.
- Licence holders in commercial fisheries were engaged/not engaged according to the following criteria:
  - Active or potentially active licence holders in commercial fisheries whose activities overlap or are very close to the proposed activity were considered to be relevant stakeholders, and were accordingly engaged during the development of the EP.
  - Licence holders in commercial fisheries that overlap or are close to the planned activity, but whose activities or interests are not expected to be affected by the proposed activity are not considered to be relevant stakeholders. Such licence holders were not engaged during the development of the EP, but the industry associations representing these fisheries were informed. An example would be where the licence holder fishes in a distant part of that fishery, e.g. off the southern coast of Australia.
  - Licence holders in commercial fisheries that overlap the broader PEZ but not the area of the proposed activity are not considered affected parties/relevant stakeholders and were therefore not informed during the development of the EP.

Licence holders that are not considered to be relevant to the planned activity are included in the expanded list of stakeholders who would be informed in the event of an unplanned emergency condition.

Table 5-2 presents the commercial fisheries classified according to their relevance to the planned activity or an unplanned emergency condition. Commonwealth fisheries data for the period 2010—2020, confirmed that the only Commonwealth-managed fishery that actively fishes in the Joseph Bonaparte Gulf is the NPF. Preliminary fisheries data for the period 2016—2020, provided by the NT DITT indicated that several NT commercial fisheries may be active within or adjacent to the project area, including the NT Demersal Fishery, NT Offshore Net and Line Fishery, NT Spanish Mackerel Fishery, NT Aquarium Fishery, NT Pearl Oyster Managed Fishery, NT Jigging Fishery and NT Development (small pelagic) Fishery. Licence holders within these fisheries were consulted directly. During preparation of this EP, finer resolution fisheries data was acquired from the NT DITT that confirmed the only fisheries that have previously fished within the project area are the NT Demersal Fishery and NT Offshore Net and Line Fishery (refer Section 4.9.6 and Table 4-4).

Table 5-2: Classification of commercial fishery licence holders

Fishery	**Relevance and process of engagement**
Commercial fisheries licence areas overlapping or close to the planned activity area and with licence holder activities or interests that may be affected by the planned activity.	
Northern Prawn Fishery (Cwlth)	Relevant. Licence holders directly consulted.
NT Demersal Fishery	
NT Offshore Net and Line Fishery	
NT Spanish Mackerel Fishery	Licence holders directly consulted but during the development of this EP

NT Aquarium Fishery	were found not to be affected. Licence holders to be informed in the event of an unplanned emergency condition.
NT Pearl Oyster Managed Fishery	
NT Jigging Fishery	
NT Development (small pelagic) Fishery	
Commercial fisheries licence areas overlapping the planned activity area, but licence holder activities or interests are not expected to be affected by the planned activity.	
Western Tuna and Billfish Fisheries (Cwlth)	Not affected. Licence holders not consulted during the development of the EP; however, representative industry associations were informed, and each fishery's interests considered in the development of the EP. Licence holders to be informed in the event of an unplanned emergency condition.
Southern Bluefin Tuna Fishery (Cwlth)	
Western Skipjack Fishery (Cwlth)	
Commercial fisheries licence areas overlapping the PEZ but not the planned activity area.	
NT Coastal Line Fishery	Not affected. Licence holders not consulted during the development of the EP, but each fishery's interests considered in the development of the EP. Licence holders to be informed in the event of an unplanned emergency condition.
NT Coastal Net Fishery	
NT Barramundi Fishery	
NT Trepang Fishery	
NT Mud Crab Fishery	
NT Bait Net Fishery	
WA Pearl Oyster Managed Fishery (Zone 4)	
WA Marine Aquarium Fish Managed Fishery	
WA Specimen Shell Managed Fishery	
WA Beche-de-Mer Managed Fishery	
WA Joint Authority Northern Shark Fishery	

5.2.4 Stakeholder classification

Stakeholders were then classified based on their level of interest in/potential impact by, and influence over, the proposed activity. The purpose of this classification was to determine a 'priority' for consultation that was appropriate to the classification. Priority levels are shown in Table 5-3.

Table 5-3: Engagement classification

Priority	Interest/potential impact level and/or Influence level	Stakeholder classification (engagement priority)
Level 1	(Both) High to very high	**Collaborate/empower**: partner with stakeholder on each aspect of the decision; allow stakeholder (regulatory or approvals bodies) to make the final decision
Level 2	(Either) High to very high	**Consult/involve**: ensure stakeholder concerns and expectations are consistently understood and considered, and obtain feedback from stakeholders on analysis, alternatives and/or decisions
Level 3	(Both) Low to medium	**Inform**: provide balanced, objective, timely and consistent information to stakeholder

Stakeholders who are relevant only in the event of unplanned emergency conditions were classified separately based on their role or function in relation to unplanned emergency conditions or based on their level of interest and influence such unplanned emergency conditions.

5.3 Stakeholder engagement

Following the stakeholder identification and classification exercise, an engagement plan was developed to register identified stakeholders and the following information:

- the activity/ies (planned and unplanned) for which they have been identified as relevant
- the activities on which they should be engaged
- the function, activity or interest that may be affected by the relevant activity
- their assigned classification (priority for engagement)
- the proposed manner of engagement (i.e. modes, timing, and by whom).
- Those INPEX personnel responsible for engagement were provided with a copy of the plan and instructions on how to carry out the necessary engagement.

INPEX prepared a consultation information sheet to provide relevant stakeholders with important details of the proposed activity. The information sheet included the following information:

- description of the activity, including location and map
- schedule
- methodology (i.e. how the activity will be undertaken, as well as general logistics and safety information)
- environmental management approach
- enquiries and feedback information.

The accompanying email (or cover letter) provided more information relevant to the functions, activities or interests of the stakeholder receiving the information sheet. Additional information was also sent to stakeholders in subsequent communications, as requested by the stakeholder and/or as the information became available.

5.4 Stakeholder monitoring and reporting

Using the stakeholder engagement plan as a guide, INPEX retains a record of all communications sent and received as part of the stakeholder engagement activity. This includes email correspondence, telephone call logs, letters and minutes of meetings.

All queries and feedback from stakeholders are logged, and where applicable, forwarded for follow up. All responses provided to stakeholders are appropriate to the nature of their communication, e.g. technical queries are investigated by area experts and responses provided.

5.4.1 Relevant matters, objections and claims

During stakeholder consultation, each meeting, phone call or piece of correspondence received from a stakeholder was assessed by INPEX for relevant information or for objections, claims or concerns raised regarding the activity. INPEX's assessment of relevance and assessment of merit considered four broad categories:

- objection, claim or concern has merit – the objection, claim or concern raised is relevant to both the planned activity and the stakeholder's functions, activities or interests. The matter has merit if there is a reasonable / scientific basis for related effects or impacts to occur and/or there is reasonable basis for the matter to be addressed in the EP.
- objection, claim, or concern does not have merit – the objection, claim or concern raised may be relevant to the planned activity or the stakeholder's functions, activities or interests, however, the matter raised has no credible or scientific basis.
- relevant matter – the matter raised does not fit the criteria descriptions for objections, claims or concerns with/without merit. However, the matter raised is relevant to the planned activity, comprises a request to INPEX for further relevant information, or provides information to INPEX that is relevant to the activity or the EP.
- not a relevant matter – correspondence does not relate to the planned activity or the stakeholder's functions; interests or activities being affected by the activity. Non-relevant matters may also be generic in nature with no specific issues raised (e.g. salutations, acknowledgements, meeting arrangements, etc.).

A summary of all stakeholder consultation undertaken, and the full assessment relevance and merit are provided in Appendix B. The actual records of correspondence are provided in a 'Sensitive Matters Report' that is submitted to NOPSEMA separately to this EP.

An overview of feedback received from stakeholders that resulted in material inputs to the EP is provided in Table 5-4.

Table 5-4: Summary of relevant matters, objections, claims or concerns from stakeholder consultation

Stakeholder	Summary of material stakeholder feedback	Summary of INPEX action
AMSA (nautical advice)	AMSA requested: • The Master notify AMSA's Joint Rescue Coordination Centre (JRCC) for promulgation of radio-navigation warnings at least 24-48 hours before operations commence. • The JRCC be advised when operations start and end.	The relevant notifications requested by AMSA have been adopted as controls in Section 7.6.1 and Section 9.8.3 of the EP.

Stakeholder	Summary of material stakeholder feedback	Summary of INPEX action
	• The AHO be contacted no less than four working weeks before operations to promulgate the appropriate Notice to Mariners.	
AMSA (first strike capabilities, vessel spill scenario)	With regard to petroleum titleholder (TH) activation of 'first strike' capabilities under a TH OPEP, it was discussed: - AMSA is Control Agency – however AMSA position is that TH should activate all TH OPEP 'first strike' capabilities, where there is no 'risk' of additional environmental harm, associated with the mobilisation/activation of that capability. -TH mobilised capabilities can be 'turned-off' at any time, as directed by AMSA. -Whilst initially mobilised by the TH, operational control of these capabilities will be taken over by AMSA as the Control Agency, as the scenario evolves and IMT's become established. Transfer of control of THs capabilities to AMSA will occur via consultation between the TH IMT and the AMSA IMT. -AMSA agreed with the following amendment: 1. INPEX will advise AMSA of the commencement and completion of each step. 2. INPEX will note that cost recovery will be against the polluter's insurance (i.e. ship). 3. Fixed wing aerial dispersant (FWAD) will be activated through AMSA contract and control for ship-sourced incident.	INPEX will advise AMSA of the commencement and completion of each step in the event of a vessel collision spill scenario. INPEX noted that cost recovery will be against the polluter's insurance (i.e., ship). FWAD will be activated through AMSA contract and control for ship-sourced incident. The INPEX *Browse Regional OPEP* has been updated to reflect these requirements.
DCCEEW formerly DAWE (Biosecurity)	Stakeholder requested INPEX provide information on interactions that project vessels/installations will have with domestic vessels during the proposed activities and how they will be managed. This information was requested via the completion of a 'Questionnaire for Biosecurity Exemptions for Biosecurity Control Determination'.	INPEX confirmed to DAWE that the exact vessels to be contracted to undertake the proposed activities are unknown at present. Therefore, INPEX cannot provide the required information at this stage. However, INPEX will provide all the requested information at least 4 weeks prior to the commencement of activities as described in Section 9.8.3.

Stakeholder	Summary of material stakeholder feedback	Summary of INPEX action
WA Department of Transport	Stakeholder requested to review INPEX's Browse Regional OPEP. The review identified that some of the required information was not presented within the Browse Regional OPEP. A discussion/meeting was requested to discuss.	INPEX welcomed the review of the Browse Regional OPEP by WA DoT and noted that the required information identified by WA DoT is in presented in other BROPEP supporting documents. A meeting is scheduled to discuss the documents and the required changes.
Department of Defence	Defence confirmed current planned military exercises in the NAXA for 2022, 2023 and 2024 and requested that INPEX provide as much advance notice as possible for any planned activities by INPEX or contractors in the NAXA (i.e.: five to six weeks' notice). Patrol boats conduct regular training in the NAXA area including live firings; however, these are not usually programmed until six to eight weeks prior and will be included in the Notice to Airmen (NOTAMs). Defence recommend INPEX check these notices regularly.	INPEX will provide advance details in relation to the nature and scale of the activities including vessel size, MODU location and proposed dates for scheduled activities. These requirements have been considered in Section 7.6.1 and Section 9.8.3 of the EP.
Department of Mines, Industry Regulation and Safety WA (DMIRS)	Requested INPEX send through activity commencement and cessation notifications. DMIRS also highlighted Consultation Guidance Note in relation to the reporting of incidents that could potentially impact on any land or water under State jurisdiction.	DMIRS's request to be notified of the activity commencement has been incorporated into Section 9.8.3 of the EP.
Director of National Parks (DNP) (Cwlth)	The DNP requested INPEX to provide further detail regarding the identification and management of risks to natural values, including, but not limited to, the Flatback, Loggerhead and Olive Ridley turtles which are present and display behaviours including foraging and migration within the acreage and proposed operational areas. The DNP requested that matters addressed should include activity timing, cumulative impacts with other known activities within the region, noise interference, vessel disturbance and light pollution. INPEX should ensure that the EP: - Identifies and manages all impacts and risks on AMP values (including ecosystem values) to an acceptable	Information provided from the DNP with respect to the values associated with the closest AMPs have been described in Section 4.2 and 4.3 of the EP. Section 4.7.4 describes all marine turtle species that may be present as identified in the EPBC Protected Matters database search. BIAs, critical habitats, seasonality, migratory and foraging behaviours are all described in Section 4.7.4. To be conservative, in Sections 7 and 8, the impact and risk assessments have been completed on the basis that marine turtles may be present in the project area on year-round.

Stakeholder	Summary of material stakeholder feedback	Summary of INPEX action
	level and has considered all options to avoid or reduce them to ALARP. - Clearly demonstrates that the activity will not be inconsistent with the management plan. In emergency situations, DNP requested to be made aware as soon as possible of oil/gas pollution incidences which occur within or are likely to impact on a marine park. DNP further requested that INPEX consider cumulative impacts to marine fauna from concurrent petroleum and GHG activities in adjacent acreages.	Sections 7 and 8 assess the impacts and risks associated with the activity and demonstrate that with the defined controls in place all impacts and risks will be reduced to ALARP and acceptable levels. The activity will be managed in accordance with AMP management plan objectives. In the event of a spill, INPEX oil spill notifications are aligned with the DNP requirements as described in Section 4.3, Section 9.11.3 and the INPEX *Browse Regional OPEP*. INPEX updated Section 7 of the EP to include the assessment of cumulative impacts from petroleum and GHG activities that may occur within the timeframe of this EP that overlap or are adjacent to the project area.
Northern Prawn Fishery Industry (NPFI)	Stakeholder reiterated the advice that NPFI does not support any activities by oil and gas companies being undertaken in the Joseph Bonaparte Gulf during the period from 1 August and 1 December each year given this is the only time period in which NPF fishers can access the Joseph Bonaparte Gulf fishery.	INPEX notes NPFI's request for activities to be undertaken in the Joseph Bonaparte Gulf outside the period from 1 August and 1 December. However, based on historical fishing effort data and fishery publications, INPEX understands that exploration drilling will not be taking place in a location that is of particular significance for prawns (in terms of biology, recruitment) or for fishing activities. Fishing effort in this location has historically been very low or non-existent in some years. INPEX notes that there is a new closure in place for the banana prawn fishing season, but there is no apparent reason why this would affect tiger prawn fishing activities during the tiger prawn season. Given the limited potential for impact and low risk to the NPF, INPEX does not consider undertaking activities outside the period from 1 August and 1 December to be practicable.

5.5 Stakeholder grievance management

A grievance is a complex stakeholder objection or claim ('relevant matter') which has progressed beyond management through the Stakeholder Monitoring and Reporting process.

In line with grievance management as described in the INPEX Community Grievance Management Procedure, a relevant matter that cannot be resolved with the concerned stakeholder (grievant) by the applicable contact person (supported by area experts where required) will be referred to the INPEX Community Relations Working Group (CRWG) for advice and resolution before a response is made to the grievant.

If the resolution proposed by the INPEX CRWG is unacceptable to the grievant, a third-party mediator may become involved to facilitate a resolution between the parties.

In relation to engagement activities for this EP, all stakeholder enquiries were either dealt with as outlined above or are ongoing due to the iterative process of engagement being applied.

5.6 Ongoing consultation

Ongoing consultation activities ensure that INPEX develops and maintains a current and comprehensive view of stakeholder functions, interests and activities, and provide a forum for enquiries, objections or claims by relevant persons in the lead up to and during the conduct of a planned activity.

Ongoing consultation for the proposed activity described in this EP is outlined in the implementation strategy (Section 9.8.3).

6 ENVIRONMENTAL IMPACT AND RISK ASSESSMENT METHODOLOGY

In accordance with Division 2.3, Regulation 13(5) of the OPGGS (E) Regulations 2009, an environmental risk assessment was undertaken to evaluate impacts and risks arising from the activities described in Section 3. This section describes the process in which impacts, and risks were identified. A summary of the outcomes from this process are included in Section 7 and Section 8.

An environmental hazard identification and risk assessment workshop was undertaken for the activity. The workshop involved environmental, compliance, health, safety, emergency response, drilling and engineering personnel.

The workshop was undertaken in accordance with INPEX HSE Risk Management processes. The approach generally aligned to the processes outlined in International Standards Organisation (ISO) 31000:2009 *Risk Management – Principles and guidelines* (Standards Australia/ Standards New Zealand, 2009) and Handbook 203:2012 *Managing environment-related risk* (Standards Australia/Standards New Zealand 2012).

The environmental impact and risk evaluation process has been undertaken in nine distinct stages:

- the establishment of context
- the identification of aspects, hazards and threats
- the identification of potential consequences (severity)
- the identification of existing design safeguards and control measures
- proposal of additional safeguards (ALARP evaluation)
- an assessment of the likelihood
- an assessment of the residual risk
- an assessment of the acceptability of the residual risk
- the definition of environmental performance outcomes, standards and measurement criteria.

6.1 Establishment of context

The first stage in the process involved a review of legislative requirements including government policies and guidelines (Section 2 *Environmental Management Framework*). Following this the scope of the activity was defined and the existing environment reviewed to identify particular values and sensitivities of that environment. The outcomes of these exercises are presented in Section 3 *Activity Description* and Section 4 *Existing Environment*, of this EP.

6.2 Identification of aspects, hazards and threats

An assessment was undertaken to identify the aspects associated with the activity. An aspect is defined by ISO 14001: 2015 *Environmental Management Systems (EMS)* as:

“An element or characteristic of an activity, product, or service that interacts or can interact with the environment”.

The aspects were grouped to align with the INPEX BMS environment standards. A summary of the aspects identified for the activity were as follows:

- emissions and discharges
- waste management

- noise and vibration
- loss of containment
- biodiversity and conservation protection
- land disturbance (or seabed disturbance)
- social and cultural heritage protection.

Hazards are defined by the *INPEX HSE Hazard and Risk Management Standard* as:

"A physical situation with the potential to cause harm to people, damage to property, damage to the environment".

As the definition suggests, for an environmental risk or impact to be realised, there needs to be a chance of exposing an environmental value or sensitivity to a hazard. If there is no credible exposure of the value or sensitivity, there is no risk of harm or damage. Subsequently, there is no potential for impact (or consequence).

Given the various receptors present in the environment, they have been refined to environmentally sensitive or biologically important receptors (values and sensitivities). They have been selected using regulations, government guidance and stakeholder feedback.

For the purposes of the evaluation, environmental values and sensitivities to be considered include the following:

- receptors that are considered socially important as identified during stakeholder engagement (including social and cultural heritage)
- benthic primary producer habitat, defined by the Western Australian Environmental Protection Authority Environmental Assessment Guideline No. 3 *Environmental Assessment Guidelines for Protection of Benthic Primary Producer Habitat in Western Australia's Marine Environment* as functional ecological communities that inhabit the seabed within which algae (e.g. macroalgae, turf and benthic microalgae), seagrass, mangroves, corals, or mixtures of these groups, are prominent components
- regionally important areas of high diversity (such as shoals and banks)
- particular values and sensitivities as defined by Regulation 13(3) of the OPGGS(E) Regulations 2009:
  - the world heritage values of a declared World Heritage property within the meaning of the EPBC Act
  - the national heritage values of a National Heritage place within the meaning of the EPBC Act
  - the ecological character of a declared Ramsar wetland within the meaning of the EPBC Act
  - the presence of a listed threatened species or listed threatened ecological community within the meaning of the EPBC Act
  - the presence of a listed migratory species within the meaning of the EPBC Act
  - any values and sensitivities that exist in, or in relation to, part or all of:
    - a Commonwealth marine area within the meaning of the EPBC Act – Note that this value and sensitivity includes receptors (e.g. planktonic and benthic communities) that, when exposed, have the potential to affect regionally significant ecological diversity and productivity from benthic and planktonic communities
    - Commonwealth land within the meaning of the EPBC Act.

- biologically important areas associated with EPBC-listed species.

6.3 Identify potential consequence

In sections 7 and 8, for each aspect, the greatest consequence (or potential impact) of an activity, is evaluated with no additional safeguards or control measures in place. This allows the assessment to be made on the maximum foreseeable exposure of identified values and sensitivities to the hazard taking into account the extent and duration of potential exposure. The consequence is defined using the INPEX risk matrix (Figure 6-1).

Given that the receptors, identified as particular values and sensitivities are the most regionally significant or sensitive to exposure, these are considered to present a credible worst-case level of consequence to assess against for environmental impact and impacts to cultural and social heritage.

6.4 Identify existing design safeguards/controls

Control measures associated with existing design are then identified to prevent or mitigate the threat and/or its consequence(s). These controls may relate to the implementation strategy of this EP and have relevant environmental performance outcomes and standards presented in Section 9.

6.5 Propose additional safeguards (ALARP evaluation)

Where existing safeguards or controls have been judged during the evaluation as inadequate to manage the identified hazards (on the basis that the criteria for acceptability is not met as defined in Section 6.8), additional safeguards or controls are proposed.

The INPEX *HSE Hazard and Risk Management Standard* describes the process in which additional engineering and management control measures are identified, taking account of the principle of preferences illustrated in Figure 6-2. The options were then systematically evaluated in terms of risk reduction. Where the level of risk reduction achieved by their selection was determined to be grossly disproportionate to the “cost” of implementing the identified control measures, the control measure will not be implemented, and the risk is considered ALARP. Cost includes financial cost, time or duration, effort, occupational health and safety risks, or environmental impacts associated with implementing the control.

6.6 Assess the likelihood

The likelihood (or probability) of a consequence occurring was determined, taking into account the control measures in place. The likelihood of a particular consequence occurring was identified using one of the six likelihood categories shown in Figure 6-1.

6.7 Assess residual risk

Once any additional controls/safeguards have been considered, the residual risk is then evaluated and ranked.

INPEX

Risk Matrix

Refer to the Risk Management Guideline [0000-A0-GLN-60010] for guidance on how to apply the risk matrix.

LIKELIHOOD TABLE

Time Frame Could be experienced	100 year timeframe or less	50 year timeframe	10 - 20 year timeframe	5 year strategic planning time frame	1 - 2 year budget timeframe	Once or more during the next year
Experience History of occurrence in Company or Industry	Unheard of in the industry or in Projects	Has occurred once or twice in the industry or rarely occurs in Projects	Has occurred many times in the industry but not in the company or in <1 out of 100 Projects	Has occurred once or twice in the company or in <1 out of 10 Projects	Has occurred frequently in the company or in many Projects	Has occurred frequently at the location or in every Project
Frequency Continuous Operation	Once every 10 000 – 100 000 years at location	Once every 1,000 – 10 000 years at location	Once every 100 - 1000 years at location	Once every 10 - 100 years at location	Once every 1 - 10 years at location	More than once a year at location or continuously
Probability Single activity	1 in 100 000 – 1 000 000	1 in 10 000 – 100 000	1 in 1000 – 10 000	1 in 100 - 1000	1 in 10 - 100	>1 in 10

CONSEQUENCE TABLE

CONSEQUENCES

Severity Level	Financial NPV (USD)	Health & Safety	Environment	Reputation	Cultural & Social Heritage	Legal
A	>$1B	>20 fatalities or permanent total disabilities	Regional scale event, permanent impact on environment. Eradication of local populations of protected species	Prolonged international multi-NGO and media and by public protests. Loss of host government support and/ or social licence to operate. Company reputation severely tarnished	Permanent, long-term impact on social structure, and destruction of highly valued heritage, aesthetic, economic or recreational items	Criminal prosecution, potential jail sentences for directors and senior officers. Civil prosecution, class actions. Heavy fines, threat to licence to operate or future approvals
B	$100M – $1B	2 – 20 fatalities or permanent total disabilities	Large scale event, long term impact on environment. Extensive impact on populations of protected species	International multi-NGO and media condemnation. Host government registers concerns. Prolonged large protests. Company reputation seriously impacted	Widespread disruption to a number of communities with damage to highly valued heritage, aesthetic, economic or recreational items	Criminal prosecution for directors and senior officers. Civil prosecution and class actions. Heavy fines, threat to licence to operate
C	$10M – $100M	Single fatality or Permanent Total Disability	Medium to large scale event, medium term impact on environment. No threat to overall population viability of protected species	Serious public or national media outcry. Damaging NGO campaign. Large protests. Company reputation impacted	Significant impact to regional communities, and to heritage, aesthetic, economic or recreational items of significant value	Significant, multiple breaches of regulation or licence conditions. Significant litigation and fines
D	$1M – $10M	Major injury or illness, permanent partial disability, lost time injury	Local to medium scale event with short to medium term impact on environment. No threat to overall population viability of protected species	Major adverse national media, public or NGO attention. Significant protests. Asset reputation impacted	Regional community disruption with moderate impact on heritage, aesthetic, economic or recreational values	Serious breach of regulation. Investigation by regulatory authorities. Potential litigation and moderate fines
E	$100K– $1M	Minor injury or illness, alternative duties injury, medical treatment injury	Local scale event with short term impact on the environment. Minor and temporary impact on a small portion of the population of protected species	Attention from regional media with heightened concern with local community. Criticism by community or NGOs	Isolated community disruption with limited adverse impact on heritage, aesthetic, economic or recreational values	Minor legal issues. Report provided to regulatory authorities. Potential for minor fines
F	<$100K	Slight injury or illness, first aid injury	Local scale event with temporary impact on environment. Behavioural responses inconsequential ecological significance to protected species	Short term local concern or complaints. Low level media or regulatory issue	Minor impact on heritage, aesthetic, economic or recreational values	Breach of internal standards. Potential scrutiny by regulatory authorities

Likelihood Level

Severity	6 Remote	5 Highly Unlikely	4 Unlikely	3 Possible	2 Likely	1 Highly Likely
A Catastrophic	6	5	4	3	2	1
B Major	7	6	5	4	3	2
C Significant	8	7	6	5	4	3
D Moderate	9	8	7	6	5	4
E Minor	10	9	8	7	6	5
F Insignificant	10	10	9	8	7	6

Critical Risk

High Risk

Moderate Risk

Low Risk

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Figure 6-1: INPEX risk matrix

Most Preferred	Elimination		Removal of the hazard or sensitive receptor
	Substitution		Replacement of highly hazardous materials / approaches with less hazardous materials / approaches
	Engineering	Prevention	Design measures that reduce the likelihood of a hazardous event occuring
		Detection	Design measures that facilitate early detection of a hazardous event
		Control	Design measures that limit the extent/escalation potential of a hazardous event
		Mitigation	Design measures that protect the environment should a hazardous event occur
		Response Equipment	Design measures or safeguards that enable clean-up / response following the realisation of a hazardous event
Least Preferred	Procedures & Administration		Management systems and work instructions used to prevent or mitigate environmental exposure to hazards

Figure 6-2: ALARP options preferences

6.8 Assess residual risk acceptability

Potential environmental impacts and risks are only deemed acceptable once all reasonably practicable alternatives and additional measures have been taken to reduce the potential impacts and risks to ALARP.

INPEX has determined that risks rated as “Critical” are considered too significant to proceed and are therefore, in general, unacceptable. In alignment with NOPSEMA’s *Environment Plan Decision Making Guideline* (NOPSEMA 2021a), INPEX considers that when a risk rating of “Low” or “Moderate” applies, where the consequence does not exceed “C” (Significant) and where it can be demonstrated that the risk has been reduced to ALARP, that this defines an acceptable level of impact.

Through implementation of this EP, impacts to the environment will be managed to ALARP and acceptable levels and will meet the requirements of Section 3A of the EPBC Act (principles of ecologically sustainable development; ESD) as shown in Table 6-1.

Table 6-1: Principles of ecological sustainable development

Principles of ESD	Demonstration
a) decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations;	The INPEX environmental policy (Figure 9-2) INPEX *HSE Hazard and Risk Management Standard* and the INPEX BMS (Section 9) consider both long-term and short-term economic, environmental, social and equitable considerations.
(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;	No threat of serious or irreversible environmental damage is expected from the activity. Scientific knowledge is available to support this, and processes are in place to ensure that INPEX remains up-to-date with scientific publications (Section 9.13).
(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;	The health, diversity and productivity of the environment shall be maintained and not impacted by the activity.
(d) the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making;	Biological diversity and ecological integrity will not be compromised by the activity.
(e) improved valuation, pricing and incentive mechanisms should be promoted.	N/A

Consequently, the potential environmental impacts and risks associated with implementing the activity were determined to be acceptable if the activity:

- complies with relevant environmental legislation and corporate policies, standards, and procedures specific to the operational environment
- takes into consideration stakeholder feedback
- is managed in a manner that is consistent with AMP management objectives for ecologically sustainable use and the protection of MP values
- takes into consideration conservation management documents
- does not compromise the relevant principles of ESD; and
- the predicted level of impact does not exceed the defined acceptable level, in that the environmental risk has been assessed as "Low" or "Moderate", the consequence does not exceed "C – Significant" and the risk has been reduced to ALARP.

6.9 Definition of performance outcomes, standards and measurement criteria

As defined in Regulation 4 of the OPGGS (E) Regulations, INPEX has used environmental performance outcomes and performance standards to address potential environmental impacts and risks identified during the risk assessment.

Environmental performance outcomes, standards, and measurement criteria that relate to the management of the identified environmental impacts and risks are defined as follows:

- environmental performance outcome (EPO) means a measurable level of performance required for the management of environmental aspects of an activity to ensure that environmental impacts and risks will be of an acceptable level.
- environmental performance standard (EPS) means a statement of the performance required of a control measure.
- measurement criteria are used to determine whether each environmental performance outcome and environmental performance standard has been met.

7 IMPACT AND RISK ASSESSMENT

Following the environmental impact and risk assessment methodology described in Section 6, the aspects, hazards and threats have been systematically identified. The aspects (and associated hazards) with the potential for impact or risk in relation to the relevant identified values and sensitivities are discussed in this section and in Section 8.

7.1 Emissions and discharges

7.1.1 Light emissions

Table 7-1: Impact and risk evaluation – change in ambient light levels from navigational lighting on MODU and vessels

Identify hazards and threats	
Light emissions have the potential to disturb light-sensitive marine fauna, specifically marine turtles, seabirds and migratory bird species, through localised attraction to light that may result in behavioural changes. Low-intensity light spill will be generated from the MODU and vessels undertaking the activity as a consequence of providing safe illumination of work and accommodation areas. Additional lighting will be required periodically for the safe loading and unloading of support vessels to minimise the potential for safety and environmental hazards. Lighting on the MODU and vessels is directed over the work area, which aids in limiting light spill to the marine environment.	
Potential consequence	Severity
The particular values and sensitivities identified as having the potential to be impacted by light emissions from navigational lighting are: • marine turtles (foraging BIA) • marine avifauna. Behavioural changes reported in marine turtles exposed to increases in artificial lighting can include disorientation and interference during nesting (Pendoley 2005; DEE 2020). Disorientation of adult marine turtles or hatchlings has been known to result in risks to the survival of some individuals through excess energy expenditure or increased likelihood of predation (Witherington & Martin 2000; Limpus et al. 2003). The effect of light emissions resulting in disruption to turtle orientation and behaviour has been observed from up to 18 km away (DEE 2020) and the National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (DEE 2020) recommends that a 20 km buffer for assessment of impacts be considered around important habitat for turtles.	Insignificant (F)

A marine turtle foraging BIA overlaps the project area relating to green turtles and olive ridley turtles. Flatback turtles and loggerhead turtles are also known to forage in an area approximately 20 km west of the project area at the closest point. Although overlapping the BIA, it is unlikely that the project area is the predominant foraging area for all marine turtle species given water depths range from 75 m to 100 m. This is deeper than the preferred range for foraging marine turtles which is generally less than 40 m based on NPF bycatch records (Poiner & Harris 1996). Dietary samples of olive ridley turtles from the eastern Joseph Bonaparte Gulf indicate foraging depths of less than 14 m (Conway 1994 reported in Whiting et al. 2007). Most turtle foraging is therefore expected to be associated shallower waters within the KEFs surrounding the project area (Pinnacles of Bonaparte Basin, Carbonate Bank and Terrace System of the Sahul Shelf and Carbonate Bank and Terrace System of the Van Dieman Rise (DEWHA 2008). Satellite tracking data reviewed in recent studies (Ferreira et al. 2020; Thums et al. 2021) concluded that although the spatial extent of marine turtle internesting areas was adequately covered by the defined internesting buffers and therefore afforded an appropriate level of protection, it was not the same for foraging areas. The spatial extents of foraging BIAs are considered to potentially underestimate the distribution of foraging turtles. In particular, flatback turtles are reported to forage in areas of the Joseph Bonaparte Gulf with bare substrate and may potentially forage in deeper waters depths (Thums at al. 2021), such as those found in the project area. Therefore, it is considered possible that green, olive ridley, flatback and loggerhead turtles may be present in the project area year-round. The closest turtle nesting beaches and internesting habitat is located at the Tiwi Islands approximately 140 km from the project area. Therefore, based on this distance there will be no discernible effect on turtle hatchlings abilities to orientate to water. Although navigational light emissions from the MODU/vessels may be visible to foraging turtles within the project area, significant exposure or changes in ambient light levels are not expected to affect the behaviour of the adult turtle population as adult turtles undertaking internesting, migration, mating or foraging activities do not use light cues to guide these behaviours (Woodside 2020). The offshore light emissions generated from MODU/vessel lighting is not expected to have a discernible effect on foraging turtles and the potential for light from MODU/vessels to attract marine turtles once they are at sea is not expected. Any impacts are considered to be at a local scale, with short-term, temporary impact on a small portion of a population (Insignificant F). Section 4.9.9 lists other petroleum operations that have the potential to occur in the exploration permits/retention leases overlapping or adjacent to the project area during the timeframe associated with the GHG activities described in this EP. As stated above, light emissions associated with MODU and vessel navigational lighting may be visible to foraging turtles within the project area. The Recovery Plan for Marine Turtles in Australia (DEE 2017a) states, based on the long-life span and highly dispersed life history requirements of marine turtles, they may be subject to multiple threats acting simultaneously across their entire life cycle, such as increases in background noise levels and vessel strike. In considering cumulative impacts of threats on small or vulnerable stocks of marine turtles, it is possible that light emissions may act as contributor to a stock level decline. Lighting from additional vessel traffic in the project area associated with other activities may be detectable but given that adult turtles do not use light cues to guide foraging, migration, internesting or migration behaviours (Woodside 2020) any cumulative impacts are expected to be Insignificant (F).	

As described in Section 4.7.4, the project area is located within the EEA Flyway, an internationally recognised migratory bird pathway that covers the whole of Australia and its surrounding waters. The migration of marine avifauna through the EAA Flyway generally occurs at two times of year, northward between March and May and southward between August and November (Bamford et al. 2008; DEE 2017b). Artificial light can attract and disorient seabirds, disrupt foraging and potentially cause injury and/or death through collision with infrastructure (DEE 2020). Nocturnal birds are at much higher risk of impact (Wiese et al. 2001; DEE 2020); however, there are no threatened nocturnal migratory seabirds that use the EEA Flyway (DEWHA 2010). Marine avifauna are highly visually orientated. Where bird collision incidents have been reported by industry, low visibility weather conditions (cloudy, overcast and foggy nights) are usually implicated as the major contributing factor with few collision incidents on clear nights (Wiese et al. 2001). Where there is important habitat for seabirds within 20 km of a project, the National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (DEE 2020) recommends that consideration be given as to whether light is likely to have an effect on those birds. There are no BIAs for marine avifauna that overlap the project area. The PEZ overlaps three BIAs for different marine avifauna species (Section 4.7.4; Figure 4-7). However, these are located on the periphery of the PEZ with the closest outer boundary of a marine avifauna BIA being 175 km away from the project area at the closest point. No Ramsar sites overlap the PEZ; however, a nationally important wetland (Finniss Floodplain and Fog Bay Systems) is present adjacent to the boundary of the PEZ (Section 4.5.1). This site provides important habitat for marine avifauna including migratory species which could be expected to be encountered in low numbers as they are likely to transit through the project area and the PEZ. Migratory shorebirds travelling the EAA Flyway may fly over the project area, before moving on to the mainland (south) in the spring or Indonesia/Australian External Territories (north) in the autumn. It is possible that migratory birds may use ships and other offshore facilities in order to rest. However, the possibility of this occurring on the MODU or vessels associated with the activity in the project area is considered to be low due to the presence of alternative habitat for resting and foraging, resulting in minimal deviation from migratory pathways and limited potential for behavioural disruption. Therefore, any impact to seabirds or migratory birds from light emissions associated with the MODU and vessels is considered to be of inconsequential ecological significance (Insignificant F).	

Identify existing design and safeguards/controls measures
• Vessel personnel will receive an induction/training to inform them of the requirements to minimise external artificial lighting in accordance with Table 9-3.

Propose additional safeguards/control measures (ALARP Evaluation)			
Hierarchy of control	Control measure	Used?	Justification

Elimination	Do not use lighting at night-time.	No	Lighting is required for navigational and safety purposes and cannot be eliminated. This is in accordance with the *Navigation Act 2012* and associated Marine Orders (which are consistent with COLREGS requirements). Unnecessary outdoor/deck lighting is already eliminated.
Substitution	Exclude MODU/vessel lighting during sensitive periods for marine fauna	No	In general, bird migrations occur over several months of the year: between March and May (northward) and between August and November (southward) (Bamford et al., 2008). Foraging turtles may be present in the project area year-round. Lighting of MODU/vessels is required year-round to ensure the safety of workers and the environment and cannot be eliminated for certain periods during the year. Therefore, substituting the timing of activities would offer no benefit as it is possible that there will be sensitive periods for marine avifauna and turtles on a year-round basis.
Engineering	Reduce light intensity and/or frequencies which may attract turtles.	No	Lighting will be designed in accordance with the relevant Australian and international standards to ensure that worker and MODU/vessel safety is not compromised. The deployment of low-pressure sodium vapour lamps or other technologies which reduce/eliminate frequencies which have been shown to attract turtles would not result in any significant benefit regarding turtle hatchling attraction from the nesting beaches given the distance (140 km from closest nesting beaches) and the wave-front orientation cues (rather than light cues) of hatchlings once they are in the ocean. Additionally, adult turtles undertaking internesting, migration, mating or foraging activities are reported to not use light cues to guide these behaviours.
	Light shielding	No	The deployment of light shielding on MODUs/vessels to reduce light spill would not result in any significant benefit regarding turtle hatchling attraction from the nesting beaches given the distance (140 km) and wave front orientation cues (rather than light cues) of hatchlings once they are in the ocean. Similarly, for adult turtles, foraging behaviours are not known to be influenced by light cues.

Procedures & administration	Premobilisation review and planning of MODU/vessel lighting to be undertaken prior to activities (pre-drill survey and exploration drilling) commencing.	Yes	MODUs/vessels will maintain appropriate navigational and deck lighting to provide safe working conditions. The worst-case consequence of light impacts for all identified receptors at all times of the year has been assessed as Insignificant (F). However, a review of deck lighting will be undertaken during the premobilisation HSE inspection of MODU/vessels to ensure external lighting is minimised where practicable.
	Implementation of a seabird management plan to prevent seabird landings on MODUs/vessels due to attraction from artificial lighting.	No	A seabird management plan to prevent seabird landings on MODUs/vessels and to help manage birds appropriately is a recommendation as a consideration for vessels working in seabird foraging areas during breeding season (DEE 2020). As shown in Figure 4-7, the project area does not overlap any avifauna foraging BIAs and the closest BIAs are over 175 km away therefore this control is not considered necessary.
	Implementation of a light management plan to prevent impacts to marine turtles from artificial lighting on MODU/vessels.	No	The effect of light emissions resulting in disruption to turtle orientation and behaviour has been observed from up to 18 km away (DEE 2020). Navigational lighting on MODU/vessels may be visible to turtles in the foraging BIA that partly overlaps the project areas. However, given the water depths most turtle foraging is therefore expected to be associated shallower waters within the KEFs surrounding the project area. Additionally, adult turtles undertaking internesting, migration, mating or foraging activities are reported to not use light cues to guide these behaviours. Based on the short duration of activities (pre-drill survey approximately 30 days; exploration drilling approximately 150 days) any impacts to foraging turtles in the BIA are expected to be temporary and will not result in displacement from the foraging areas. Therefore, this control is not considered necessary.
Identify the likelihood			

Although light may potentially be visible from the MODU/vessels, given the distance from the closest turtle nesting beaches (approximately 140 km at the Tiwi Islands) and short-term duration of the activities (pre-drill survey and exploration drilling), impacts to turtles from light emissions is Highly Unlikely (5). While impacts to seabirds from lighting of offshore platforms and vessels have been reported in the industry, given the presence of alternative resting/foraging habitat on the Australian mainland the likelihood of impact to these receptors from navigational lighting of the MODUs/vessels is considered Highly Unlikely (5).		
Residual risk summary		
Based on a consequence of Insignificant (F) and a likelihood of Highly Unlikely (5) the residual risk is Low (10).		
Consequence	Likelihood	Residual risk
Insignificant (F)	Highly Unlikely (5)	Low (10)
Assess residual risk acceptability		
Legislative requirements Navigational lighting is required under the Navigation Act 2012 (which is consistent with COLREGS requirements) for the safe operation of MODUs and vessels. The MODU/vessels have been designed to meet Australian and international standards for safety purposes, including the requirements of the Navigation Act 2012. The National Light Pollution Guidelines for Wildlife including Marine Turtles, Seabirds and Migratory Shorebirds, published in 2020 (DEE 2020), has been used to ensure that the activities covered by this EP align with the guideline (see below conservation management plans/threat abatement plans). Stakeholder consultation The DNP requested that INPEX identify and manage impacts and risks on AMP values with respect to light pollution. With the above-described controls in place all impacts and risks are reduced to ALARP and the activity will be undertaken in a manner that is consistent with management plan objectives. AMP management objectives and values The project area is located approximately 40 km and 90 km respectively away from the Oceanic Shoals MP and Joseph Bonaparte Gulf MP. Given the distance to these MPs, no light impacts on marine fauna or avifauna in AMPs or impacts to MP values are expected. Conservation management plans / threat abatement plans Several conservation management plans have been considered in the development of this EP (refer Appendix A). DEE (2020) states that “natural darkness has a conservation value in the same way that clean water, air and soil has intrinsic value” and that artificial light has the potential to stall the recovery of a threatened species. The activities covered by this EP align with the guideline.		

ALARP summary Although the level of environmental risk is assessed as Low, a detailed ALARP evaluation was undertaken to determine what additional control measures could be implemented to reduce the level of impacts and risks. No additional controls, beyond those identified during the detailed ALARP assessment can reasonably be implemented to further reduce the risk of impact. Acceptability summary Based on the above assessment, the risk of impacts is managed to acceptable levels because: • the activity demonstrates compliance with legislative requirements/industry standards • the activity takes into account stakeholder feedback • the activity is managed in a manner that is consistent with AMP management objectives for ecologically sustainable use and the protection of MP values • the activity is managed in a manner that is consistent with the intent of conservation management documents • the activity does not compromise the relevant principles of ESD • the predicted level of impact does not exceed the defined acceptable level in that the environmental risk has been assessed as "low", the consequence does not exceed "C – significant" and the risk has been reduced to ALARP.		
Environmental performance outcomes	Environmental performance standards	Measurement criteria
Activities are managed in a manner that minimises potential lighting impacts to marine avifauna and turtles.	Premobilisation HSE inspections confirm that MODU and vessel lighting is reviewed to reduce unnecessary lighting.	Premobilisation HSE inspection records Monthly environmental checklist

7.1.2 Atmospheric emissions

Table 7-2: Impact and risk evaluation – atmospheric emissions from MODU and vessels

<table>
<tr><th colspan="2">Identify hazards and threats</th></tr>
<tr><td colspan="2">Atmospheric emissions (greenhouse gas (GHG) such as CO_2 and CH_4; non-GHG such as sulphur dioxide and nitrogen oxides) will be generated through the use of combustion engines, compressors, steam generators and potentially ODS containing equipment on board the MODU and vessels.

Atmospheric emissions from the activity will contribute to overall GHG concentrations and have the potential to result in localised changes in air quality and subsequent exposure of marine avifauna to air pollutants.

Expected direct GHG emissions have been estimated for the activity and are presented in Section 3.6.</td></tr>
<tr><th>Potential consequence</th><th>Severity</th></tr>
<tr><td>The particular values and sensitivities identified as having the potential to be impacted by atmospheric emissions are:
• climate
• marine avifauna.
The various sources of atmospheric emissions generated from the activity will add to overall global GHG concentrations. The contribution arising from vessels and the MODU (such as from fuel use) will be relatively short term and temporary in duration and insignificant in volume on a global scale. Therefore, the potential consequence is considered to be Insignificant (F).

As described in Section 4.7.4, the project area is located within the EAA Flyway, an internationally recognised migratory bird pathway that covers the whole of Australia and its surrounding waters. The migration of marine avifauna through the EAA Flyway generally occurs at two times of year, northward between March and May and southward between August and November (Bamford et al. 2008; DEE 2017b). There are no BIAs for marine avifauna that overlap the project area. The PEZ overlaps three BIAs for different marine avifauna species (Section 4.7.4; Figure 4-7). However, these are located on the periphery of the PEZ with the closest outer boundary of a marine avifauna BIA being 175 km away from the project area at the closest point. No Ramsar sites overlap the PEZ; however, a nationally important wetland (Finniss Floodplain and Fog Bay Systems) is present adjacent to the PEZ boundary (Section 4.5.1). This site provides important habitat for marine avifauna including migratory species which could be expected to be encountered in low numbers as they are likely to transit through the project area and the PEZ.</td><td>Insignificant (F)</td></tr>
</table>

In the absence of air quality standards or guidelines specifically for marine avifauna, human health air quality standards and guidelines have previously been used as a proxy for the assessment of atmospheric emissions from offshore production facilities and potential impacts to marine avifauna. The outcome of such assessments concluded that NO_2 concentrations may typically exceed long term (annual average) concentrations within a few km of the emissions source and that short-term (1-hour average) exposure levels may be exceeded within a few hundred metres (i.e., 200-400 m) of the emission source (RPS APASA 2014). This assessment was undertaken for a production facility and therefore any changes in air quality resulting from emissions generated by the MODU/vessels and equipment in the project area are also predicted to be highly localised given the nature of the emissions are less than those from a production facility. A review of the human health and environmental effects of the various air pollutants, as described in the National Pollutant Inventory, indicates that short-term exposures to significant concentrations of pollutants such as CO, NO_X, SO_2, VOCs, and fine particles, could cause symptoms such as irritation to eyes and respiratory tissues, breathing difficulties, and nausea (Manisalidis et al. 2020). Limited literature has been published on the vulnerability of avian species to air pollutants. The avian respiratory system, unlike the mammalian respiratory system, is characterised by unidirectional airflow and cross-current gas exchange, features that improve the efficiency of respiration. Therefore, birds are more likely to be susceptible to high concentrations of reactive gases, aerosols and particles in the air than mammals; and are considered to be useful indicators of air quality (Sanderfoot & Holloway 2017). Exposure to air pollutants may cause respiratory distress in birds, increasing their susceptibility to respiratory infection and may impair the avian immune response (Sanderfoot & Holloway 2017). As a worst case, it is conservatively assumed that a small number of individual marine avifauna may develop some short-term symptoms if they remain in the immediate vicinity of an emissions source where the pollutants are most concentrated. However, rapid recovery is expected after individuals move away from the source and any symptoms are not expected to occur. Chronic exposures are not considered plausible given that marine avifauna would move away (i.e. continue migration or undertake foraging activities elsewhere). Overall, the consequence of temporary, localised changes in air quality may result in short-term, sublethal effects to a small number of transient marine avifauna individuals and is therefore considered Insignificant (F).	
Identify existing design and safeguards/controls measures	
• MODUs and vessels will comply with the air emission requirements of Marine Order 97 (as applicable to vessel and engine size, type and class) including sulfur content of fuel oil • MODUs and vessels (as applicable to vessel and engine size, type and class) will comply with ODS requirements of Marine Order 97 • MODUs and vessels (as applicable to vessel, engine/propulsion size, type and class) will comply with energy efficiency requirements of Marine Order 97 • Measurement and monitoring of emissions data to enable legislative reporting requirements under the NGER Act to be met for the proposed activity • Implementation of an INPEX Australia contractor emissions reduction program to assist contractors identify and implement areas where they can reduce emissions.	

Propose additional safeguards/control measures (ALARP Evaluation)			
Hierarchy of control	Control measure	Used?	Justification
Elimination	Eliminate the use of MODU/vessels	No	The use of MODU/vessels to undertake the activity cannot be eliminated.
Substitution	Replace any ODS systems	No	In accordance with MARPOL Regulation 12, no chlorofluorocarbon (CFC) or halon containing system or equipment is permitted to be installed on ships constructed on or after 19 May 2005 and no new installation of the same is permitted on or after that date on existing ships. Similarly, no hydrochlorofluorocarbon (HCFC) containing system or equipment is permitted to be installed on ships constructed on or after 1 January 2020 and no new installation of the same is permitted on or after that date on existing ships. Therefore, only older vessels are considered to potentially have ODS systems installed as confirmed on the IAPP certificate. The costs to retrofit ODS equipment and replace systems are not considered to be warranted given they are being phased out in accordance with MARPOL and it may restrict vessel selection and availability in the short term.
Engineering	None identified.	N/A	N/A
Procedures & administration	Preventative maintenance system	Yes	MODU/vessel contractors have a preventative maintenance system in place to ensure diesel powered, power generation equipment is maintained and operated within original equipment manufacturers' (OEM) specification.

	NOPSEMA accepted WOMP and accepted MODU safety case and safety case revision includes aspects relevant to controls in place to minimise gas venting in the event of a well-kick.	Yes	Although there is no credible risk of a blowout from the reservoir formations targeted in the wells within the project area (Section 8), this control will be adopted as it is standard practice as part of INPEX's drilling operations management. Therefore, INPEX and MODU contractor will comply with the regulatory requirements of the OPGGS (Resource Management and Administration) Regulations 2011 (Cwlth) and the OPGGS (Safety) Regulations 2009 by ensuring the drilling activity is carried out in accordance with the accepted WOMP and safety case.
	MODU contractor Well Control Manual will cover all aspects of primary and secondary well control for drilling operations that includes aspects relevant to controls in place to minimise gas venting in the event of a well-kick.	Yes	Although there is no credible risk of a blowout from the reservoir formations targeted in the wells within the project area (Section 8), this control will be adopted as it is standard practice as part of INPEX's drilling operations management. Therefore, INPEX will ensure the Well Control Bridging Document aligns the requirements of the contractor's Well Control Manual with the requirements of the INPEX Well Integrity Standard and INPEX Well Operations Standard. This will ensure that in the event of a requirement to vent gas (e.g. from a well-kick), the influx volume can be minimised and therefore reduce the overall volume of gas vented to atmosphere.
	Voluntarily offset all GHG emissions associated with the proposed GHG activity.	No	As described in Section 3.6, the GHG emissions associated with the proposed GHG activity are indirect (scope 3) emissions for INPEX Australia. INPEX Australia has an offsets program in place to cover scope 1 and 2 emissions for the Ichthys Project as per the safeguard mechanism under the NGER Act. There is no safeguard mechanism baseline applicable to the activities covered by this EP as the activities relate to exploration and do not involve the recovery of hydrocarbons for production. Through implementation of INPEX Australia's contractor emissions reduction program, INPEX works with contractors and suppliers to reduce INPEX's scope 3 emissions. Given this existing control is in place to reduce scope 3 emissions it is not reasonable to introduce an additional offsetting control for emissions generated from this activity.

Identify the likelihood		
The likelihood of marine avifauna approaching and/or resting on exhaust vents on MODU/vessels during the activity and remaining in close enough proximity to be exposed to concentrations of air pollutants that result in symptoms such as irritation of eyes and respiratory tissues and breathing difficulties is considered Unlikely (4). Marine avifauna that may pass by near the MODU and vessels during the activity are unlikely to be in close enough proximity to be exposed to the emissions sources and are therefore unlikely to have any discernible symptoms. It is considered likely that they would move away from any emissions source if they began to experience discomfort or symptoms. No marine avifauna BIAs or critical habitats overlap the project area. With the control measures described above in place, the potential for changes to air quality and associated impacts to marine avifauna are reduced. Therefore, the likelihood of the described consequences to marine avifauna occurring is considered Unlikely (4).		
Residual risk summary		
Based on a consequence of Insignificant (F) and a likelihood of Unlikely (4) the residual risk is Low (9).		
Consequence	Likelihood	Residual risk
Insignificant (F)	Unlikely (4)	Low (9)
Assess residual risk acceptability		
Legislative requirements The activities and proposed management measures are compliant with industry standards, relevant international conventions and Australian legislation, specifically AMSA Marine Order 97: Marine Pollution Prevention – Air Pollution, the POTS Act, the *Navigation Act 2012*, and MARPOL, Annex VI. Emissions, energy consumption and energy production data will be reported annually to the Clean Energy Regulator by MODU/vessel contractors in accordance with NGER requirements. The Paris Agreement provides the international framework and context around Australia's NDC (43% below 2005 levels by 2030) and the long-term aspirational goal of net zero emissions by 2050. Stakeholder consultation No specific stakeholder concerns have been raised regarding potential impacts and risks associated with atmospheric emissions. AMP management objectives and values The project area is located approximately 40 km and 90 km respectively away from the Oceanic Shoals MP and Joseph Bonaparte Gulf MP. Given the distance to these MPs and the rapid dispersion of atmospheric emissions from MODU/vessels, no risk of impacts to AMPs or impacts to MP values are expected.		

Conservation management plans / threat abatement plans Several conservation management plans have been considered in the development of this EP (refer Appendix A). None of the recovery plans or conservation advice documents have specific threats relating to atmospheric emissions from MODUs and vessels operating offshore. However, many of the recovery plans or conservation advices identify climate change as an emerging threat to protected species with research priorities and actions identified to obtain a greater understanding of the impacts of climate change. Other actions are predominantly focused on Australia's international commitments regarding NDC, to reduce GHG emissions. ALARP summary Although the level of environmental risk is assessed as Low, a detailed ALARP evaluation was undertaken to determine what additional control measures could be implemented to reduce the level of impacts and risks. No additional controls, beyond those identified during the detailed ALARP assessment can reasonably be implemented to further reduce the risk of impact. Acceptability summary Based on the above assessment, the proposed controls are expected to effectively reduce the risk of impacts to acceptable levels because: • the activity demonstrates compliance with legislative requirements/industry standards • the activity takes into account stakeholder feedback • the activity is managed in a manner that is consistent with AMP management objectives for ecologically sustainable use and the protection of MP values • the activity is managed in a manner that is consistent with the intent of conservation management documents • the activity does not compromise the relevant principles of ESD • the predicted level of impact does not exceed the defined acceptable level in that the environmental risk has been assessed as "low", the consequence does not exceed "C – significant" and the risk has been reduced to ALARP.		
Environmental performance outcomes	**Environmental performance standards**	**Measurement criteria**
Planned emissions and discharges from MODU and vessels undertaking the activity are in accordance with MARPOL requirements and industry good practice.	MODU and vessels pre-mobilisation audits undertaken by a registered organisation confirm that marine diesel engines on board MODUs and vessels >400 GT meet the requirements of Marine Order 97, (as applicable to the vessel, engine/propulsion size, type and class).	EIAPP certificate IAPP certificate Bunker delivery notes IMO type approval for waste incinerators where installed

		Training records for personnel responsible for operating waste incinerators IEE certificate SEEMP
	Fuel oil and marine diesel with 0.5% m/m sulfur content will be used.	INPEX fuel specification records confirm that fuel provided to the MODU and vessels has 0.5% m/m sulfur content
	Where present equipment or systems on board MODUs or vessels >400 GT which contain ODS will be recorded and managed in accordance with MARPOL, Annex VI, Regulation 12 (as appropriate to vessel size, type and class.	ODS Record book
	MODU and vessel contractor has a preventative maintenance system to ensure diesel powered, power generation equipment is maintained and operated within OEM specification.	Preventative maintenance system records
	INPEX and the MODU contractor will comply with the requirements of the Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011 (Cwlth) and the Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009, including: • NOPSEMA accepted WOMP • preparation and acceptance of the MODU Safety Case and Safety Case Revision (SCR).	WOMP acceptance received from NOPSEMA. MODU Safety Case acceptance received from NOPSEMA.

	INPEX will verify that the MODU contractor complies with the requirements of the approved Well Control Bridging Document which aligns requirements (and clarifies if conflicts exist, which standard takes precedence) between the Contractor Well Control Manual, and INPEX policies and standards including INPEX Well Integrity Standard (0000-AD-STD-60003), Well Operations Standard (0000-AD-STD-60004) and Well Operations Manual (0000-AD-MAN-60002), which covers primary and secondary well control for drilling operations, including: • planned mud weight overbalance to stop ingress potential (i.e. inflow of formation fluids) into the well. • leak off or limit testing to confirm that the formation has sufficient strength for planned mud weight with adequate kick tolerance. • two independent well barriers in place at all times and tested in situ to ensure the system is capable of holding pressure in the well-bore or annulus.	Summary of compliance with primary and secondary well control in the Well Integrity Standard (0000-AD-STD-60003); Well Operations Standard (0000-AD-STD-60004) and Well Operations Manual (0000-AD-MAN-60002) reported in the daily drilling report.
Reduce INPEX Australia's contractor and supplier GHG emissions across the supply chain.	INPEX Australia will work with contractors and suppliers to establish a baseline position and undertake annual reviews of opportunities that when implemented will reduce GHG emissions.	Contractor emissions reduction program
	INPEX will provided emissions data to MODU/vessel contractors to enable legislative reporting requirements under the NGER Act to be met for the proposed GHG activity.	Data provided to MODU/vessel contractors to enable NGER reporting to the Clean Energy Regulator.

7.1.3 Routine discharges to sea

Sewage, grey water and food waste

Table 7-3: Impact and evaluation – MODU and vessels sewage, grey water and food waste discharges

<table>
<tr><th colspan="2">Identify hazards and threats</th></tr>
<tr><td colspan="2">Discharging treated sewage effluent, grey water and food waste has the potential to expose planktonic communities to changes in water quality from the introduction of nutrients. Such a decline in water quality has the potential to result in reduced ecosystem productivity or diversity. These intermittent discharges will occur at the proposed well locations in the project area which is located in the open ocean and more than 12 nm from the nearest land.

The average volume of sewage and greywater expected from the MODU and vessels (including domestic wastewater) generated by a person per day is approximately 230 L (based on calculations in Huhta et al 2009); therefore, based on the maximum POB of 150 on the MODU this would equate to approximately 35 m^3 per day.</td></tr>
<tr><th>Potential consequence</th><th>Severity</th></tr>
<tr><td>The particular values and sensitivities identified as having the potential to be impacted by sewage, grey water and food waste discharges are:

• planktonic communities.

A study undertaken to assess the effects of nutrient enrichment from the discharge of sewage in the ocean found that the influence of nutrients in open marine areas is much less significant than that experienced in enclosed, poorly mixed water bodies. The study also found that zooplankton composition and distribution in areas associated with sewage dumping grounds were not affected (McIntyre & Johnston 1975).

When sewage effluent, grey water and food waste is discharged there is the potential for localised and temporary, changes in water quality within the project area. The potential consequence on planktonic communities is a localised impact on plankton abundance in the vicinity of the point of discharge. Given the water depths (approximately 75 m to 100 m), oceanic currents will result in the rapid dilution and dispersion of these discharges. Therefore, the consequence is considered to be of inconsequential ecological significance (Insignificant F).

If concurrent activities were to occur in the project area, sewage effluent, grey water and food waste discharge plumes associated with the use of MODUs and vessels are not expected to overlap due to dilution and dispersion, with no cumulative impacts to planktonic communities from such discharges expected (Insignificant F).</td><td>Insignificant (F)</td></tr>
<tr><th colspan="2">Identify existing design and safeguards/controls measures</th></tr>
</table>

- MODU and vessels will manage the discharge of sewage effluent and grey water in accordance with Marine Order 96 (as appropriate to class).
- MODUs will be equipped with an approved sewage treatment plant (STP) compliant with Marine Order 96.
- MODUs and vessels will manage the discharge of garbage in accordance with Marine Order 95 (as appropriate to class).
- MODUs and vessels will macerate food waste to a particle size of <25 mm before disposal.

Propose additional safeguards/control measures (ALARP Evaluation)

Hierarchy of control	Control measure	Used?	Justification
Elimination	Eliminate discharges from MODU and vessels by storage of sewage, grey water and food waste on board and ship to the mainland.	No	The significant financial cost and health risks associated with storing sewage, grey water and food waste on board MODU/vessels and transporting it to the mainland for the duration of operations is grossly disproportionate to the low level of risk associated with this discharge, permitted under legislation. Additional environmental impacts would also be generated in terms of air emissions and onshore disposal. In the event that food waste is not macerated it will be transferred for onshore disposal. No unmacerated food waste will be disposed at sea.
Substitution	None identified	N/A	N/A
Engineering	STP installed and used on all vessels	No	While the MODUs will have a STP, a requirement for all vessels to have STPs installed is not practicable and costs are considered to be grossly disproportionate for what is a permitted discharge under relevant legislation.
Procedures & administration	Preventative maintenance system	Yes	MODU contractors have a preventative maintenance system in place to ensure STP is maintained and operated within OEM specification.

Identify the likelihood

Sewage and garbage discharges for the MODU and vessels will be in accordance with legislative requirements (MARPOL Annex IV & V, Marine Orders 95 and 96). Maceration of sewage and food waste to a particle size <25 mm prior to disposal will increase the ability of the discharges to disperse rapidly.

The effects of sewage discharged to the ocean have been relatively well studied (Gray et al. 1992; Weis et al. 1989) and toxic effects generally only occur where high volumes are discharged into a small and poorly mixed waterbody. The volumes discharged within the project area are unlikely to cause toxic effects, especially considering the rapid dilution provided by the deep water and ocean currents. Based on the expected high dispersion due to the open-ocean environment, localised impacts to plankton at the point of the planned discharge are considered to be Unlikely (4).		
Residual risk summary		
Based on a consequence of Insignificant (F) and a likelihood of Unlikely (4) the residual risk is Low (9).		
Consequence	Likelihood	Residual risk
Insignificant (F)	Unlikely (4)	Low (9)
Assess residual risk acceptability		
Legislative requirements Sewage, grey water and food waste discharges are standard practice in the offshore environment and the disposal at sea is permitted under AMSA Marine Order – Part 96: Marine Pollution Prevention – Sewage, which gives effect to MARPOL, Annex IV and Marine Order – Part 95: Marine Pollution Prevention – Garbage, which gives effect to MARPOL, Annex V. Stakeholder consultation No stakeholder concerns have been raised regarding potential impacts and risks from planned discharges (sewage, grey water and food waste). AMP management objectives and values The project area is located approximately 40 km and 90 km respectively away from the Oceanic Shoals MP and Joseph Bonaparte Gulf MP. Discharges are expected to disperse rapidly and no impacts to AMPs or MP values are expected. Conservation management plans / threat abatement plans Several conservation management plans have been considered in the development of this EP (refer Appendix A). Emissions and discharges are listed as threatening processes; however, none of the recovery plans or conservation advice documents has specific actions relating to discharges of sewage, grey water and food waste. The maceraters will assist in reducing impacts from the discharge stream, consistent with the intent of the conservation management documents. ALARP summary		

Although the level of environmental risk is assessed as Low, a detailed ALARP evaluation was undertaken to determine what additional control measures could be implemented to reduce the level of impacts and risks. No additional controls, beyond those identified during the detailed ALARP assessment can reasonably be implemented to further reduce the risk of impact.

Acceptability summary

Based on the above assessment, the proposed controls are expected to effectively reduce the risk of impacts to acceptable levels because:

- the activity demonstrates compliance with legislative requirements/industry standards
- the activity takes into account stakeholder feedback
- the activity is managed in a manner that is consistent with AMP management objectives for ecologically sustainable use and the protection of MP values
- the activity is managed in a manner that is consistent with the intent of conservation management documents
- the activity does not compromise the relevant principles of ESD
- the predicted level of impact does not exceed the defined acceptable level in that the environmental risk has been assessed as "low", the consequence does not exceed "C – significant" and the risk has been reduced to ALARP.

Environmental performance outcomes	Environmental performance standards	Measurement criteria
Planned emissions and discharges from MODUs and vessels undertaking the activity are in accordance with MARPOL requirements and industry good practice.	Comply with Marine Order 96 including: • Current ISPPC.	ISPPC
	Comply with Marine Order 95 including: • Garbage that has been ground or comminuted to particles <25 mm discharged >3 nm from the nearest land. • Garbage disposal record book maintained.	Garbage disposal record book
	MODU will have a STP compliant with Marine Order 96	Premobilisation HSE inspection records
	MODU contractor has a preventative maintenance system to ensure STP is maintained.	Preventative maintenance system records

Deck drainage, bilge and firefighting foam

Table 7-4: Impact and evaluation – MODU and vessels deck drainage, bilge and firefighting foam discharges

<table>
<tr><th colspan="2">Identify hazards and threats</th></tr>
<tr><td colspan="2">Contaminated deck drainage and bilge discharges or failure to treat oily water to suitable OIW concentrations before discharge, have the potential to expose marine fauna to changes in water quality and/or result in impacts through direct toxicity. Deck drainage discharge volumes on the MODU and vessels will be intermittent and are dependent on weather conditions and frequency of deck washing. Volumes of bilge water from engines and other mechanical sources found throughout the machinery spaces will also vary between vessels.

In general, the capacities of oil-water separators (OWS) on vessels range from 100–1000 litres per hour. Therefore, conservatively based on maximum rates, each vessel present in the project area could potentially discharge 1 m^3 per hour.

The MODU and vessels are equipped with firefighting foam that is a safety critical requirement. The foam systems supply 3% alcohol resistant aqueous film-forming foam (AR-AFFF) and 3% film forming fluoroprotein foam (FFFP) concentrates which will be used in the event of an incident. Foam released on to the helideck will be routed to the open-drains system for discharge to sea.</td></tr>
<tr><th>Potential consequence</th><th>Severity</th></tr>
<tr><td>The particular values and sensitivities with the potential to be impacted by deck drainage, bilge and fire foam discharges are:
• EPBC-listed species
• planktonic communities
• fish including commercial species.

Discharges of oily water will be treated to <15 ppm (v) in accordance with MARPOL requirements. This could introduce hazardous substances (mixture of water, oily fluids, lubricants, cleaning fluids (rig wash), etc.) into the water column, albeit in low concentrations. These discharges could result in a reduction in water quality, and impacts to EPBC-listed species, plankton and other pelagic organisms such as fish species including those targeted by commercial fisheries.</td><td>Insignificant (F)</td></tr>
</table>

The only marine fauna BIA that overlaps the project area relates to a green turtle and olive ridley turtle foraging (Figure 4-5). Flatback turtles and loggerhead turtles are also known to forage in an area approximately 20 km west of the project area at the closest point. Satellite tracking data reviewed in recent studies (Ferreira et al. 2020; Thums et al. 2021) concluded that although the spatial extent of marine turtle internesting areas was adequately covered by the defined internesting buffers and therefore afforded an appropriate level of protection, it was not the same for foraging areas. The spatial extents of foraging BIAs are considered to potentially underestimate the distribution of foraging turtles. Therefore, it is considered possible that green, olive ridley, flatback and loggerhead turtles may be present in the project area year-round. Given the mobile and transient nature of foraging turtles and the large size of available foraging grounds, the potential exposure is likely to be limited to individuals close to the discharge point at the time of the discharge. Worst-case impacts to exposed marine fauna may include direct toxic effects, such as damage to lungs and airways, and eye and skin lesions from exposure to oil at the sea surface (Gubbay & Earll 2000). Considering the low concentrations of oil and the location of the discharges in the dispersive open ocean environment, a surface expression is not anticipated; therefore, impacts are considered to be of inconsequential ecological significance to EPBC-listed species and are therefore considered Insignificant (F). Planktonic communities in close proximity to the discharge point may be affected if exposed to oily water. Such exposure may result in lethal effects to plankton. The potential consequence on planktonic communities is a localised impact on plankton abundance in the vicinity of the point of discharge with inconsequential ecological significance (Insignificant F). The NPF and two NT-managed fisheries are potentially active in the project area (Table 4-4) and a number of commercially significant fish stocks, considered as key indicator species, may be present in the waters of the project area. There is the potential for individual fishes to be exposed to the discharge; however, this would be limited to those fish present at the sea surface/upper water column where the discharge occurs. Such exposure is not expected to result in any significant impacts to fishes based on the low toxicity, low volume and high dilution levels; in addition, the highly mobile nature and ability of fishes to move away from the intermittent discharge. The potential consequence on fish species will be short-term and highly localised with inconsequential ecological significance (Insignificant F).	

Firefighting foams generally contain organic and fluorinated surfactants, which can deplete DO in water (Schaefer 2013; IFSEC Global 2014). However, in their diluted form (as applied in the event of a fire), these foams are generally considered to have a relatively low toxicity to aquatic species (Schaefer 2013; IFSEC Global 2014) and further dilution of the foam mixtures in dispersive aquatic environments may then occur before there is any substantial demand for DO (Schaefer 2013; IFSEC Global 2014). To date, limited research regarding the potential impacts of firefighting foam to the marine environment has been undertaken with respect to bioaccumulation and persistence (Suhring et al 2017). Toxicological effects from these types of foams are typically only associated with prolonged or frequent exposures, such as on land and in watercourses near firefighting training areas (McDonald et al. 1996; Moody and Field 2000). As toxicological effects from foams are associated with frequent or prolonged exposures, and any discharges during the activity will be as a result of an incident or infrequent maintenance/regulatory testing and are expected to rapidly disperse. Subsequently, it is not expected that any impacts will occur to EPBC-listed species or fish. It is also expected that effects on planktonic communities, if any, would be localised and of a short-term nature (Insignificant F). Additionally, the potential consequences are also considered to be countered by the net environmental benefit that would be achieved through mitigating the potential for a fire resulting in harm to people and the environment. If concurrent activities were to occur in the project area, deck drainage, bilge and firefighting foam discharge plumes associated with the use of MODUs and vessels are not expected to overlap due to dilution and dispersion, with no cumulative impacts to EPBC-listed species, planktonic communities or fish from such discharges expected (Insignificant F).	

Identify existing design and safeguards/controls measures

- MODUs and vessels are equipped with OWS, which remove traces of oil from the bilge and drainage water prior to discharge to sea.
- MODUs and vessels will have equipment to ensure OIW discharges meet <15 ppm in accordance with Marine Order 91. Bilge water and wastewater that does not meet the discharge requirements will be retained onboard for controlled disposal at a port reception facility.
- Spill kits will be available on-board MODUs and vessels.
- Vessel crew will receive an induction/training to inform them of deck spill response requirements in accordance with Table 9-3.
- INPEX chemical, assessment and approval procedure for selection of rig wash and firefighting foam in accordance with Section 9.6.1 and Table 9-5.

Propose additional safeguards/control measures (ALARP Evaluation)

Hierarchy of control	Control measure	Used?	Justification

Elimination	No discharges of contaminated deck drainage or bilge to sea.	No	Discharge of deck drainage, stormwater runoff, or bilge discharges cannot be eliminated from the MODU or vessels. There is not sufficient space on board for storage, and onshore disposal would result in additional emissions and discharges associated with frequent transfers resulting in a negative impact.
	No discharge of firefighting foams to sea.	No	Firefighting foams are safety critical and are required in the event of a fire to prevent potential loss of human life or the occurrence of a significant environmental incident. It is not possible to retain and dispose of foam during an incident by any other practicable means. Infrequent controlled discharges of small quantities of firefighting foams cannot be completely eliminated as regulatory assurance activities necessary to determine that Safety Critical Systems onboard meet their performance standards for fire protection must be carried out.
Substitution	None identified	N/A	N/A
Engineering	Discharge separation and containment system for firefighting foams.	No	Given the limited (insignificant) consequence of potential impacts that may arise from such a discharge and the low potential for occurrence, implementing separate drainage systems on MODUs and vessels for firefighting foams is not considered practicable. Implementation of additional engineering measures and procedures to reroute firefighting foams is not practicable in a situation when firefighting systems must be activated as soon as possible to contain a fire and the decks adequately drained to ensure the safety of personnel and integrity of MODUs and vessels.
Procedures & administration	MODU/vessel contractors will implement specific procedures to reduce the potential for deck spills reaching the sea.	Yes	To reduce potential for deck spills entering the marine environment contractors will ensure deck drainage systems are in place and maintained. This includes implementation of maintenance procedures and the use of plugs/scuppers, etc.
Identify the likelihood			

Deck drainage and bilge discharges are treated to a maximum concentration of 15 ppm (v) OIW prior to discharge as specified in MARPOL, Annex 1; Marine Order 91: Marine Pollution Prevention - Oil. Impacts to the abundance of plankton in the vicinity of the discharge (oily water and firefighting foam) are not expected and are considered Unlikely (4) and will be ecologically insignificant based on the naturally high spatial and temporal variability of plankton distribution in Australian tropical waters. Given the mobile nature of EPBC-listed species and fish potentially in the project area, the likelihood of impacts from the discharge after treatment and subsequent dilution and dispersion is considered Unlikely (4) and is not expected to result in a threat to population viability of protected species or to affect commercial fisheries.
Residual risk summary
Based on a consequence of Insignificant (F) and a worst-case likelihood of Unlikely (4) the residual risk is Low (9).

Consequence	Likelihood	Residual risk
Insignificant (F)	Unlikely (4)	Low (9)

Assess residual risk acceptability
Legislative requirements MODU and vessel OWS meet relevant international regulatory requirements, including MARPOL; Marine Order 91: Marine Pollution Prevention - Oil. For MODU and vessel bilge the discharge of oil in water of <15 ppm (v) is permitted under MARPOL. Stakeholder consultation No stakeholder concerns have been raised regarding potential impacts and risks from deck drainage, bilge or firefighting foam discharges. AMP management objectives and values The project area is located approximately 40 km and 90 km respectively away from the Oceanic Shoals MP and Joseph Bonaparte Gulf MP. Discharges are expected to disperse rapidly and no impacts to AMPs or MP values are expected. Conservation management plans / threat abatement plans Several conservation management plans have been considered in the development of this EP (refer Appendix A). Emissions and discharges are listed as threatening processes; however, none of the recovery plans or conservation advice documents has specific actions relating to deck drainage/bilge/firefighting foam discharges. Managing OIW discharges in accordance with legislative requirements is consistent with the intent of the conservation management documents. ALARP summary

Although the level of environmental risk is assessed as Low, a detailed ALARP evaluation was undertaken to determine what additional control measures could be implemented to reduce the level of impacts and risks. No additional controls, beyond those identified during the detailed ALARP assessment can reasonably be implemented to further reduce the risk of impact. Acceptability summary Based on the above assessment, the proposed controls are expected to effectively reduce the risk of impacts to acceptable levels because: • the activity demonstrates compliance with legislative requirements/industry standards • the activity takes into account stakeholder feedback • the activity is managed in a manner that is consistent with AMP management objectives for ecologically sustainable use and the protection of MP values • the activity is managed in a manner that is consistent with the intent of conservation management documents • the activity does not compromise the relevant principles of ESD • the predicted level of impact does not exceed the defined acceptable level in that the environmental risk has been assessed as "low", the consequence does not exceed "C – significant" and the risk has been reduced to ALARP.

Environmental performance outcomes	Environmental performance standards	Measurement criteria
Planned emissions and discharges from MODUs and vessels undertaking the activity are in accordance with MARPOL requirements and industry good practice.	MODU and vessel contractors will comply with the *Navigation Act 2012* – Marine Order 91 including: • MODUs and vessels (of appropriate class) to have IOPP certificate to show they have passed structural, equipment, systems, fittings, and arrangement and material conditions. • OWS tested and approved as per IMO resolutions MARPOL (Annex I).	Record of current IOPP certificate. Calibration and maintenance records of the OWS.
	MODU and vessel liquids from drains will only be discharged if the oil in water content does not exceed 15 ppm.	Documented use of oil record book to record all oil disposal.
	MODU/vessel contractors will manage deck drainage systems including: • facility for plugging or closing of outboard drains.	Deck drainage plans confirm inboard/outboard drainage Documentation of operational status of MODU deck drainage systems

	• inboard drains routed to oil water separator units, as required. • maintain MODU drainage systems to restrict leakages and small spills overboard.	
	Spill kits will be located on MODUs and vessels to allow clean-up of any spills to the deck.	Inspection records confirm spill kits are available and stocked.

Cooling water

Table 7-5: Impact and evaluation – MODU and vessels cooling water discharges

Identify hazards and threats	
Sea water is used as a heat exchange medium for the cooling of machinery engines on the MODU and vessels. It is pumped aboard and may be treated with biocide (e.g. hypochlorite) before circulation through heat exchangers. It is subsequently discharged from the MODU/vessels to the sea surface. Cooling water (CW) discharges to the marine environment will result in a localised and temporary increase in the ambient water temperature surrounding the discharge point. Elevated discharge temperatures may cause a variety of effects, including marine fauna behavioural changes and reduced ecosystem productivity or diversity through impacts to planktonic communities. CW discharge rates vary largely depending on the vessel type. However, as a worst-case, the rate of CW discharge from the MODU during drilling is estimated to be approximately 10,000 – 20,000 m^3 per day on a continuous basis. The temperature of the CW discharge will be approximately 40 °C, in contrast to ambient surface-water temperatures of approximately 27 °C to 30 °C recorded in the Joseph Bonaparte Gulf (Section 4.6.4).	
Potential consequence	**Severity**
The particular values and sensitivities with the potential to be impacted by cooling water discharges are: • EPBC-listed species • planktonic communities. Effects of elevation in seawater temperature may include a range of behavioural responses in EPBC-listed species including attraction and avoidance behaviour. The only marine fauna BIA that overlaps the project area relates to green turtle and olive ridley turtle foraging (Figure 4-5). Flatback turtles and loggerhead turtles are also known to forage in an area approximately 20 km west of the project area at the closest point. Satellite tracking data reviewed in recent studies (Ferreira et al. 2020; Thums et al. 2021) concluded that although the spatial extent of marine turtle internesting areas was adequately covered by the defined internesting buffers and therefore afforded an appropriate level of protection, it was not the same for foraging areas. The spatial extents of foraging BIAs are considered to potentially underestimate the distribution of foraging turtles. Therefore, it is considered possible that green, olive ridley, flatback and loggerhead turtles may be present in the project area on a year-round basis. Given the mobile and transient nature of foraging turtles and the large size of available foraging grounds, the potential exposure is likely to be limited to individuals close to the discharge point at the time of the discharge and the activity is unlikely to displace turtles from the foraging grounds. The activity will occur in water depths of approximately 75 m to 100 m in a dispersive, open ocean environment. Therefore, potential consequences to EPBC-listed species are potentially localised avoidance of thermally elevated water temperatures, with an inconsequential ecological significance to protected species (Insignificant F).	Insignificant (F)

Elevated seawater temperatures are known to cause alterations to the physiological (especially enzyme-mediated) processes of exposed biota (Wolanski 1994). These alterations may cause a variety of effects and potentially even mortality of plankton in cases of prolonged exposure. In view of the high level of natural mortality and the rapid replacement rate of many plankton species, UNEP (1985) indicates that there is no evidence to suggest that lethal effects to plankton from thermal discharges are ecologically significant. The potential consequence on planktonic communities is a localised impact on plankton abundance in the vicinity of the point of discharge with inconsequential ecological significance (Insignificant F).

The use of biocide (hypochlorite) for the control of biofouling is considered an established and efficient technology for use in offshore environments and is used throughout the world (Khalanski 2002). The effects of chlorination on the marine environment have been summarised by Taylor (2006) who, based on a review of applications using hypochlorite as an antifoulant for the seawater cooling circuits, concluded that:

- the chlorination procedure itself does cause the mortality of a proportion of planktonic organisms and the smaller organisms entrained through a cooling water system; however, only in very rare instances, where dilution and dispersion were constrained, were there any impacts beyond the point of discharge
- long term exposure to chlorination residues on fish species did not impose any apparent ecotoxicological stress
- studies of the impact of chlorination by-products on marine communities, population, physiological, metabolic and genetic levels, indicate that the practice of low-level chlorination on coastal receiving water is minor in ecotoxicological terms.

These findings indicate that the toxicity of the CW discharge is negligible at the point of discharge, therefore impacts are limited to thermal effects.

If concurrent activities were to occur in the project area, CW discharge plumes associated with the use of MODUs and vessels are not expected to overlap due to dilution and dispersion, with no cumulative impacts to EPBC-listed species or planktonic communities from such discharges expected (Insignificant F).

Identify existing design and safeguards/controls measures

None identified

Propose additional safeguards/control measures (ALARP Evaluation)

Hierarchy of control	Control measure	Used?	Justification

Elimination	No discharges of CW to sea	No	Engines and machinery require cooling to operate safely and efficiently, therefore CW cannot be eliminated. Storage and containment of CW to allow cooling on board the MODU and vessels prior to discharge is not considered practicable given the size/space requirements (i.e. large surface areas are required to sufficiently cool the water). Onshore disposal was also not considered practicable given the distance to the mainland (transit time of approximately 15 hours to Darwin), frequency of trips required, and the associated emissions and discharges generated by such transfers.
Substitution	Substitute hypochlorite with an alternative biofouling control/mechanism.	No	Hypochlorite is an established and efficient technology for use in offshore environments and is a recommended technique in the application of best available techniques to industrial cooling systems (European Commission 2001). The retrofitting of alternative biofouling control mechanisms to all vessels is not considered to be practicable given the low environmental impact from vessel cooling water discharges.
Engineering	None identified	N/A	N/A
Procedures & administration	None identified	N/A	N/A
Identify the likelihood			
CW discharges are expected to rapidly disperse in the open-ocean environment of the project area. MODU and vessel CW discharges may result in temporary, localised and ecologically insignificant avoidance behaviour in EPBC-listed species in response to elevated water temperatures. However, any avoidance or behavioural changes are not expected to result in a threat to the population viability of protected species and is considered to be Unlikely (4). Localised impacts to the abundance of plankton within the vicinity of the CW discharges are considered to be Unlikely (4) based on the naturally high spatial and temporal variability of plankton distribution in Australian tropical waters.			
Residual risk summary			
Based on a consequence of Insignificant (F) and a likelihood of Unlikely (4) the residual risk is Low (9).			
Consequence	Likelihood	Residual risk	

Insignificant (F)	Unlikely (4)	Low (9)
Assess residual risk acceptability		

Legislative requirements

The discharge of return seawater from cooling water systems to the marine environment is considered to be standard practice in industry and there are no relevant Australian environmental legislative requirements that relate specifically to the discharge of cooling water.

Stakeholder consultation

No stakeholder concerns have been raised regarding potential impacts and risks from CW discharges.

AMP management objectives and values

The project area is located approximately 40 km and 90 km respectively away from the Oceanic Shoals MP and Joseph Bonaparte Gulf MP. Discharges are expected to disperse rapidly and no impacts to AMPs or MP values are expected.

Conservation management plans / threat abatement plans

Several conservation management plans have been considered in the development of this EP (refer Appendix A), none of the recovery plans or conservation advice documents have specific threats or actions relating to discharges of cooling water in remote offshore waters.

ALARP summary

Although the level of environmental risk is assessed as Low, a detailed ALARP evaluation was undertaken to determine what additional control measures could be implemented to reduce the level of impacts and risks. No additional controls have been identified that can reasonably be implemented to further reduce the risk of impact.

Acceptability summary

Based on the above assessment, the risk of impacts is managed to acceptable levels because:

- the activity demonstrates compliance with legislative requirements/industry standards
- the activity takes into account stakeholder feedback
- the activity is managed in a manner that is consistent with AMP management objectives for ecologically sustainable use and the protection of MP values
- the activity is managed in a manner that is consistent with the intent of conservation management documents
- the activity does not compromise the relevant principles of ESD

• the predicted level of impact does not exceed the defined acceptable level in that the environmental risk has been assessed as "low", the consequence does not exceed "C – significant" and the risk has been reduced to ALARP.

Environmental performance outcomes	Environmental performance standards	Measurement criteria
N/A no controls identified		

Desalination brine

Table 7-6: Impact and evaluation – MODU and vessels desalination brine discharges

Identify hazards and threats	
Potable water will be generated on the MODU and vessels using a RO plant which is supplied with sea water. Potable water is primarily supplied to the accommodation and domestic services areas. It is also supplied for other purposes such as the eyewash and safety shower systems and utilities water systems. Desalination brine produced from the RO process will be discharged to sea on a continuous basis. Discharging desalination brine has the potential to cause changes in water salinity. The estimated volume of brine discharge for the vessels and MODU is estimated to be in the order of 60 - 140 m^3 per day with salinity in the order of 45 to 50 parts per thousand (ppt) in comparison to ambient seawater with a typical salinity of 34 to 35 ppt.	
Potential consequence	**Severity**
The particular values and sensitivities with the potential to be impacted by desalination brine discharges are: • planktonic communities. The discharge of desalination brine from the MODUs and vessels has the potential to result in increased salinity within the receiving environment. Exposure to increased levels of salinity has the potential to result in impacts to planktonic communities. Azis et al. (2003) reported that effects on planktonic communities in areas of high mixing and dispersion, such as those found in the project area, are generally limited to the point of discharge only. Given the water depths in the project area (approximately 75 m to 100 m) and the dynamic open ocean environment (i.e. tides and currents) it is expected that the brine discharge would rapidly disperse relatively close to the point of discharge. Therefore, the effects of a temporary and highly localised increase in salinity are not expected to result in any significant ecological impacts to planktonic communities (Insignificant F).	Insignificant (F)

If concurrent activities were to occur in the project area, brine discharge plumes associated with the use of MODUs and vessels are not expected to overlap due to dilution and dispersion, with no cumulative impacts to planktonic communities from such discharges expected (Insignificant F).			
Identify existing design and safeguards/controls measures			
None identified			
Propose additional safeguards/control measures (ALARP Evaluation)			
Hierarchy of control	Control measure	Used?	Justification
Elimination	Eliminate brine discharges from MODU and vessels	No	The significant financial cost and health risks associated with providing fresh water to support vessels from the mainland via vessel transfer or transiting directly to port for resupply is grossly disproportionate to the low level of risk associated with this discharge. Transit time to the closest port facilities (Darwin) for resupply is approximately 15 hours. This would also generate additional environmental impacts in terms of atmospheric emissions and increased demands to the onshore supply.
Substitution	None identified	N/A	N/A
Engineering	Use of a diffuser on vessels/MODU to increase mixing in the receiving environment.	No	Given the water depth (75 m to 100 m) and oceanic currents in the project area and the small volumes of discharges, retrospective installation of a diffuser on the MODU and all vessels is not considered practicable, given the insignificant consequence from brine discharges.
Procedures & administration	None identified	N/A	N/A
Identify the likelihood			
Direct effects on plankton from desalination brine discharges may occur in the project area near the point of discharge but are not expected to result in an ecological impact to planktonic communities in the wider region. Therefore, the likelihood of impact to planktonic communities from these planned discharges is considered Highly Unlikely (5).			

Residual risk summary		
Based on a consequence of Insignificant (F) and a likelihood of Highly Unlikely (5) the residual risk is Low (10).		
Consequence	Likelihood	Residual risk
Insignificant (F)	Highly Unlikely (5)	Low (10)
Assess residual risk acceptability		
Legislative requirements The discharge of desalination brine to the marine environment is considered to be standard practice in industry and there are no relevant Australian environmental legislative requirements that relate specifically to the discharge of desalination brine. Stakeholder consultation No stakeholder concerns have been raised regarding potential impacts and risks from desalination brine discharges. AMP management objectives and values The project area is located approximately 40 km and 90 km respectively away from the Oceanic Shoals MP and Joseph Bonaparte Gulf MP. Discharges are expected to disperse rapidly and no impacts to AMPs or MP values are expected. Conservation management plans / threat abatement plans Several conservation management plans have been considered in the development of this EP (refer Appendix A), none of the recovery plans or conservation advice documents have specific threats or actions relating to discharges of desalination brine in remote offshore waters. ALARP summary Although the level of environmental risk is assessed as Low, a detailed ALARP evaluation was undertaken to determine what additional control measures could be implemented to reduce the level of impacts and risks. No additional controls have been identified that can reasonably be implemented to further reduce the risk of impact. Acceptability summary Based on the above assessment, the risk of impacts is managed to acceptable levels because: • the activity demonstrates compliance with legislative requirements/industry standards • the activity takes into account stakeholder feedback		

• the activity is managed in a manner that is consistent with AMP management objectives for ecologically sustainable use and the protection of MP values • the activity is managed in a manner that is consistent with the intent of conservation management documents • the activity does not compromise the relevant principles of ESD • the predicted level of impact does not exceed the defined acceptable level in that the environmental risk has been assessed as "low", the consequence does not exceed "C – significant" and the risk has been reduced to ALARP.		
Environmental performance outcomes	Environmental performance standards	Measurement criteria
N/A no controls identified		

Drill fluids and drill cuttings

Table 7-7: Impact and evaluation – discharges of drill fluids and drill cuttings

<table>
<tr><th colspan="2">Identify hazards and threats</th></tr>
<tr><td colspan="2">During drilling operations, drill cuttings consisting of crushed rock fragments are generated. Along with the cuttings, drill fluids (used to lubricate/ cool the drill bit, stabilise the borehole and control pressure) are brought to the surface. The main constituents of drill fluids are WBM and a weighting material (typically barite) (Section 3.4.1). Barium sulphate (barite) is considered to be relatively inert in the marine environment, and unlikely to be toxic (Neff 2002). The acute toxicity of WBM is also considered to be low (Neff 1987). Various additives may also be added to improve the technical performance of the drill fluids such as viscosifiers, emulsifiers and pH control agents. The chemicals used as additives in the drill fluids are mostly classified as PLONOR (Pose Little or No Risk to the Environment) by OSPAR Commission (2012) or have an OCNS rating of D or E or a HQ rating of silver or gold (Table 3-2).

Routine discharges of drill fluids and drill cuttings will occur during the exploration drilling activity. Sources of discharge are listed below, and quantities discharged are shown in Table 3-1:
• WBM drill cuttings and drill fluids discharge at the seabed during riserless well sections
• WBM drill cuttings discharge at the sea surface (overboard from the MODU) including bulk discharges of WBM fluid and cuttings at the end of drilling/pit washing and cleaning

Discharged drill fluids and drill cuttings may impact benthic communities, water quality and associated pelagic receptors within the discharge plume (Bakke et al. 2013).</td></tr>
<tr><th>Potential consequence</th><th>Severity</th></tr>
<tr><td>The particular values and sensitivities with the potential to be impacted by drilling discharges (drill fluids/cuttings) are:
• benthic communities
• fish including commercial species.

The main impact pathways from the discharge of drill fluids and drill cuttings are associated with smothering of benthic communities and an increase in turbidity within the water column potentially impacting on water quality. Cuttings in suspension may also affect pelagic organisms, sponges, corals and other sessile fauna within the discharge plume (Bakke et al. 2013).

Smothering</td><td>Insignificant (F)</td></tr>
</table>

Smothering of benthic fauna may occur in locations where the rate of cuttings deposition exceeds the rate at which in situ fauna are able to move up through the sediments. There is generally no agreed threshold point for tolerance to sedimentation as it depends on the species and the structure of the accumulating material. Smit et al. (2008) conducted an extensive literature review of species sensitivity distributions for sediment burial in the marine environment. They reported that the 50% hazardous level for burial of deep-water epibenthic fauna, such as found in the project area, was 54 mm. The discharge of drill fluids and cuttings may result in the smothering of benthic communities in the immediate vicinity of the wells in the project area. This may result in burial and low sediment oxygen concentrations caused by increased oxygen consumption and organic enrichment (Neff 2008). Monitoring in the North Sea has not revealed any in situ effects of WBM cuttings on sediment macrofauna community structure, implying that any such effects, if present, will be confined to within 25–250 m from the discharge point (Bakke et al. 2013 and references within). Effects on filter feeding bivalves were reported to be limited to within a distance of 0.5 to 1 km from the discharge (Bakke et al. 2013). Further studies also indicate impacts from drilling (fluids/cuttings) discharges are localised to within 1 km of the wells (Ellis et al. 2012; Purser 2015). KEFs near the project area (Section 4.2) have unique seafloor features and are thought to provide biologically important habitats in areas otherwise dominated by soft sediments (DSEWPaC 2012a, 2012b). It is considered that the hard substrates provided by pinnacles, terraces and low-lying ridges are likely to support a range of sponges, corals, crinoids, molluscs, echinoderms and other benthic invertebrates (Section 4.6.3; ERM 2011). The closest pinnacle is located, approximately 16 km west from the project area at its closest point. Therefore, benthic communities associated with the KEF are not expected to be impacted by drilling discharges as any silt plumes generated would have dissipated over this distance in the presence of near-seabed currents and it is not expected that sedimentation/smothering impacts would occur to benthic communities. While complete smothering of corals in sediment or drill cuttings will cause suffocation, conditions typically generated during the discharge of drill cuttings are unlikely to cause coral death, although this will be dependent on coral morphology (branching) and the capacity to shed sediment through the release of mucus (Allers et al. 2013). The nearest submerged coral communities to the project area are Roche Reefs located approximately 140 km away. As such these are not expected to be impacted by smothering effects due to the drilling discharges. Any potential impacts to benthic communities from WBM drilling discharges are expected to be at a local scale and short-term, therefore the consequence is considered to be Insignificant (F).	

The discharge of drill fluids and cuttings resulting in smothering of benthic communities is considered to be relatively localised to within 1 km of the wells (Bakke et al. 2013; Ellis et al. 2012; Purser 2015). Based on this distance, if concurrent activities were to occur in the project area, no cumulative impacts to benthic communities and KEFs are expected (Insignificant F). *Turbidity and water quality* Disposal of drill fluids and cuttings discharge overboard at the sea surface may affect other parts of the marine ecosystem such as pelagic organisms and other submerged receptors that may be present within the discharge plume. Discharged drill cuttings and fluids will create a temporary and localised turbid plume, which will gradually dilute as it disperses through the water column as a result of the action of currents. Field observations from drilling campaigns on the north-west shelf (NWS) have found that plumes associated with drilling discharges at the seabed and sea surface were visible in the upper water column for up to approximately 1 km from the discharge location and for a short time (approximately 24 hours) after discharge (INPEX 2010). Exposure to increased turbidity and potential toxicity is expected to be short term, and intermittent depending on plume behaviour (Bakke et al. 2013). Benthic communities are expected to be largely unaffected from the presence of a discharge plume (reducing light exposure levels), due to the water depth and high dispersion and mixing of the drilling cuttings and fluids within the water column. Pelagic species including fish species targeted by commercial fisheries (Section 4.9.6), and EPBC-listed species transiting the area, are unlikely to be significantly impacted as they are likely to exhibit avoidance behaviour. There is the potential for individual fishes to be exposed to the discharge; however, this would be limited to those fish present at the sea surface/upper water column. Pelagic receptors may be impacted by increased TSS in the water column as an increase in particle load could adversely affect the respiratory efficiency of fish. However, most visual orientated fish/fauna species would likely relocate to an unaffected area to avoid the plume or simply pass unaffected through turbid waters. There is limited evidence that drilling discharges affect fishes in the natural environment, other than references to laboratory experiments, such as those undertaken by Gagnon and Bakhtyar (2013) that reported that acute toxicity of SBMs was generally low for pink snapper (*Pagrus auratus*), noting that only WBM will be used for the wells in the project area. The barite to be used for the wells in has very low concentrations of mercury and cadmium (less than 1 mg/kg and 3 mg/kg respectively). A study investigating barite solubility and the release of trace metal compounds to the marine environment recorded that <1% of the mercury and 15% of the cadmium dissolved from the barite after one-week exposure in sea water (Crecelius et al. 2007). Considering the low levels of these metals released to sea, and the small initial amounts of these metals present in the barite, it is considered that the discharge of drilling fluids will not have a significant environmental impact on water quality and the receptors present within the water column. While turbidity in the project area is likely to increase, up to approximately 1 km from the point of discharge, the plume is expected to rapidly disperse, and any impacts will be localised and of short-term duration (Insignificant F). The discharge of drill fluids and cuttings will generate discharge plumes in the water column that may extend up to 1 km from the discharge location. If concurrent drilling activities were to occur in the project area, drill fluids and cuttings discharge plumes are not expected to overlap due to dilution and dispersion, with no cumulative impacts to benthic communities, EPBC-listed species, planktonic communities or fish from such discharges expected (Insignificant F).	

Identify existing design and safeguards/controls measures			
• INPEX chemical, assessment and approval procedure for selection of drill fluids in accordance with Section 9.6.1 and Table 9-5.			
Propose additional safeguards/control measures (ALARP Evaluation)			
Hierarchy of control	Control measure	Used?	Justification
Elimination	Do not use drill fluids.	No	Drill fluids are a critical component for maintaining a stabilised well-bore and therefore cannot be eliminated.
	Do not discharge drill cuttings.	No	This control is typically only considered for synthetic based mud (SBM). Containment of cuttings and centrifuge solids from drilling operations (WBM) and shipping for onshore disposal was discounted due to excessive logistical costs and safety implications.
	Reinject cuttings to avoid discharge to sea.	No	In cuttings reinjection, the cuttings are crushed and blended with water to create slurry. Typically, the slurry is then pumped to a suitable geological structure with an appropriate seal below the seabed through an annulus or tubing. This method of disposal is only an option if a suitable disposal well or disposal annuli are available which is not the case in the project area. This control would typically only be considered if using SBM with higher levels of potentially toxicity than WBM.
Substitution	None identified	N/A	N/A
Engineering	Use of SCE that is appropriately maintained for effective operation	Yes	Quantities of drilling fluids and cuttings discharged will be minimised through the use of SCE, which includes recirculation of the mud where possible.
Procedures & administration	Concentrations of mercury and cadmium in stock barite will meet International Finance Corporation (IFC) Environment, Health and Safety (EHS) guidelines (IFC 2015) effluent levels.	Yes	The barite used for drilling operations in the project area will have low concentrations of mercury and cadmium (less than 1 mg/kg and 3 mg/kg respectively) in accordance with IFC EHS guidelines.

Identify the likelihood		
Smothering of benthic communities may occur adjacent to the well site albeit limited to an extent ranging to within a couple of hundred metres. With the reported limited benthic community diversity in the project area (Section 4.6.3) and distances to sensitive benthic communities (Roche Reefs located 140 km from the project area) any localised loss of benthic communities in the vicinity of the wells from smothering are predicted to be relatively temporary based on the expected recovery of benthic communities through recolonisation aided by seabed currents. Therefore, with the controls in place to minimise toxicity by the use of WBM and selecting the least hazardous chemicals coupled with the likely recolonisation within the project area, impacts to benthic communities from smothering are considered to be Highly Unlikely (5). Based on the highly dispersive environment in the project area, short-term and intermittent nature of the discharges, the low levels of associated toxicity (WBM) and the localised scale of potential impact (<1 km) it is Highly Unlikely (5) that drill fluids and cuttings will have a significant environmental impact on water quality, submerged receptors and marine fauna present within the water column.		
Residual risk summary		
Based on a consequence of Insignificant (F) and a likelihood of Highly Unlikely (5) the residual risk is Low (10).		
Consequence	Likelihood	Residual risk
Insignificant (F)	Highly Unlikely (5)	Low (10)
Assess residual risk acceptability		
Legislative requirements The Minimata Convention covers all aspects of the life cycle of mercury, controlling and reducing mercury across a range of products, processes and industries. Australia ratified the Minamata Convention on 7 December 2021. Countries that have ratified the Convention are bound by international law to put controls in place to manage emissions, releases and disposal of mercury and mercury compounds. At present there are no specific guidelines regarding acceptable levels of mercury waste in drilling fluids. The discharge of drill fluids and cuttings to the marine environment is considered to be standard practice in industry. Barite contamination, with mercury and cadmium, will be managed in accordance with IFC EHS Guidelines – Offshore Oil and Gas Development (2015) that represent good international industry practice. Stakeholder consultation No stakeholder concerns have been raised regarding potential impacts and risks from planned discharges of drill fluids and cuttings. AMP management objectives and values The project area is located approximately 40 km and 90 km respectively away from the Oceanic Shoals MP and Joseph Bonaparte Gulf MP. Discharges are expected to disperse rapidly and no impacts to AMPs or MP values are expected.		

Conservation management plans / threat abatement plans

Several conservation management plans have been considered in the development of this EP (refer Appendix A). Emissions and discharges are listed as threatening processes; however, none of the recovery plans or conservation advice documents has specific actions relating to discharges of drill fluids or cuttings in remote offshore waters.

ALARP summary

Although the level of environmental risk is assessed as Low, a detailed ALARP evaluation was undertaken to determine what additional control measures could be implemented to reduce the level of impacts and risks. No additional controls, beyond those identified during the detailed ALARP assessment can reasonably be implemented to further reduce the risk of impact.

Acceptability summary

Based on the above assessment, the proposed controls are expected to effectively reduce the risk of impacts to acceptable levels because:

- the activity demonstrates compliance with legislative requirements/industry standards
- the activity takes into account stakeholder feedback
- the activity is managed in a manner that is consistent with AMP management objectives for ecologically sustainable use and the protection of MP values
- the activity is managed in a manner that is consistent with the intent of conservation management documents
- the activity does not compromise the relevant principles of ESD
- the predicted level of impact does not exceed the defined acceptable level in that the environmental risk has been assessed as "low", the consequence does not exceed "C – significant" and the risk has been reduced to ALARP.

Environmental performance outcomes	Environmental performance standards	Measurement criteria
Limit planned discharges from drilling activities so that impacts to receptors will be localised.	Volumes of drill fluids discharged will be minimised through the use of SCE, which includes recirculation of the mud where possible.	Records of all operational discharges (planned and unplanned) of drilling fluids and cuttings are recorded on the MODU and demonstrate compliance with all requirements for operational discharge.

	Maintenance of SCE in accordance with the MODU preventive maintenance system.	Documentation of planned and completed maintenance and testing of SCE in accordance with the MODU preventive maintenance system.
	INPEX will verify that the drilling fluids contractor adheres to the following with respect to limits on mercury and cadmium concentration in drilling fluids including: • Mercury (Hg) – 1 mg/kg dry weight in stock barite • Cadmium (Cd) – 3 mg/kg dry weight in stock barite.	• Drilling fluids will have concentrations of mercury and cadmium less than 1 mg/kg and 3 mg/kg respectively in stock barite. • Documentation of quality assurance/control acceptance process undertaken for all individual batches of barite used.

Cement, cementing fluids and additives

Table 7-8: Impact and evaluation – discharges of cement, cementing fluids and additives

Identify hazards and threats	
Planned cement discharges at the seabed during the cementing of conductors and casing, and during well abandonment operations, will occur as part of the drilling activity in the project area. Small volumes (1–2 m^3 of cement per section) may also be discharged as a slurry at the sea surface from circulating cement with the riser installed, or from cleaning of cementing tanks and equipment on the MODU. Contingency discharges of cement may also be required if a cementing job does not meet technical and safety standards. In this instance any remaining cement will be mixed and operationally discharged within the well bore e.g., by increasing the length of the upper plug or discharged to the marine environment. As described in Section 3.4.1, it is standard practice to allow some excess cement slurry to overflow when cementing the top-hole section of a well to visually confirm that the annular space between the hole and the casing has been filled. This may typically extend up to 10 m from each well. The discharge of cement, cementing fluids and additives has the potential to reduce water quality through increasing turbidity or toxicity which may affect organisms within the water column. Seabed cement discharges may result in smothering of benthic communities in the vicinity of the well.	
Potential consequence	**Severity**
The particular values and sensitivities with the potential to be impacted by cementing discharges (fluids/additives) are: • benthic communities • fish including commercial species. Impact pathways associated with the discharge of cement during drilling operations are associated with smothering of benthic communities in close proximity to the wells, and an increase in turbidity within the water column potentially impacting on water quality. *Smothering* As described in Table 7-7, discharges at the seabed may result in the smothering of benthic communities in the immediate vicinity of the wells in the project area. Discharges of cement (potentially extending up to 10 m from each well) will result in burial and loss of benthic communities immediately adjacent to the well, particularly for sessile epifauna. Any potential impacts to benthic communities and loss of benthic habitat due to cement discharges are expected to be at a local scale, therefore the consequence is considered to be Insignificant (F) particularly given the context of the potential area impacted in comparison to the size of the project area. There are no sensitive or unique benthic habitats that would be impacted by seabed cement discharges, with the closest pinnacle associated with the Pinnacles of the Bonaparte Basin KEF located over 16 km away from the project area at its closest point.	Insignificant (F)

The discharge of cement may result in smothering of benthic communities in the immediate vicinity surrounding the wells (up to approximately 10 m from each well). If concurrent drilling activities were to occur in the project area, cement discharges will not overlap, with no cumulative impacts to benthic communities from such discharges expected (Insignificant F). *Turbidity* Disposal of cement discharges overboard at the sea surface may affect other parts of the marine ecosystem such as pelagic organisms and other submerged receptors that may be present within the discharge plume. Intermittent discharges of cement, albeit at small volumes (1–2 m^3) may create a temporary and localised turbid plume, which will gradually dilute as it disperses through the water column as a result of the action of currents. Data on the longevity of cement discharge plumes is not available; however, plumes associated with drilling muds have been reported to be visible in the upper water column for up to approximately 1 km from the discharge location and for a short time (approximately 24 hours) after discharge (INPEX 2010). Therefore, low volume cement discharges would also be expected to dissipate within this timeframe and exposure to increased turbidity and potential toxicity associated with the discharge is expected to be short term, and intermittent. Benthic communities are expected to be largely unaffected from the presence of a discharge plume (reducing light exposure levels), due to the water depth, high dispersion and mixing of the cement discharge within the water column. Pelagic species including fish species targeted by commercial fisheries (Section 4.9.6), and EPBC-listed species transiting the area, are unlikely to be significantly impacted as they are likely to exhibit avoidance behaviour. There is the potential for individual fishes to be exposed to the discharge; however, this would be limited to those fish present at the sea surface/upper water column. Pelagic receptors may be impacted by increased TSS in the water column as an increase in particle load could adversely affect the respiratory efficiency of fish. However, most visual orientated fish/fauna species would likely relocate to an unaffected area to avoid the plume or simply pass unaffected through turbid waters. The potential for toxicity effects to fish and pelagic organisms is expected to be limited given toxicity is mainly associated with cement additives that are used in minor quantities. Given the dispersive environment in the project area and expected high level of dilution, any exposure is expected to be limited to a few individuals within the immediate vicinity of the discharge. Therefore, the discharge of cement/cement slurry will not have a significant environmental impact on water quality and the receptors present within the water column (Insignificant F). The discharge of cement will generate discharge plumes in the water column that may extend up to 1 km from the discharge location. If concurrent drilling activities were to occur in the project area, cement discharge plumes are not expected to overlap due to dilution and dispersion, with no cumulative impacts to benthic communities, EPBC-listed species or fish from such discharges expected (Insignificant F).	
Identify existing design and safeguards/controls measures	
• INPEX chemical, assessment and approval procedure for selection of cementing chemicals in accordance with Section 9.6.1 and Table 9-5.	

• Records of all operational cement discharges will be monitored and maintained. Any remaining cement will be mixed and operationally discharged within the well bore or to the marine environment.			
Propose additional safeguards/control measures (ALARP Evaluation)			
Hierarchy of control	Control measure	Used?	Justification
Elimination	Do not cement well casing	No	Cementing of well casing is required and cannot be eliminated. Only the conductor hole section will result in the discharge of cement to the seabed. Through casing design of the lower well sections, no cement will be discharged to the seabed from the lower casings.
Substitution	None identified	N/A	N/A
Engineering	None identified	N/A	N/A
Procedures & administration	None identified	N/A	N/A
Identify the likelihood			
Localised smothering of benthic communities and habitats may occur immediately adjacent to the well site from seabed cement returns potentially occurring up to 10 m from each well. With the reported limited benthic community diversity in the project area (Section 4.6.3) and the controls in place to minimise toxicity, the loss of sensitive benthic communities from smothering due to cement discharge is considered Highly Unlikely (5). Based on the highly dispersive environment in the project area, the short-term and intermittent nature of the discharges, the low levels of associated toxicity and the localised scale of potential impact (<1 km), it is Highly Unlikely (5) that cement discharges will have a significant environmental impact on water quality and the marine fauna present within the water column.			
Residual risk summary			
Based on a consequence of Insignificant (F) and a likelihood of Highly Unlikely (5) the residual risk is Low (10).			

Consequence	Likelihood	Residual risk
Insignificant (F)	Highly Unlikely (5)	Low (10)

Assess residual risk acceptability
Legislative requirements The discharge of cement to the marine environment is considered to be standard practice in industry and there are no relevant Australian environmental legislative requirements that relate specifically to the discharge. Stakeholder consultation No stakeholder concerns have been raised regarding potential impacts and risks from planned discharges of cement. AMP management objectives and values The project area is located approximately 40 km and 90 km respectively away from the Oceanic Shoals MP and Joseph Bonaparte Gulf MP. Discharges are expected to disperse rapidly and no impacts to AMPs or MP values are expected. Conservation management plans / threat abatement plans Several conservation management plans have been considered in the development of this EP (refer Appendix A). Emissions and discharges are listed as threatening processes; however, none of the recovery plans or conservation advice documents has specific actions relating to discharges of cement in remote offshore waters. ALARP summary Although the level of environmental risk is assessed as Low, a detailed ALARP evaluation was undertaken to determine what additional control measures could be implemented to reduce the level of impacts and risks. No additional controls, beyond those identified during the detailed ALARP assessment can reasonably be implemented to further reduce the risk of impact. Acceptability summary Based on the above assessment, the proposed controls are expected to effectively reduce the risk of impacts to acceptable levels because: • the activity demonstrates compliance with legislative requirements/industry standards • the activity takes into account stakeholder feedback • the activity is managed in a manner that is consistent with AMP management objectives for ecologically sustainable use and the protection of MP values • the activity is managed in a manner that is consistent with the intent of conservation management documents • the activity does not compromise the relevant principles of ESD • the predicted level of impact does not exceed the defined acceptable level in that the environmental risk has been assessed as "low", the consequence does not exceed "C – significant" and the risk has been reduced to ALARP.

Environmental performance outcomes	Environmental performance standards	Measurement criteria
Limit planned discharges from drilling activities so that impacts to receptors will be localised.	Volumes of excess cement will be minimised through optimising operational cement discharges.	Records of all operational discharges (planned and unplanned) of cement are recorded on the MODU and demonstrate compliance with all requirements for operational discharge.

BOP and hydraulic control fluids

Table 7-9: Impact and evaluation – subsea discharges of BOP and hydraulic control fluids

Identify hazards and threats	
The MODU that will be contracted to undertake the drilling activities described in this EP will either be a jack-up or semi-submersible MODU. In the event that a jack-up is utilised the BOP control circuit is a closed circuit and no BOP control fluid will be discharged. However, a semi-submersible MODU, with a subsea BOP, uses an open circuit control fluid system resulting in discharges of BOP control fluid to the marine environment. BOP function testing is undertaken approximately weekly or fortnightly during the drilling activity. Generally, an initial pre-deployment function testing is undertaken on deck with no resulting subsea discharge of BOP control fluid. However, function testing will occur subsea, with each test releasing approximately 0.25 m^3 of BOP control fluid. BOP control fluid generally consists of water mixed with a glycol based detergent, or equivalent water based, anti-corrosive additive suitable for open hydraulic systems. BOP control fluid is ranked as a Group E product by the OCNS is considered PLONOR. Water-based hydraulic fluids will also be discharged subsea (typically < 1 m^3) through the use of ROVs during the drilling activity which may result in a temporary and localised reduction in water quality.	
Potential consequence	**Severity**
The particular values and sensitivities with the potential to be impacted by discharges of BOP and hydraulic control fluids are: • EPBC-listed species • fish including commercial species • benthic communities. Discharges of BOP control fluids and other water-based hydraulic fluids could introduce hazardous substances into the water column, albeit in low concentrations, and in the majority of cases the chemicals are classified as PLONOR. However, this could result in a reduction in water quality, and impacts to EPBC-listed species and other pelagic organisms such as fish species including those targeted by commercial fisheries) and benthic communities given some discharges may occur at or near the seabed.	Insignificant (F)

The only marine fauna BIA that overlaps the project area relates to a green turtle and olive ridley turtle foraging (Figure 4-5). Flatback turtles and loggerhead turtles are also known to forage in an area approximately 20 km west of the project area at the closest point. It is considered possible that green, olive ridley, flatback and loggerhead turtles may be present in the project area year-round. Considering the low volumes and low levels of associated toxicity of the BOP and hydraulic control fluid discharges in the dispersive open environment and the highly mobile and transient nature of marine fauna, any potential exposure is likely to be limited to individuals close to the discharge point at the time of the discharge. Therefore, impacts are considered to be of inconsequential ecological significance to EPBC-listed species and are therefore considered Insignificant (F).

There is the potential for individual fishes, directly adjacent to the discharge point to be exposed to the intermittent subsea discharges. Such exposure is not expected to result in any significant impacts to fishes based on the high dilution levels, low toxicity, low volumes and in consideration of the highly mobile nature and ability of fishes to move away. The potential consequence on fish species targeted by commercial fisheries will be short-term and highly localised with inconsequential ecological significance (Insignificant F).

Subsea discharges of BOP and hydraulic control fluids are expected to be highly influenced by natural dispersion and dilution processes associated with the currents experienced in the offshore environment. Potential impacts on benthic communities may include lethal and sub-lethal effects; however, impacts are expected to be limited both spatial and temporally due to intermittent nature, small volumes and low toxicity of the discharges. Therefore, the consequence of the exposure of benthic communities would be at a local scale with a temporary impact and is ranked as Insignificant (F).

If concurrent activities were to occur in the project area, BOP and hydraulic control fluids discharge plumes associated with the use of MODUs are not expected to overlap due to dilution and dispersion, with no cumulative impacts to EPBC-listed species, benthic communities or fish from such discharges expected (Insignificant F).

Identify existing design and safeguards/controls measures

- INPEX chemical, assessment and approval procedure for selection of drill fluids in accordance with Section 9.6.1 and Table 9 5.
- Records of BOP and hydraulic control fluid discharges will be monitored and maintained.

Propose additional safeguards/control measures (ALARP Evaluation)

Hierarchy of control	Control measure	Used?	Justification
Elimination	No subsea discharges of BOP or hydraulic control fluids	No	If a jack-up MODU is selected to undertake the drilling activities there will be no subsea discharges of BOP control fluid.

			However, if a semi-submersible MODU is used, function and pressure testing of the BOP is required to ensure safe and effective operation. Therefore, the subsea discharge of BOP control fluids cannot be eliminated. Hydraulic fluid (water-based) discharges are inherent for the use of subsea equipment e.g. ROVs. There are no practicable ways to eliminate these small volume discharges (< 1 m^3). There are no practicable ways to capture the small volumes of such discharges and based on the chemical composition (water/glycol based) these discharges are considered to PLONOR when discharged to the marine environment.
Substitution	None identified	N/A	N/A
Engineering	None identified	N/A	N/A
Procedures & administration	None identified	N/A	N/A

Identify the likelihood
Impacts to the EPBC-listed marine fauna, fish and benthic communities in the vicinity of the BOP and hydraulic control fluid discharges are not expected to occur and are considered Unlikely (4). This is largely due to the water depth, low toxicity and low volumes of the discharged fluids. The open-ocean, highly dispersive environment in the project area will also result in high levels of dilution further reducing the likelihood of exposure to the identified receptors.
Residual risk summary
Based on a consequence of Insignificant (F) and a worst-case likelihood of Unlikely (4) the residual risk is Low (9).

Consequence	Likelihood	Residual risk
Insignificant (F)	Unlikely (4)	Low (9)

Assess residual risk acceptability

Legislative requirements

The majority of subsea control fluids are based on fresh water with additives, such as monoethylene glycol as well as lubricants, corrosion inhibitors, biocides and surfactants. Subsea discharges to the marine environment are considered to be standard practice in industry and there are no relevant Australian environmental legislative requirements that relate specifically to these discharges.

Stakeholder consultation

No stakeholder concerns have been raised regarding potential impacts and risks from planned subsea discharges of BOP and hydraulic control fluids.

AMP management objectives and values

The project area is located approximately 40 km and 90 km respectively away from the Oceanic Shoals MP and Joseph Bonaparte Gulf MP. Discharges are expected to disperse rapidly and no impacts to AMPs or MP values are expected.

Conservation management plans / threat abatement plans

Several conservation management plans have been considered in the development of this EP (refer Appendix A). Emissions and discharges are listed as threatening processes; however, none of the recovery plans or conservation advices has specific actions relating to discharges of BOP control/hydraulic fluid discharges in remote offshore waters.

ALARP summary

Although the level of environmental risk is assessed as Low, a detailed ALARP evaluation was undertaken to determine what additional control measures could be implemented to reduce the level of impacts and risks. No additional controls, beyond those identified during the detailed ALARP assessment can reasonably be implemented to further reduce the risk of impact.

Acceptability summary

Based on the above assessment, the proposed controls are expected to effectively reduce the risk of impacts to acceptable levels because:

- the activity demonstrates compliance with legislative requirements/industry standards
- the activity takes into account stakeholder feedback
- the activity is managed in a manner that is consistent with AMP management objectives for ecologically sustainable use and the protection of MP values
- the activity is managed in a manner that is consistent with the intent of conservation management documents
- the activity does not compromise the relevant principles of ESD
- the predicted level of impact does not exceed the defined acceptable level in that the environmental risk has been assessed as “low”, the consequence does not exceed “C – significant” and the risk has been reduced to ALARP.

Environmental performance outcomes	Environmental performance standards	Measurement criteria
Limit planned discharges from drilling activities so that impacts to receptors will be localised.	Records of subsea discharges will be monitored and maintained.	Operational daily drilling report

7.2 Waste management

Table 7-10: Impact and evaluation – waste management

Identify hazards and threats	
The MODUs and vessels associated with the activity will generate a variety of non-hazardous and hazardous wastes, which will not be intentionally discharged to the marine environment. Unsecured or incorrectly stored waste may be windblown or displaced into the ocean where it has the potential to negatively affect marine ecosystems. Wastes can cause contamination of the ocean resulting in changes to water quality e.g. through the leaching of chemicals from wastes, which can cause changes to ecosystem productivity and diversity. Additionally, certain types of waste can cause injury to marine fauna through entanglement or may affect the health of marine species that ingest waste materials.	
Potential consequence	**Severity**
The particular values and sensitivities with the potential to be impacted by improper waste management are: • EPBC-listed species • planktonic communities. Improper management of wastes may result in pollution and contamination of the environment. There is also the potential for secondary impacts on marine fauna that may interact with wastes, such as packaging and binding, should these enter the ocean. These include physical injury or death of marine biota (as a result of ingestion, or entanglement of wastes). A change to water quality has the potential to impact planktonic communities found at the sea surface. Impacts associated with the accidental loss of hazardous waste materials to the ocean as a result of leaching from waste would be localised and limited to the immediate area. These are further likely to be reduced due to the dispersive open ocean offshore environment. While plankton abundance in close proximity to the accidental loss location, or leaching waste items may be reduced, this is expected to be of insignificant ecological consequence (Insignificant F). Marine fauna can become entangled in waste plastics, which can also be ingested when mistaken as prey (Ryan et al. 1988), potentially leading to injury or death. For example, due to indiscriminate foraging behaviour, marine turtles have been known to mistake plastic for jellyfish (Mrosovsky et al. 2009). Seabirds foraging on planktonic organisms, generally at, or near, the surface of the water column may eat floating plastic (DEE 2018). Other items (e.g. discarded rope) have also been found to entangle fauna, such as birds and marine mammals. The accidental loss of waste to the ocean may result in injury or even death to individual transient EPBC Act listed species, but this is not expected to result in a threat to population viability of a protected species (Insignificant F).	Insignificant (F)
Identify existing design and safeguards/controls measures	

- Spill containment and recovery equipment
- MODUs and vessels will manage waste in accordance with MARPOL Annex V, specifically maintain and implement a garbage management plan.

Propose additional safeguards/control measures (ALARP Evaluation)			
Hierarchy of control	Control measure	Used?	Justification
Elimination	None identified	N/A	N/A
Substitution	None identified	N/A	N/A
Engineering	None identified	N/A	N/A
Procedures & administration	Premobilisation HSE inspection of MODU/vessel and waste contractors	Yes	HSE inspection conducted pre-mobilisation and ongoing during the activity will confirm correct storage, labelling and handling of wastes including presence of netting to prevent windblown waste
	Reporting of equipment or materials lost to sea	Yes	Any equipment or materials lost to the marine environment will be reported.

Identify the likelihood		
During previous INPEX drilling activities with MODUs and associated vessels, the accidental release or loss of materials/equipment overboard has occurred on several occasions often through incorrect storage and handling. Therefore, impacts to EPBC-listed species and planktonic communities from the unplanned release of waste to the ocean are considered Possible (3).		
Residual risk summary		
Based on a consequence of Insignificant (F) and a worst-case likelihood of Possible (3) the residual risk is Low (8).		
Consequence	Likelihood	Residual risk
Insignificant (F)	Possible (3)	Low (8)
Assess residual risk acceptability		

Legislative requirements

The existing preventative and mitigation measures outlined to prevent accidental release of hazardous and non-hazardous wastes are consistent with, and typical of, good industry practice. Procedures for managing waste (i.e. handling, storage, transfer and disposal) will be outlined in the vessel/MODU garbage management plan, in accordance with MARPOL Annex V requirements.

Stakeholder consultation

No stakeholder concerns have been raised regarding potential impacts and risks from improper waste handling and disposal.

AMP management objectives and values

The project area is located approximately 40 km and 90 km respectively away from the Oceanic Shoals MP and Joseph Bonaparte Gulf MP. Proposed control measures reduce the risk of waste materials released or lost to the marine environment and no significant impacts to fauna in AMPs or impacts to MP values are expected.

Conservation management plans / threat abatement plans

Several conservation management plans have been considered in the development of this EP (refer Appendix A). Injury and fatality to vertebrate marine life caused by ingestion of, or entanglement in, harmful marine debris was listed in August 2003 as a key threatening process under the EPBC Act as detailed in the 'Threat abatement plan for impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans' (DEE 2018). The entanglement and ingestion of marine debris is also identified as a threat in the 'Recovery Plan for Marine Turtles in Australia" (DEE 2017a). Specific actions which contribute to the long-term prevention of marine debris (Objective 1 of the 'Threat abatement plan for marine debris on vertebrate marine life' (DEE 2018)) have been adopted including compliance with applicable legislation in relation to the improvement of waste management practices, such as MARPOL 73/78, Annex V.

ALARP summary

Although the level of environmental risk is assessed as Low, a detailed ALARP evaluation was undertaken to determine what additional control measures could be implemented to reduce the level of impacts and risks. No additional controls, beyond those identified during the detailed ALARP assessment can reasonably be implemented to further reduce the risk of impact.

Acceptability summary

Based on the above assessment, the proposed controls are expected to effectively reduce the risk of impacts to acceptable levels because:

- the activity demonstrates compliance with legislative requirements/industry standards
- the activity takes into account stakeholder feedback
- the activity is managed in a manner that is consistent with AMP management objectives for ecologically sustainable use and the protection of MP values
- the activity is managed in a manner that is consistent with the intent of conservation management documents

- the activity does not compromise the relevant principles of ESD
- the predicted level of impact does not exceed the defined acceptable level in that the environmental risk has been assessed as "low", the consequence does not exceed "C – significant" and the risk has been reduced to ALARP.

Environmental performance outcomes	Environmental performance standards	Measurement criteria
No unplanned loss of equipment, materials or wastes to the marine environment during the activity.	Loss of equipment or materials lost to sea will be reported.	Incident report of equipment or material lost overboard.
	Spill kits will be available on board the MODUs and vessels.	Inspection records confirm spill kits are available and stocked.
	Premobilisation HSE inspection of MODU/vessel and waste contractors confirm capability for the correct storage, labelling and handling of wastes.	Premobilisation HSE inspection records.
	Garbage management plans will be provided on MODUs and vessels in accordance with Marine Order 95; Annex V of MARPOL (garbage), and will specifically include: • procedures for collecting, storing, processing and disposing of all waste types (including segregation and labelling) • the use of waste storage and transfer equipment • the use of food waste macerators/comminuters • garbage record keeping requirements, including discharges, and disposals of waste in a Garbage Record Book • communication of waste management practices and awareness materials for crew.	HSE inspection records confirm garbage management plans are implemented on MODUs and vessels. Incident report of waste lost overboard.

7.3 Noise and vibration

Table 7-11: Impact and risk evaluation – underwater noise

Identify hazards and threats	
Marine fauna may be exposed to several sources of noise emissions during the activity, as summarised below: • Operation of the MODU (including power generation and drilling) has the potential to expose sound sensitive marine fauna to localised changes in underwater noise levels. Machinery positioned on the deck is above the waterline and therefore the overall noise levels will be low. The level of underwater noise associated with MODUs while not drilling are reported to decrease rapidly with distance from the MODU. In a study by McCauley (1998), it is reported that during non-drilling operations sound levels of 117 dB re 1µPa were recorded at a distance of 125 m from the wellhead and were audible over a distance of 1-2 km. This noise was reported to be associated with the discharging of fluids and the operation of pumping systems and mechanical plant, etc. While actively drilling, sound levels of 115 dB re 1µPa were recorded at a distance of 405 m from the wellhead (McCauley 1998). Other studies have reported measured sound levels of 136 dB re 1 µPa at 100 m distance from drilling activities (Nedwell & Edwards 2004) and Greene (1986) reported 117 dB re 1 µPa at 185 m and 110 dB re 1µPa at 926 m. The noise generated during drilling activities was primarily associated with the use of the drill string. • The pre-drill survey will use underwater acoustic techniques including the use of MBES, side-scan sonar and sub-bottom profiling (Section 3.3.1). The survey will be conducted from a dedicated geophysical survey vessel and have the potential to expose sound sensitive marine fauna to localised changes in underwater noise levels. The different survey devices shall emit various levels of sound at a range of frequencies. MBES and side-scan sonar transmit at high frequencies (approximately 120 – 410 kHz) and produce a highly focused beam of sound towards the seabed, due to this there is very limited horizontal sound propagation, and it is expected to rapidly attenuate. Indicative ranges of sound outputs at source are 163 - 190 dB re 1 µPa at 1 m and 137 - 200 dB re 1 µPa at 1 m, for MBES and side-scan sonar respectively. Sub-bottom profiling systems operate at low frequency (1-16 kHz) directing beans of sound towards the seabed and therefore horizontal sound propagation is again limited. Sound outputs at source may range from 142 - 200 dB re 1 µPa at 1 m. • Operating vessels (pre-drill survey and support vessels) have the potential to expose sound sensitive marine fauna to localised changes in underwater noise levels. Vessel engines and dynamic positioning thrusters are capable of generating sound at levels between 108 and 182 dB re 1 µPa at 1 m at dominant frequencies between 50 Hz and 7 kHz (Simmonds et al. 2004; McCauley 1998). • As part of reservoir evaluation, a VSP may be undertaken at each well in the project area (Section 3.4.3), which will generate high-intensity, impulsive sound that will propagate into the water column with the potential to expose sound sensitive marine fauna to localised changes in underwater noise levels. Sound levels generated during the VSP will be 232 dB re 1 µPa@1 m with a frequency range of 5 – 125 Hz. Each VSP will be of short duration (approximately 18 hours).	
Potential consequence	Severity
The particular values and sensitivities with the potential to be impacted by underwater noise emissions are:	Insignificant (F)

• EPBC-listed species (cetaceans, turtles and whale sharks) • fish including commercial species. The generation of underwater sound from the pre-drill survey and drilling activities in the project area has the potential to impact EPBC-listed marine fauna, specifically cetaceans, turtles and whale sharks. Sudden exposure to very high sound levels or exposure for prolonged periods can result in a permanent threshold shift (PTS) or temporary threshold shift (TTS) in hearing. Noise impact thresholds proposed by the U.S. National Oceanic and Atmospheric Administration and National Marine Fisheries Service (NMFS 2018) for cetaceans, suggest that, for the types of cetacean with the potential to occur in the project area, PTS could occur as a result of peak sound pressure levels of 219 – 230 dB re 1 µPa or prolonged exposure to sound exposure levels of 198 – 199 dB re 1 µPa2·s. TTS could occur at peak sound pressure levels of 213 - 224 dB re 1 µPa or prolonged exposure to sound exposure levels of 168 - 170 dB re 1 µPa2·s (NMFS 2018). Popper et al. (2014) propose conservatively protective sound pressure thresholds of 207 - 213 dB re 1 µPa for potential injury to various types of fish and for marine turtles. With the exception of the VSP, no sources of noise associated with the activity are expected to have the potential to result in PTS or TTS. A range of behavioural changes can occur in cetaceans in response to sound pressure levels as low as 120 dB re 1 µPa (Southall et al. 2007). This may include minor responses, such as a momentary pause in vocalisation or reorientation of an animal to the source of the sound, or avoidance responses (Southal et al. 2007). For cetaceans, NMFS (2019) propose a behavioural response threshold of 160 dB re 1 µPa for impulsive sound sources and 120 dB re 1 µPa for continuous sound sources (NMFS 2019). Marine turtles are not reported to use sound for communication; however, it is proposed that they may use sound for navigation, avoiding predators and finding prey (Dow Piniak 2012). For received sound pressure levels above 166 dB re 1 µPa, turtles have shown some increased swimming activity and above 175 dB re 1 µPa can become more agitated (McCauley et al. 2000). The 166 dB re 1 µPa level is used as the threshold level for a behavioural disturbance response by turtles (NSF 2011). A number of commercially significant fish stocks may be present in the project area that may be exposed to underwater noise emissions (Table 4-4). *<u>Pre-drill survey noise</u>* MBES and side-scan sonar are high-frequency, low-energy geophysical survey instruments, which are understood to be significantly less intrusive than high-energy seismic survey instruments. As described in Section 3.3.1, sound source levels produced by these different instruments range from 137–200 dB re 1 µPa at 1 m. The high frequency pulses of sound are produced in a highly directional and narrow beams, which rapidly attenuate outside of the beam (Zykov 2013). The high operating frequencies of MBES and side-scan instruments place the dominant sound frequencies above the auditory range of most other marine fauna species, including cetaceans, turtles and fish, although some instruments may be audible to mid-frequency and high-frequency cetaceans such as some dolphin species (MacGillivray et al. 2013; Zykov 2013). It is not expected that fauna would persist in close proximity to the instruments long enough for impacts to occur. Therefore, no impacts to these species' groups are expected and hearing impairment impacts to marine fauna from MBES, and side-scan sonar have not been previously reported. Therefore, the consequence is considered to be Insignificant (F).	

Sub-bottom profilers produce directional beams of sound towards the seabed and therefore sound propagation tends to be downwards in the water column with limited horizontal propagation. The sub-bottom profiling system used for the pre-drill survey will operate at low frequency (1-16 kHz) with sound output at source ranging from 142 - 200 dB re 1 µPa at 1 m. Underwater noise modelling of a range of sub-bottom profiling systems reported that sound levels may be audible over several kilometres (Zykov 2013). On this basis, behavioural responses to the sub-bottom profiler may occur in marine fauna limited to within a few kilometres of the survey vessel depending on the hearing range of the receptors. The closest cetacean BIA relates to the Indo-pacific humpback dolphin located approximately 160 km west of the breeding BIA (Figure 4-4). The species would not be expected to be present in the project area based on the water depths in the project area (75 m to 100 m) as the species is mainly found in water less than 20 km from the nearest river mouth, and in water depths of less than 15 m to 20 m (DAWE 2022b). A few individuals have been observed in waters up to 30 m to 50 m deep, but these remained in close proximity (within 5 km) to the coast (DAWE 2022b). Other cetacean BIAs/migration corridors include those associated with the humpback and pygmy blue whales (Figure 4-4). The humpback whale calving BIA is located approximately 410 km south-west of the project area, and the pygmy blue whale migration BIA approximately 320 km north-west of the project area at the closest points. Omura's whale populations may also be present within the project area based on vocalisations detected in the Joseph Bonaparte Gulf (McCauley 2009, 2014). Given the short duration of the survey (approximately 30 days), any impacts from the pre-drill site survey are considered to be Insignificant (F). The southern portion of the project area overlaps a turtle foraging BIA for both green turtles and olive ridley turtles. Flatback turtles and loggerhead turtles are also known to forage in an area approximately 20 km west of the project area at the closest point. Therefore, there is a potential for marine turtles to be foraging in the area on a year-round basis. Popper et al. (2014) reported that turtles are highly likely to exhibit a behavioural response if they encounter the source within tens of metres, a moderate response if they encounter the source at intermediate ranges (hundreds of metres), and a low response if they are far (thousands of metres) from the source. Based on the sound source levels of the survey equipment and the NFS behavioural response threshold of 166 dB re 1 µPa (NFS 2011), any turtles present in the foraging BIA during the site survey and in proximity to the source may be disturbed and actively swim away. However, given the size of the foraging areas and short duration of the survey, any impacts are expected to be temporary with inconsequential behavioural responses (Insignficant F). A BIA for whale shark foraging is located approximately 300 km west of the project are at its closest point (Figure 4-6); however, whale sharks are transient and there are no aggregation sites in proximity to the project area. Sharks and rays (elasmobranchs) are considered to be less sensitive to sound pressure than bony finfish (McCauley 1994). Studies show that elasmobranchs may detect low frequency sound from 50 - 500 Hz (Myberg 2001; Hawkins & Popper 2012). As elasmobranchs lack a swim bladder it is thought that they have a relatively poor sensitivity to sound pressure and are mainly capable of detecting the particle motion component of sound (Casper et al. 2012). Given the distance to the BIA, expected low abundance of whale sharks and the short duration of the survey (approximately 30 days) any impacts from the pre-drill site survey are considered to be Insignificant (F). *<u>MODU and drilling noise</u>*	

Based on the expected noise emissions associated with the MODU and drilling activities any sound emissions that are typically attributed to behavioral changes are expected to be limited to within a few hundred metres of the MODU, based on recorded drilling sound levels by McCauley (1998), Nedwell & Edwards (2004) and Greene (1986). Underwater noise modelling undertaken for the nearby Ichthys Project (INPEX 2010) to consider noise emissions (albeit for tanker offloading operations rather than drilling activities, reported that low-frequency noise generated would abate to 120 dB re 1 µPa within 8 km of the source location and the area receiving 130–140 dB re 1 µPa was very small, i.e. less than 1 km in radius. Therefore, drilling noise combined with associated vessel and MODU engines and thrusters may result in sound that is detectable above ambient noise levels over several kilometres from the MODU, although behavioural avoidance responses are more likely to occur within 1-2 km. As described above for pre-drill site survey, a turtle foraging BIA overlaps the southern portion of the project area. It is possible foraging turtles may be exposed to increased sound levels. However, given the size of available foraging grounds, and their ability to avoid the source in the open ocean of the project area, it is not expected they would be displaced from the foraging BIA for the duration of the activity. In the unlikely event that behavioural changes to marine fauna did occur such as reorientation of an animal to the source of the sound, or avoidance responses (Southall et al. 2007), they are expected to be localised and temporary (Insignificant F). Gradual exposure to continuous noise sources, such as the MODU, are generally regarded as being less harmful and less likely to startle or stress marine fauna than rapid-onset impulsive noise sources (Hamernik et al. 1993, 2003; Southall et al. 2007). *Vessel noise* Based on the expected noise emissions associated with the operation of vessels during the activity in the project area, any noise emissions (ranging from 108 to 182 dB re 1 µPa at 1 m) are not expected to result in PTS or TTS impacts to marine fauna. Although not directly relevant to vessel engine noise, noise modelling from tanker offloading operations reportedly abated to 120 dB re 1 µPa within 8 km of the source location with the area receiving 130–140 dB re 1 µPa predicted to be less than 1 km in radius (INPEX 2010). The sound levels produced by smaller support vessels is expected to be less than the levels modelled for offloading tankers, but the sound may be audible to marine fauna over several kilometres, with the likelihood of behavioural impacts increasing in close proximity to the vessels. Gradual exposure to continuous noise sources, such as vessel engines, are generally regarded as being less harmful and less likely to startle or stress marine fauna than rapid-onset impulsive noise sources (Hamernik et al. 1993, 2003; Southall et al. 2007). As such, exposure that would result in significant alteration of behaviour is not expected and as such any impacts are considered to be Insignificant (F). *VSP noise*	

The VSP will emit high-intensity, impulsive sounds albeit on a temporary basis (approximately 18 hours) at each well location within the project area. Based upon the sound levels generated during the VSP (232 dB re 1 μPa@1 m) there is the potential for noise impacts to occur (PTS and TTS) in close proximity to the VSP source, with sound levels likely to be above ambient noise levels over several kilometres. Discharging the VSP source at full power may result in PTS for any cetaceans within a few metres of the source and TTS within a few tens of metres of the source. These ranges are comparable to ranges modelled for VSP by Matthews (2012) and reported in Salgado Kent et al. (2016). Prolonged exposure to multiple pulses of the VSP source could result in TTS within a few hundred metres of the source, but such exposures would occur after many minutes or hours and marine fauna are likely to move to avoid such sound exposures before TTS effects occur. In the unlikely event that TTS did occur to marine fauna, it would be limited to a few individuals and the effects will be temporary and recoverable. Salgado Kent et al. (2016) reported that seismic pulses, in the order of that used for the VSP in the project area, will reduce to levels < 120 dB re 1 μPa over approximately 5 – 10 km, therefore a range of behavioural responses may occur within this distance from the VSP source, although actual behavioural avoidance as a result of sound pressure levels greater than 160 dB re 1 μPa is more likely to occur within 1 – 2 km of the source. Given other marine fauna have less sensitive hearing than cetaceans, the range of distances for which noise impacts may occur for other EPBC-listed species is expected to be less. Popper et al. (2014) reported that turtles are highly likely to exhibit a behavioural response when they are near an airgun (tens of metres), a moderate response if they encounter the source at intermediate ranges (hundreds of metres), and a low response if they are far (thousands of metres) from the airgun. Based on the NSF (2011) behavioural response threshold of 166 dB re 1 μPa, turtles may actively swim to avoid the VSP within 1–2 km. Potential significant behavioural impacts in fish arising from exposure to seismic pulses is likely to be limited to within tens to hundreds of metres, or within thousands of metres for the most sensitive fish species (Popper et al. 2014). On this basis, it is possible that physical and behavioural impacts may occur from the VSP undertaken in the project area. Potential behavioural responses for various groups of sound sensitive marine fauna (i.e., marine turtles, omura's whales) are expected, at a worst case, to be limited to several kilometres from the source for the duration of the VSP. Marine fauna are transient and able to move away from noise sources and any impacts are considered to be Insignificant (F) given the short duration and temporary/localised nature of any impacts.	

The most commercially and economically significant invertebrate species in the Joseph Bonaparte Gulf are prawns, targeted by the NPF. Invertebrates are less sensitive to noise impacts than fish species and marine mammals due to their lack of air-filled internal organs. The impact of sound on crustacean species such as rock lobster, crabs and prawns has been studied with respect to commercial scale seismic surveys, which are significantly louder than VSP sources. Many studies (e.g. Christian et al. 2003; Payne et al. 2008) found no acute or chronic mortality or stress impacts. Research undertaken by Day et al. (2016) on rock lobsters in Australian waters also found no mortality impacts and no impacts to the eggs or hatched larvae of berried females exposed to seismic sound at very close range. Some sub-lethal stress and pathological impacts were observed in these studies although this occurred while the lobsters were captive in cages and subject to repeat exposures within close proximity to an airgun. Therefore, the effect of VSP on prawn species targeted by the NPF is not expected to result in any mortality or impacts to their eggs or larvae. It is likely that prawns will move to avoid the immediate proximity of the well site during the VSP, although in all probability are likely to have moved away from the well site prior to this as a result of drilling vibration and settlement of drill cuttings. The impacts will be highly localised (e.g. hundreds of metres) and limited to the duration of VSP activities (approximately 18 hours per well). Therefore, the effects of sound to invertebrates including prawns will be negligible and are considered to be Insignificant (F). Pelagic fish species such as Spanish mackerel and demersal fish species such as snapper and emperor, may also be present in the project area but these species are highly mobile and belong to groups of fish with limited sensitivity to sound (Popper et al. 2014; Hawkins & Popper 2016; Carroll et al. 2017). These fish species are expected to swim away or avoid waters immediately surrounding VSP activities with no impacts to these stocks expected. Therefore, disturbance to commercially important fish species may occur; however, any impacts would be localised to individuals and would not result in any detrimental impacts in stock levels, and as such any impacts are considered to be Insignificant (F). Section 4.9.9 lists other petroleum operations that have the potential to occur in the exploration permits/retention leases overlapping or adjacent to the project area during the timeframe associated with the GHG activities described in this EP. As stated above, several sources of underwater noise will be generated during the proposed activity that may produce sound above ambient levels, with behavioural avoidance responses possible within several kilometres but most likely limited to within 1 – 2 km of the source. Additional MODU operations and vessel traffic in the project area associated with other activities may result in cumulative sound emissions that are detectable to receptors (EPBC-listed species and fish) but given their mobile nature it is likely that they would move away from the area and therefore any behavioural response would be limited to short-term avoidance of the area with no significant alteration of behavior (Insignificant F).	
Identify existing design and safeguards/controls measures	
• Implementation of EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.05 - modified to include turtles) – with the exception of Regulation 8.07 – aircraft. • Implement EPBC Act Policy Statement 2.1 - *Interaction between offshore seismic exploration and whales* during VSP operations. • Relevant personnel will receive an induction/training to inform them of the requirements of EPBC Regulations 2000 – Part 8, Division 8.1 (Regulation 8.05) in accordance with Table 9-3 (INPEX Australia Support Vessels Marine Fauna Awareness Training).	

Propose additional safeguards/control measures (ALARP Evaluation)			
Hierarchy of control	Control measure	Used?	Justification
Elimination	Eliminate the use of MODU and vessels	No	The use of MODU/vessels to undertake the activity cannot be eliminated.
	Do not undertake VSP	No	VSP is required to obtain information on geological structures/formations to assess the potential suitability for carbon storage. The number of VSPs has been limited to one per well.
	Do not undertake site survey	No	The pre-drill site survey is required to enable the completion of the MODU anchoring study for safety and stability purposes.
Substitution	Undertake pre-drill site survey outside of sensitive periods for marine turtles	No	The duration of the site survey is approximately 30 days. Foraging turtles may be present in the project area on a year-round basis. Therefore, substituting the timing of activities would offer no benefit as it is possible that there will be sensitive periods for marine turtles on a year-round basis. Most turtle foraging is expected to be associated with shallower waters within the KEFs surrounding the project area. Given the size of available foraging grounds, and their ability to avoid the sound source in the open ocean of the project area, it is not expected turtles would be displaced from the foraging BIA for the duration of the activity.
	Undertake VSP outside of sensitive periods for marine turtles	No	The duration of the VSP is approximately 18 hours per well. Foraging turtles may be present in the project area on a year-round basis. Therefore, as described above substituting the timing of activities would offer no benefit. Most turtle foraging is therefore expected to be associated shallower waters within the KEFs surrounding the project area and not impacted by sound emissions associated with the activity in the project area.
Engineering	None identified	N/A	N/A

Procedures & administration	Implement EPBC Regulations 2000 - Part 8 Division 8.1 (Regulation 8.07 - aircraft) specifically maintaining separation distances for helicopters.	No	As described in Section 4.7.4, no BIAs for cetaceans overlap the operational area. Given the distances to the nearest cetacean BIAs (Figure 4-4) and that helicopter approaches to the MODUs will not result in injury or hearing impairment implementing this control does not provide any significant environmental benefit.

Identify the likelihood		
With the above-described controls in place the likelihood of impacts to marine fauna and fish species from noise emissions generated from the MODU, vessels and drilling operations in the project area are considered Unlikely (4). Transient marine fauna individuals (such as green turtles and olive ridley turtles present within the foraging BIA that partly overlaps the project area and possibly Omura's whales) may be exposed to increased sound source levels in the expected propagation distances associated with the pre-drill site survey and VSP noise emissions. Therefore, impacts to marine fauna and fish species are considered Possible (3); however, this would be limited to individuals and the timeframes associated with these operations are considered to be of short duration. It is also expected that marine fauna would not persist in close proximity to the sound source long enough for impacts to occur.		
Residual risk summary		
Based on a consequence of Insignificant (F) and a worst-case likelihood of Possible (3) the residual risk is Moderate (8).		
Consequence	Likelihood	Residual risk
Insignificant (F)	Possible (3)	Low (8)
Assess residual risk acceptability		
Legislative requirements As required by law the EPBC Regulations 2000 – Part 8, Division 8.1 will be implemented during the activity. During VSP operations the EPBC Act Policy Statement 2.1 will also be implemented. Stakeholder consultation The DNP requested that INPEX identify and manage impacts and risks on AMP values with respect to noise interference. With the above-described controls in place all impacts and risks are reduced to ALARP and the activity will be undertaken in a manner that is consistent with management plan objectives. AMP management objectives and values		

The project area is located approximately 40 km and 90 km respectively away from the Oceanic Shoals MP and Joseph Bonaparte Gulf MP. Given the distance to these MPs, no sound emissions associated with the activity are expected to be audible in the AMPs. Therefore no impacts to receptors in AMPs or impacts to MP values are expected.

Conservation management plans / threat abatement plans

Several conservation management plans have been considered in the development of this EP (Appendix A). Anthropogenic noise from seismic surveys (e.g. VSP) has been identified as a threat to pygmy blue whales in the Conservation Management Plan for the Blue Whale (DoE 2015). Noise interference has also been identified as a threat to marine turtles (DEE 2017a). The above listed controls to be adopted during the activity are in alignment with the actions identified in the various conservation management documents.

ALARP summary

Although the level of environmental risk is assessed as Low, a detailed ALARP evaluation was undertaken to determine what additional control measures could be implemented to reduce the level of impacts and risks. No additional controls, beyond those identified during the detailed ALARP assessment can reasonably be implemented to further reduce the risk of impact.

Acceptability summary

Based on the above assessment, the proposed controls are expected to effectively reduce the risk of impacts to acceptable levels because:

- the activity demonstrates compliance with legislative requirements/industry standards
- the activity takes into account stakeholder feedback
- the activity is managed in a manner that is consistent with AMP management objectives for ecologically sustainable use and the protection of MP values
- the activity is managed in a manner that is consistent with the intent of conservation management documents
- the activity does not compromise the relevant principles of ESD
- the predicted level of impact does not exceed the defined acceptable level in that the environmental risk has been assessed as "low", the consequence does not exceed "C – significant" and the risk has been reduced to ALARP.

Environmental performance outcomes	Environmental performance standards	Measurement criteria
Undertake site survey and drilling activities in a manner that prevents injury to marine fauna resulting from sound emissions.	Vessel contractors comply with relevant requirements of the EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.05) *Interacting with cetaceans* (modified to include turtles), within the 500 m exclusion zone including:	Records of breaches of vessel - cetacean interaction requirements outlined in the EBPC Regulations 2000 reported.

	• Support vessels will not travel faster than 6 knots within 300 m of a cetacean or turtle (caution zone) and minimise noise. • Support vessels will not approach closer than 50 m to a dolphin (with the exception of bow riding) or turtle and/or 100 m for a whale. • If a cetacean shows signs of being disturbed, support vessels will immediately withdraw from the caution zone at a constant speed of less than 6 knots.	
	INPEX will verify VSP operations are conducted in accordance with EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales which includes: • Implement 30-minute pre-start observations to the extent of the observation zone (as defined in Policy Statement 2.1), only start if no whales are sighted within 3 km. • Implement soft start procedures, including a gradual ramp up of acoustic source to full power over 20 minutes only if no whales are sighted within the shutdown zone during the pre-start observations. • While the VSP is operating, both during soft start and operations: visual observations of the observation zone are maintained; if whales are sighted – acoustic source placed on standby; if whales are sighted in the shut-down zone (within 1 km of source)– the acoustic source will be shut down.	Records of pre-start observations prior to time of commencement; and soft-start time of commencement and durations. Records of sound source on standby or VSP shutdown if whales are observed.

7.4 Biodiversity and conservation protection

7.4.1 Introduction of invasive marine species

Table 7-12: Impact and evaluation – Introduction of IMS

<table>
<tr><th colspan="2">Identify hazards and threats</th></tr>
<tr><td colspan="2">IMS are non-indigenous marine plants or animals that have been introduced into a region beyond their natural range and have the ability to survive, reproduce and establish founder populations. IMS are widely recognised as one of the most significant threats to marine ecosystems worldwide. Shallow coastal marine environments in particular, are thought to be amongst the most heavily invaded ecosystems, which largely reflects the accidental transport of IMS by international shipping to marinas and ports where the preferred artificial hard structures are commonly found.

The introduction and establishment of IMS into the marine environment may result in impacts to benthic communities and associated receptors dependent on these including fishing, due to changes to the structure of benthic habitats and native marine organisms through predation and/or competition for resources, leading to a change in ecological function. Once IMS establish, spread and become abundant in coastal waters some species can have major ecological, economic, human health and social/cultural consequences (Carlton 1996, 2001; Pimental et al. 2000; Hewitt et al. 2011).

The introduction and spread of IMS of concern associated with the activities covered in this EP including the mobilisation of vessels/MODUs from international and domestic waters, and domestic conveyances associated with support vessels during planned operations.</td></tr>
<tr><th>Potential consequence</th><th>Severity</th></tr>
<tr><td>The particular values and sensitivities with the potential to be impacted by the introduction of IMS are:
• benthic communities – associated with KEFs, benthic primary producer habitat (BPPH) and shallow water coastal environments and marine parks
• commercial, recreational and traditional fishing.

The introduction and subsequent establishment of IMS could result in changes to the structure of benthic communities leading to a change in ecological function due to predation of native marine organisms and/or competition for resources. Once IMS establish, spread and become abundant in coastal waters some species can have major ecological, economic, human health and social/cultural consequences (Carlton 1996, 2001; Pimental et al. 2000; Hewitt et al. 2011).</td><td>Significant (C)</td></tr>
</table>

In order for an IMS to pose a biosecurity risk once present at a recipient location, viable IMS propagules and/or individuals must be able to transfer from the colonised area (e.g. a vessel hull), survive in the surrounding environment, find a suitable habitat, and establish a self-sustaining population. The Pinnacles of the Bonaparte Basin KEF, a unique seafloor feature, provides areas of hard substrate in an otherwise soft sediment environment and are therefore important for sessile species. Pinnacles typically rise steeply from depths of about 80 m and emerge to within 30 m of the water surface, allowing light dependent organisms to thrive. Pinnacles that rise to within at least 45 m of the water surface support more biodiversity. Communities include sessile benthic invertebrates including hard and soft corals, sponges, whips, fans, bryozoans and aggregations of demersal fish species such as snappers, emperors and groupers (DSEWPaC 2012b). The Pinnacles of the Bonaparte Basin KEF does not overlap the project area, with the closest pinnacle approximately 16 km west at the closest point. Shallow water, coastal marine environments are susceptible to the establishment of invasive populations, with most IMS associated with artificial substrates in disturbed shallow water environments such as ports and harbours (e.g. Glasby et al. 2007; Dafforn et al. 2009a, 2009b). Aside from ports and harbours, other shallow water, pristine environments also at risk include offshore island and shoals such as those found in the PEZ. These areas may contain sensitive benthic habitats with a potential to be impacted by invasive populations. MODU and vessel operations are a mechanism for such transfer of IMS propagules either through the uptake and discharge of high-risk ballast water containing IMS and/or via the presence of IMS within biofouling communities on hulls or submerged equipment. IMS propagules may also be transferred via natural dispersion. Natural dispersal mechanisms could involve a mobile life-history stage (such as actively swimming adults or larval stages) with sufficient swimming capacity and/or larval durations to directly reach suitable habitats in coastal waters. Natural dispersal from offshore locations for IMS with shorter pelagic dispersal capabilities to coastal areas is also theoretically possible via intermediate steps (stepping-stone dispersal), where intermediate populations establish in suitable habitats closer inshore, and subsequent generations then spread towards coastal regions. With consideration of the habitat preferences of IMS (shallow water environments), the closest shallow water habitats to the project area are located on the Australian mainland approximately 100 km from the project area. Support vessels transiting between the project area and Darwin Port (Section 4.9.7) have the potential to act as vectors for the transfer of IMS propagules to sensitive benthic habitats in the PEZ and this may result in medium term impacts to benthic communities with a consequence rating of Significant (C). The transfer of IMS propagules via anthropogenic dispersal mechanisms and/or stepping-stone dispersal from MODUs or vessels colonised with IMS, has the potential to affect commercial, traditional and recreational fishing which may result in a loss of revenue. Although no aquaculture is present, the NPF and several NT-managed fisheries are potentially active in the project area. Recreational fishing also occurs in the Joseph Bonaparte Gulf with fishing activities (e.g. barramundi fishing) typically located near estuaries or in coastal waters. Other fishing activities that may be impacted include traditional Aboriginal fishing known to occur at the Tiwi Islands and in the North Kimberley Marine Park on the WA coast. Overall, the successful introduction of IMS may result in regional community disruption with a significant impact on economic or recreational values with a consequence rating of Significant (C).	

In the event an IMS is translocated into the project area, then transfers and subsequently establishes a self-sustaining population it is considered that the establishment of an IMS in WA/NT waters has the potential to result in a medium to large scale event with a medium-term impact on the environment, also potentially resulting in regional community disruption with significant impact on economic or recreational values with a consequence rating of Significant (C).	

Identify existing design and safeguards/controls measures

- Vessels have an antifouling coating applied that is in accordance with the prescriptions of the International Convention on the Control of Harmful Anti-fouling systems on ships, 2001, and the *Protection of the Sea (Harmful Antifouling Systems) Act 2006* (Cwlth).
- MODU and vessels will have an approved ballast water management plan and valid ballast water management certificate, unless an exemption applies or is obtained.
- MODUs and vessels operating within Australian seas will manage ballast water discharge using one of the following approved methods of management (DAWE 2020):
    - an approved ballast water management system
    - ballast water exchange conducted in an acceptable area *
    - use of low risk ballast water (e.g. fresh potable water, water taken up on the high seas, water taken up and discharged within the same place)
    - retention of high-risk ballast water on board the vessel
    - discharge to an approved ballast water reception facility.

* Acceptable area is as defined in the Biosecurity (Ballast Water and Sediment) Determination 2019. For high-risk ballast water an acceptable area for ballast water exchange is defined as (DAWE 2020):

- Vessels servicing a MODU: at least 500 m from the facility, and no closer than 12 nm from the nearest land
- All other vessel movements: at least 12 nm from the nearest land and in water at least 50 m deep; not within 12 nm of the Great Barrier Reef or Ningaloo Reef ballast water exchange exclusion areas.

- Complete a biofouling risk assessment (including immersible equipment) for vessels mobilised domestically, and implement mitigation measures commensurate to the risk, as appropriate to ensure the mobilisation of the vessel poses a low risk of introducing IMS in accordance with Figure 9-5.

Propose additional safeguards/control measures (ALARP Evaluation)

Hierarchy of control	Control measure	Used?	Justification

Elimination	Eliminate vessel use to avoid the spread of IMS	No	Vessels are the only form of transport that can supply and support the MODU that is practicable and cost efficient.
Substitution	Only use a local MODU already operating in Australian waters.	No	Although using only local vessels is possible for the activity, using only a local MODU would result in delays when sourcing an appropriate available MODU. The potential cost and time needed to source a capable MODU locally is disproportionate to the minor environmental gain potentially achieved. Additional to this, there are known locations within Australia which harbour IMS (Section 4.8) and could potentially act as a source for the further spread of IMS within Australian regions. Therefore, substituting to the use of a locally available MODU will not provide an environmental benefit.
Engineering	MODU has an anti-fouling coating to all submerged areas.	No	Some MODUs currently on the market may have anti-fouling coatings applied to all submerged areas and others may only have it applied to intakes and sea chests. Anti-fouling coatings vary in their efficacy and utilise a range of technologies to limit the ability of biofouling to attach to the surface. Some anti-fouling coatings include biocidal layers, while others rely upon creating surfaces that reduce the likelihood of organisms to freely attach. Despite the differences in types of anti-fouling coatings and the subsequent variations in performance and efficacy, there is always an inherent risk that niche areas below the water line may harbor biofouling communities and IMS, even when antifoul coatings are present. MODU availability must align with the schedule and other commercial considerations therefore, to limit MODU selection to only those that have anti-fouling coatings may add some value, but it will not eliminate the risk completely.

			Therefore, INPEX will engage an independent third-party to undertake a biofouling risk assessment for the MODU (described in procedural controls row below) and will implement any controls required as the outcome of the biofouling risk assessment rather than rely on a MODU being available that has an anti-fouling coating that may not necessarily be an effective control.
Procedures & administration	Complete a biofouling risk assessment (including immersible equipment) for vessels/MODU mobilised from international waters, and implement mitigation measures commensurate to the risk, as appropriate to ensure the mobilisation of the vessel poses a low risk of introducing IMS.	Yes	The completion of a biofouling risk assessment and the implementation of associated biofouling reduction and management measures reduce the likelihood of IMS translocation and subsequent potential for transfer and establishment. This approach is in accordance with the National Biofouling Management Guidelines for the Petroleum Production and Exploration Industry (Marine Pest Sectoral Committee 2018) A biofouling risk assessment is a desktop-based evaluation to determine the likelihood, and hence theoretical risk of a vessel acting as a vector for the transfer of IMS. It does not attempt to identify whether or not a vessel is actually carrying a pest species, but rather ranks vessels on a relative scale of High, Uncertain or Low/Acceptable risk, to identify which vessels may require further detailed investigation and/or management actions to reduce potential risk. The assessment, undertaken by an independent third-party IMS expert on behalf of INPEX, relies on the provision of accurate information from the vessel operator, which may include, but is not limited to, the following: • vessel specifications: vessel name, type, size and Flag State, etc. • movements: port of origin, voyage history, destination, transport method, evidence of recent dry-docking and/or inspection, etc. • anti-fouling coating: type (i.e. biocidal/non-biocidal), age, service life, application area, record of Antifouling Systems Certificate, etc. • inspection/cleaning: inspection and cleaning history including any relevant independent biofouling inspection reports, etc.

			• seawater systems: marine growth prevention systems present and functioning, maintenance records, evidence of chemically or manually cleaned seawater systems including last treatment date and chemicals used etc. • duration of stay: at overseas or interstate locations, and duration in WA coastal waters etc. Outcomes of the biofouling risk assessment may identify the need to implement mitigation measures such as limitations of time spent in coastal waters/or alongside and managing interactions with supply vessels, through to inspection and cleaning of hulls and submerged areas.
	MODU/vessels will have biofouling management plans and record book.	Yes	A biofouling management plan that includes elements of performance described in the IMO Guidelines for the Control and Management of Ship' Biofouling to Minimize the Transfer of Invasive Aquatic Species (2012 Edition) enables the capture of management controls to be recorded by the MODU/vessels. It is a prudent control that can be implemented with little additional cost and is considered ALARP.
Identify the likelihood			
The likelihood of an IMS becoming successfully established at a recipient location depends on a range of factors including physical characteristics of the environment falling within the tolerance ranges of the IMS (i.e. salinity, temperature, nutrient availability, etc.), and the biological characteristics of the species and the natural environment (i.e. reproductive properties, presence of appropriate prey species, predation pressure, etc.). This potential is known to be dependent on a range of factors including propagule pressure, density of the colonised population, and a range of biotic interactions and abiotic factors specific to the local marine environment.			

For an IMS to establish a self-sustaining reproductive population in a recipient region, it must successfully pass through a series of stages along an invasion pathway, which include a range of selective filters. Selective filters affect the total number of organisms that can survive and successfully transition to the next stage of the invasion pathway. Offshore selective filters in the invasion pathway are likely to be more significant than for coastal environments, given there is little availability of artificial surfaces or suitable settlement habitats for propagules, and greater dilution of propagule plumes. As a result, in offshore oceanic environments propagule plumes from infrastructure colonised by IMS are likely to be highly dispersed with low densities of propagules present in the water column. In turn, if propagules are able to survive the extended periods necessary for them to be transferred to coastal waters, this is still likely to result in low densities of propagules encountering suitable habitat in shallow coastal environments. As a result, propagule pressure will be low and therefore establishment potential constrained. It is now widely accepted that 'propagule pressure' (or the number of individuals introduced), is a primary determinant of establishment success for introduced populations (Lockwood & Cassey 2005, Simberloff 2009). Propagule pressure is also important for the post-establishment success of IMS populations. As propagule pressure increases, it becomes more likely that the founder population will survive or has sufficient genetic variation to adapt to local conditions and establish a self-sustaining population (Lejeusne et al. 2014; Roman & Darling 2007) thereby becoming 'introduced'. Many propagules may be released but never survive to join local populations. Marine pests known to be present in WA and NT waters (including Darwin Port) and are described in Section 4.8 and Section 4.9.7. MODUs and vessels that may be mobilised from international waters or domestically are not considered to provide a likely source for the introduction and establishment of IMS. This is due to a number of factors including the lack of man-made infrastructure e.g. jetties/wharves in the project area where the activity will occur, and the controls and procedures in place to manage ballast water exchange and biofouling risks. As such, there is a low potential for the establishment and subsequent spread of IMS. Adherence to the Australian Ballast Water Management Requirements (DAWE 2020) including the use of an approved ballast water management method also reduces the potential for the spread of IMS (Remote 6). During drilling, support vessels will use Darwin Port as the main supply base. The presence of jetties and wharves in ports, provides substrate for IMS, meaning that the ports could act as a source of IMS inoculum. However, resupply is typically undertaken within a relatively short timeframe (approximately 48 hours) therefore the potential for vessels to become colonised by biofouling communities is reduced. With the described controls in place, the potential spread of IMS via support vessels during the activity is considered to be Remote (6).		
Residual risk summary		
Based on a consequence of Significant (C) and a worst-case likelihood of Remote (6) the residual risk is Moderate (8).		
Consequence	Likelihood	Residual risk
Significant (C)	Remote (6)	Moderate (8)
Assess residual risk acceptability		
Legislative requirements		

MODU and vessel ballast water will be managed in accordance with the intent of the Australian Ballast Water Management Requirements Version 8 (DAWE 2020) and the *Biosecurity Act 2015*. Biofouling will be managed through vessel and equipment risk assessments and mitigation measures, in accordance with the National Biofouling Management Guidelines for the Petroleum Production and Exploration Industry (Marine Pest Sectoral Committee 2018). All vessels that use ballast water are required to meet the Regulation D2 discharge standard of the International Convention for the Control and Management of Ships' Ballast Water and Sediments (the Convention) if they were constructed after 2017 or at their next renewal survey after September 2019. All ships must meet the D2 standard by 8th September 2024 and this will lead to an ongoing reduction in potential risk from ballast water discharges over the life of this EP. The control measures described are consistent with NOPSEMA's Information Paper: Reducing marine pest biosecurity risks through good practice and biofouling management, IP1899 (NOPSEMA 2020b).

Stakeholder consultation

During stakeholder engagement for the development of this EP, DCCEEW requested INPEX provide information on interactions that project vessels/installations will have with domestic vessels during the proposed activities and how they will be managed. INPEX will provide this information via the completion of a 'Questionnaire for Biosecurity Exemptions for Biosecurity Control Determination' when the vessels to be contracted are known as described in Section 9.8.3.

AMP management objectives and values

The project area is located approximately 40 km and 90 km respectively away from the Oceanic Shoals MP and Joseph Bonaparte Gulf MP. Proposed control measures reduce the risk of introduction of IMS to the marine environment and no risk of IMS to the AMPs or impacts to MP values are expected.

Conservation management plans / threat abatement plans

Several conservation management plans have been considered in the development of this EP (refer Appendix A). IMS have been identified as a threat in many conservation management plans, with actions focusing on the prevention of their introduction. The control measures described are consistent with the actions described in the conservation management documentation.

ALARP summary

The level of environmental risk is assessed as Moderate, therefore a detailed ALARP evaluation was undertaken to determine what additional control measures could be implemented to reduce the level of impacts and risks. No additional controls, beyond those identified during the detailed ALARP assessment can reasonably be implemented to further reduce the risk of impact.

Acceptability summary

Based on the above assessment, the proposed controls are expected to effectively reduce the risk of impacts to acceptable levels because:

- the activity demonstrates compliance with legislative requirements/industry standards
- the activity takes into account stakeholder feedback
- the activity is managed in a manner that is consistent with AMP management objectives for ecologically sustainable use and the protection of MP values

- the activity is managed in a manner that is consistent with the intent of conservation management documents
- the activity does not compromise the relevant principles of ESD
- the predicted level of impact does not exceed the defined acceptable level in that the environmental risk has been assessed as "moderate", the consequence does not exceed "C – significant" and the risk has been reduced to ALARP.

Environmental performance outcomes	Environmental performance standards	Measurement criteria
No establishment of IMS of concern in the Commonwealth Marine Area or coastal waters via ballast water or biofouling attributable to the activity.	Support vessels (of appropriate class*)* will have an antifouling coating applied in accordance with the prescriptions of the International Convention on the Control of Harmful Anti-fouling Systems on Ships (2001) and the *Protection of the Sea (Harmful Antifouling Systems) Act 2006* (Cwlth).	Support vessels (of appropriate class) have a current International Anti-fouling Systems certificate or a Declaration on Anti-fouling Systems.
	MODUs and vessels operating within Australian seas will manage ballast water discharge using one of the following approved methods of management (DAWE 2020) including: • an approved ballast water management system • exchange of ballast water exchange conducted in an acceptable area • use of low risk ballast water (e.g. fresh potable water, water taken up on the high seas, water taken up and discharged within the same place) • retention of high-risk ballast water on board the vessel • discharge to an approved ballast water reception facility.	MODUs/vessels premobilisation inspection and annual verification audit reports confirm through ballast water records that an approved ballast water management option has been used.
	All MODUs/vessels will have: • Approved MODUs/vessel-specific ballast water management plan maintained, or record of DCCEEW issued exemption (if not automatic exemption) on board.	All MODUs/vessels will have: • an approved ballast water management plan, unless an exemption applies or is obtained

	• Valid ballast water management certificate or record of DCCEEW issued exemption (if not an automatic exemption) on board.	• a valid ballast water management certificate, unless an exemption applies or is obtained.
	A biofouling risk assessment will be completed by an independent IMS expert for MODUs and all support vessels, including immersible equipment, prior to mobilisation from international waters. Where required, mitigation measures commensurate to the risk will be implemented to ensure the vessel mobilisation poses a low risk of introducing IMS.	MODUs/vessel-specific biofouling risk assessment and any records of mitigation measures implemented confirming the MODU/vessel presents a low risk.
	Domestic biofouling risk assessment for vessels mobilised from other regions in Australia, and implement mitigation measures commensurate to the risk, as appropriate to ensure the mobilisation of the vessel poses a low risk of introducing IMS in accordance with Figure 9-5.	Domestic biofouling risk assessment.
	MODU and all support vessels will have a biofouling management plan to include elements of performance described in the IMO Guidelines for the Control and Management of Ship Biofouling to Minimize the Transfer of Invasive Aquatic Species (2012 Edition).	Biofouling management records are available in the biofouling management plan and biofouling record book.

7.4.2 Interaction with marine fauna

Table 7-13: Impact and risk evaluation – Physical presence of vessels and interaction with marine fauna (vessel strike)

Identify hazards and threats	
The physical presence and use of vessels in the project area has the potential to result in collision (vessel strike) with marine fauna which may result in death or injury to individuals. Increased vessel traffic may result in increased turtle/vessel interactions and behavioural disruption.	
Potential consequence	Severity
The particular values and sensitivities with the potential to be impacted by vessel strike are: • EPBC-listed species. Vessels undertaking the pre-drill site survey and vessels supporting the exploration drilling activities in the project area have the potential to interact with EPBC-listed species. This may result in injury or death of marine fauna from a vessel strike. Collisions between vessels and cetaceans occur more frequently where high vessel traffic and cetacean habitat overlap (Dolman & Williams Grey 2006). Vessel speed has been demonstrated as a key factor in collisions with marine fauna such as cetaceans and turtles, and it is reported that there is a higher likelihood of injury or mortality from vessel strikes on marine mammals when vessel speeds are greater than 14 knots (Laist et al. 2001; Vanderlaan & Taggart 2007). The potential for vessel strike applies to all marine mammals, whale sharks and turtle species; however, humpback whales are considered to have a higher potential likelihood due to their extended surface time. The potential for collision during the activity is reduced as there are no BIAs for marine mammals that overlap the project area. The closest cetacean BIA relates to the Indo-pacific humpback dolphin located approximately 160 km west of the breeding BIA (Figure 4-4). The species would not be expected to be present in the project area based on the water depths in the project area (75 m to 100 m) as the species is mainly found in water less than 20 km from the nearest river mouth, and in water depths of less than 15 m to 20 m (DAWE 2022b). A few individuals have been observed in waters up to 30 m to 50 m deep, but these remained in close proximity (within 5 km) to the coast (DAWE 2022b). Omura's whale populations may be present within the project area based on vocalisations detected in the Joseph Bonaparte Gulf (McCauley 2009, 2014). The reaction of whales to approaching ships is reported to be quite variable. Dolman and Williams Grey (2006) indicate that some cetacean species, such as humpback whales, can detect and change course to avoid a vessel.	Minor (E)

Other cetacean BIAs/migration corridors include humpback and pygmy blue whales (Figure 4-4) with the humpback whale calving BIA approximately 410 km south-west: and the pygmy blue whale migration BIA approximately 320 km north-west of the project area at the closest points. The pygmy blue whale is subject to a Conservation Management Plan (Appendix A). The Conservation Management Plan identifies that, since 2006, there have been two records of likely ship strikes of blue whales in Australia. In 2009 and 2010, there were blue whale strandings in Victoria, near the Bonney Upwelling with suspected ship strike injuries visible. Where blue whales are feeding at or near the surface, they are more susceptible to vessel strike. However, the open ocean environment allows for whales to invoke avoidance behaviour in threatening situations. The Blue Whale Conservation Management Plan highlights that minimising vessel collision is one of the top four priorities and requires assessment of vessel strike on blue whales, assures that incidents are reported in the National Ship Strike Database, and that control measures proposed will align with these priorities. Whale sharks do not breach the surface as cetaceans do; however, they are known to swim near to the water surface; hence, are susceptible to vessel strike. The foraging area for whale sharks (BIA) is located approximately 300 km west of the project area at its closest point. Whale sharks are also subject to a Conservation Advice (Appendix A), which notes that the threat to the recovery of the species includes strikes from vessels. Turtles transiting the region are also at risk from vessel strike when they periodically return to the surface to breathe and rest. Only a small portion of their time is spent at the surface, with routine dive times lasting anywhere between 15 and 20 minutes nearly every hour. The presence of vessels has the potential to alter the behaviour of individual turtles. Some turtles have been shown to be visually attracted to vessels, while others show strong avoidance behaviour (Milton et al. 2003). A marine turtle foraging BIA overlaps the project area relating to green turtles and olive ridley turtles. Flatback turtles and loggerhead turtles are also known to forage in an area approximately 20 km west of the project area at the closest point. Although overlapping the BIA, it is unlikely that the project area is the predominant foraging area for all marine turtle species given water depths range from 75 m to 100 m, which is deeper than the preferred range of generally less than 40 m based on NPF bycatch records (Poiner & Harris 1996). Dietary samples of olive ridley turtles from the eastern Joseph Bonaparte Gulf indicate foraging depths of less than 14 m (Conway 1994 reported in Whiting et al. 2007). Most turtle foraging is therefore expected to be associated shallower waters within the KEFs surrounding the project area (Pinnacles of Bonaparte Basin, Carbonate Bank and Terrace System of the Sahul Shelf and Carbonate Bank and Terrace System of the Van Dieman Rise (DEWHA 2008). Satellite tracking data reviewed in recent studies (Ferreira et al. 2020; Thums et al. 2021) concluded that the spatial extents of foraging BIAs are considered to potentially underestimate the distribution of foraging turtles. In particular, flatback turtles are reported to forage in areas of the Joseph Bonaparte Gulf with bare substrate and may potentially forage in deeper waters depths (Thums at al. 2021) such as those found in the project area. Therefore, it is considered possible that green, olive ridley, flatback and loggerhead turtles may be present in the project area year-round. Therefore, there is a potential for marine turtles to be impacted by vessels associated with the activity; however, any potential vessel strike to marine fauna is likely to be limited to isolated incidents. As reported (DEE 2017a), although the outcome can be fatal for individual turtles, vessel strike (as a standalone threat) has not been shown to cause stock level declines. In the event of the death of an individual turtle, it would not be expected to have a significant effect at the population level (Minor E).	

With reference to the Recovery Plan for Marine Turtles in Australia (DEE 2017a) based on the long-life span and highly dispersed life history requirements of marine turtles it is acknowledged that they may be subject to multiple threats acting simultaneously across their entire life cycle, such as increases in background light and noise levels. In considering cumulative impacts of threats on small or vulnerable stocks of marine turtles, it is likely that vessel strike may act as contributor to a stock level decline.	

Identify existing design and safeguards/controls measures

- Implementation of EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.05 – modified to include turtles).
- Vessel speed restrictions and separation distances maintained for whale sharks.
- Vessel crew will receive an induction/training to inform them of the requirements of EPBC Regulations 2000 – Part 8, Division 8.1 (Regulation 8.05) in accordance with Table 9-3 (INPEX Australia Support Vessels Marine Fauna Awareness Training).

Propose additional safeguards/control measures (ALARP Evaluation)

Hierarchy of control	Control measure	Used?	Justification
Elimination	Eliminate the use of vessels	No	Vessels are the only form of transport that can undertake the pre-drill site survey and provide the required level of supply and support to the MODU, that is practicable and cost efficient.
	Reduce the frequency of supply vessel visits to MODUs	No	Reducing the number of vessel supply trips would decrease the potential for vessel interactions with marine fauna; however, the frequency of re-supply by support vessels is already optimised to be as low as practicable and cannot be further reduced.
Substitution	Use smaller vessels for resupply of the MODU	No	Using smaller vessels, travelling at slower speeds may decrease the potential to harm or fatally injure marine fauna in the event that a vessel strike occurred; however, smaller vessels would require more frequent journeys or may have space and weight limitations for equipment required on the MODU.
Engineering	None identified	N/A	N/A

Procedures & administration	Dedicated marine fauna observers on vessels	No	The use of dedicated MFO’s onboard vessels may improve the ability to identify marine fauna at risk of collision. However, this is not considered to be practicable given POB limits on vessels and through implementation of the environmental awareness program for crew (Table 9-2) is not considered to provide additional environmental benefit for the increase in cost associated with implementing this control.
Identify the likelihood			
Collisions with large vessels often go unnoticed and/or unreported (Cates et al. 2017). A preliminary examination of vessel collision reports between 1840 and 2015 was undertaken by Peel et al. in 2016, referenced in the National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Fauna (DEE 2017c). Peel et al. (DEE 2017c) identified 109 records of ship strike in Australian waters predominantly involving humpback whales (47%). The records showed that the majority of events were in Queensland, with 10 events recorded in WA waters between 1995 and 2015. This suggests that despite the growing presence of oil and gas activities on the north west shelf (NWS) and in the Timor Sea, and the steady increase (9% per year) in humpback whale numbers (Bejder et al. 2016), whale populations have not been affected by collisions with oil and gas related vessels. The likelihood is also further reduced as there are no identified BIAs for marine mammals within the project area, EMBA or PEZ. Although overlapping a turtle foraging BIA, the project area is not considered to be the predominant foraging area for turtles given water depths range from 75 m to 100 m, which is deeper than the preferred range for foraging turtles which is generally less than 40 m based on NPF bycatch records (Poiner & Harris 1996). Dietary samples of olive ridley turtles from the eastern Joseph Bonaparte Gulf indicate foraging depths of less than 14 m (Conway 1994 reported in Whiting et al. 2007). Satellite tracking data (Ferreira et al. 2020; Thums et al. 2021) concluded that the spatial extents of foraging BIAs are considered to potentially underestimate the distribution of foraging turtles. In particular, flatback turtles are reported to forage in areas of the Joseph Bonaparte Gulf with bare substrate and may potentially forage in deeper waters depths (Thums at al. 2021) such as those found in the project area. Most turtle foraging is expected to be associated shallower waters within the KEFs surrounding the project area (Pinnacles of Bonaparte Basin, Carbonate Bank and Terrace System of the Sahul Shelf and Carbonate Bank and Terrace System of the Van Dieman Rise (DEWHA 2008)). If concurrent operations were to occur in the project area during the timeframe associated with this EP, an increase in vessel movements may increase the potential for vessel strike to occur. However, the controls described above are commensurate with the level of risk and the likelihood of a vessel strike causing injury or death to EPBC-listed species is considered to be Highly Unlikely (5).			
Residual risk summary			
Based on a consequence of Minor (E) and a likelihood of Highly Unlikely (5) the residual risk is Low (9).			
Consequence	Likelihood	Residual risk	

Minor (E)	Highly Unlikely (5)	Low (9)
Assess residual risk acceptability		

Legislative requirements

EPBC Regulations 2000 – Part 8, Division 8.1 (Regulation 8.05) will be implemented with regards to vessel speeds and separation distances.

Stakeholder consultation

The DNP requested that INPEX identify and manage impacts and risks on AMP values with respect to vessel disturbance. With the above-described controls in place all impacts and risks are reduced to ALARP and the activity will be undertaken in a manner that is consistent with management plan objectives.

AMP management objectives and values

The project area is located approximately 40 km and 90 km respectively away from the Oceanic Shoals MP and Joseph Bonaparte Gulf MP. Proposed control measures reduce the risk of interaction with marine fauna and no risk of interactions with marine fauna in AMPs or impacts to MP values are expected.

Conservation management plans / threat abatement plans

Several conservation management plans have been considered in the development of this EP (Appendix A). Actions identified in the Blue Whale Conservation Management Plan and conservation advice documents for whale sharks regarding vessel strike incident reporting will be implemented and controls in this EP are in alignment with the intent of the National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Fauna (DEE 2017c).

ALARP summary

Although the level of environmental risk is assessed as Low, a detailed ALARP evaluation was undertaken to determine what additional control measures could be implemented to reduce the level of impacts and risks. No additional controls, beyond those identified during the detailed ALARP assessment can reasonably be implemented to further reduce the risk of impact.

Acceptability summary

Based on the above assessment, the proposed controls are expected to effectively reduce the risk of impacts to acceptable levels because:

- the activity demonstrates compliance with legislative requirements/industry standards
- the activity takes into account stakeholder feedback
- the activity is managed in a manner that is consistent with AMP management objectives for ecologically sustainable use and the protection of MP values

<table>
<tr><td colspan="3">

the activity is managed in a manner that is consistent with the intent of conservation management documents
the activity does not compromise the relevant principles of ESD
the predicted level of impact does not exceed the defined acceptable level in that the environmental risk has been assessed as “low”, the consequence does not exceed “C – significant” and the risk has been reduced to ALARP.

</td></tr>
<tr><th>Environmental performance outcomes</th><th>Environmental performance standards</th><th>Measurement criteria</th></tr>
<tr><td rowspan="2">No injury/ mortality of cetaceans, whale sharks or turtles resulting from interactions with vessels undertaking the activity.</td>
<td>Vessel contractors comply with relevant requirements of the EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.05) Interacting with cetaceans (modified to include turtles), within the 500 m exclusion zone including:

Support vessels will not travel faster than 6 knots within 300 m of a cetacean or turtle (caution zone) and minimise noise.
Support vessels will not approach closer than 50 m to a dolphin (with the exception of bow riding) or turtle and/or 100 m for a whale.
If a cetacean shows signs of being disturbed, support vessels will immediately withdraw from the caution zone at a constant speed of less than 6 knots.
</td>
<td>Records of event reports if vessel strike occurs.</td></tr>
<tr><td>Interactions between support vessels and whale sharks will be consistent with the Whale Shark Wildlife Management Program no. 57 (DPaW 2013); specifically, vessels will not travel faster than 8 knots within 250 m of a whale shark (exclusive contact zone) and not approach closer than 30 m of a whale shark.</td>
<td>Records of breaches of whale shark code of conduct are documented.</td></tr>
</table>

7.5 Seabed disturbance

Table 7-14: Impact and risk evaluation – Seabed disturbance

<table>
<tr><th colspan="2">Identify hazards and threats</th></tr>
<tr><td colspan="2">To validate and ground truth the geophysical pre-drill survey data, approximately 25 samples of seabed sediments may be collected within the project area during the pre-drill site surveys (Section 3.3). Each sample comprises of approximately 0.13 m^3 of sediment collected using a specialised grab sampler. One geotechnical borehole and/or several piezo-cone penetrometer tests may be completed at each proposed well location to obtain adequate soil data prior to arrival of the MODU. Geotechnical investigation will extend to a depth of 30—45 m. The boreholes will be drilled and/or penetrometer tests be performed using subsea coring equipment operated from a survey vessel.

As described in Section 3.5, the MODU that will be contracted to undertake the drilling activities will either be a jack-up or semi-submersible MODU. The legs of the jack-up would be lowered to be in complete contact with the seabed and will penetrate the seabed sediments anywhere from 3 m to 25 m depth dependent on soil properties, creating a depression approximately 18 m in diameter in the footprint of each of the three legs as the MODU raises itself approximately 20 m above the sea surface. This results in an area of approximately 750 m^2 (0.00075 km^2) of temporary seabed disturbance at each well location. A moored semi-submersible MODU will be secured to the seabed through a series of anchors and anchor chains. For a typical moored semi-submersible MODU, given the expected anchor and anchor chain dimensions approximately 1,000 m^2 (0.001 km^2) of benthic habitat at each well location area may be disturbed. There will be no planned survey or support vessel anchoring during the activity.

On completion of the drilling and evaluation activities, the wells will be permanently plugged and abandoned. As described in Section 3.4.1 Well Abandonment, the conductor and casing will be cut below the sea floor (mudline) and the wellheads removed from the project area. This process also has the potential to disturb benthic communities at the well locations, albeit in an already disturbed area due to discharged drill cuttings (top-hole section) and excess cement returns at the well location.

The physical footprint of the drilling activities will be limited to the well locations and MODU jack-up/mooring system. A disturbance to benthic communities has the potential to result in reduced ecosystem productivity or diversity. In addition to physical disturbance, the drilling activities may also result in the localised generation of silt plumes that could affect surrounding benthic communities.</td></tr>
<tr><th>Potential consequence</th><th>Severity</th></tr>
<tr><td>The particular values and sensitivities with the potential to be impacted by seabed disturbance are:
• benthic communities
• fish including commercial species.</td><td>Insignificant (F)</td></tr>
</table>

Physical disturbance of the seabed may cause temporary disturbance to benthic habitats and loss of associated infauna and epifauna. As described in Section 4.6.3, marine baseline studies in 2010 and 2011 (ERM 2011) within the Joseph Bonaparte Gulf, in areas adjacent to the project area, determined the seabed to comprise of sand, coarse shell fragments and silt. Benthic communities reported included sparse coverage of heterotrophic filter feeders such as octocorals and sponges, and hydrozoa (ERM 2011). The observed habitat was also reported to support infauna mainly comprising of polychaete worms, gastropods, shrimp and crabs (ERM 2011). In the Joseph Bonaparte Gulf, benthic assemblages generally corresponded with geomorphic features where stable substrate such as low-lying ridges provide support to mixed patches of octocorals and sponges (Nicholas et al. 2015). Depressions on the seabed (pockmarks) were reported by Nicholas et al. (2015) to have no distinctive epifauna associated with these features. Impacts from grab sampling and borehole/piezo-cone penetrometer tests are expected to be limited due to the small size of area affected by sampling. Well abandonment activities may also disturb benthic communities at the well locations during the cutting and recovery of the conductor/casing at the mudline; however as described in Table 7-7 and Table 7-8, the discharge of drill cuttings and excess cement adjacent to the well locations will have already previously disturbed this area and given the short-term duration of the activity (approximately 150 days) it is not expected to delay the recolonisation and recovery of benthic habitats in the project area. The total disturbance footprint from the activity is expected to be approximately 0.00075-0.001 km^2 at each well location depending on whether a jack-up or semi-submersible rig is used. In the context of the total area covered by the GHG assessment permit, this represents a very small area of disturbance. The activity may result in the mortality of sessile fauna within this footprint and potentially the mortality of benthic infauna associated with the habitat; however, it is considered that potentially impacted benthic habitats and associated biota are well represented in the region (Nicholas et al. 2015). Therefore, any temporary disturbance and losses will represent a very small fraction of the widespread available habitat. Following removal of the MODU jack-up legs/anchors and completion of the activity, the soft sediments will be left disturbed; however, based on the short-term duration (approximately 150 days) upon removal of the jack-up legs or retrieval of the anchors, benthic habitats would remain viable and are expected to recolonise through the recruitment of new colonists from planktonic larvae and adjacent undisturbed areas. Displacement of sediments during jack-up leg/mooring deployment/retrieval operations may result in temporary, localised plumes of suspended sediment and subsequent deposition of sediment resulting in smothering of marine benthic habitat and benthic communities in the immediate vicinity. KEFs near the project area (Section 4.2) have unique seafloor features and are thought to provide biologically important habitats in areas otherwise dominated by soft sediments (DSEWPaC 2012a, 2012b). It is considered that the hard substrates provided by pinnacles, terraces and low-lying ridges are likely to support a range of sponges, corals, crinoids, molluscs, echinoderms and other benthic invertebrates (Section 4.6.3; ERM 2011; Nicholas et al. 2015). The closest pinnacle is located, approximately 16 km west from the project area at its closest point. Therefore, benthic communities associated with the KEF are not expected to be impacted by any displaced sediments or silt plumes generated which are likely to have dissipated over this distance.	

The potential consequence on benthic communities is a localised impact from physical disturbance within the footprint of the jack-up legs or anchors/chains which is expected to be limited given the predicted sparse cover of benthic communities and expected recovery through recolonisation. Therefore, it is assessed to be of inconsequential ecological significance (Insignificant F). The NPF (Cwlth) and two NT-managed fisheries are potentially active in the project area (Table 4-4) and a number of commercially significant fish stocks, considered as key indicator species, may be present in the waters of the project area. Recreational fishing also occurs in the Joseph Bonaparte Gulf; however, fishing tends to take place in estuaries (e.g. barramundi fishing) or in coastal waters distant from the project area. Disturbance to seabed habitats from the activity is not expected to affect fish spawning habitats due to the short-term nature of the activity (Insignificant F).	

Identify existing design and safeguards/controls measures
• No planned anchoring of survey or support vessels.

Propose additional safeguards/control measures (ALARP Evaluation)			
Hierarchy of control	Control measure	Used?	Justification
Elimination	No anchoring by MODU	No	All MODUs require some form of contact to remain stable on the seabed at the well location. Given the water depth, the use of a jack-up MODU is possible. If available, a DP MODU may be selected; however due to the drilling schedule availability cannot be guaranteed, in which case a jack-up or moored semi-submersible MODU will be used and hence this has been assessed.
Substitution	None identified	N/A	N/A
Engineering	None identified	N/A	N/A
Procedures & administration	Rig move and positioning plan	Yes	Jack-up operations/anchor installation and retrieval operations will be managed by implementation of the plan, based on the approved mooring design, to ensure that the mooring lines are installed as per design and the MODU remains on station and within the boundaries of project area and GHG assessment permit.

Identify the likelihood		
Given the controls in place, the likelihood of impacting benthic communities in the project area is considered to be Possible (3). Any temporary impacts are considered to be ecologically insignificant to the wider diversity and productivity of benthic communities in the region based on the relatively small area potentially impacted i.e. total disturbance footprint relative to the widespread available habitat and expected recovery.		
Residual risk summary		
Based on a consequence of Insignificant (F) and a likelihood of Possible (3) the residual risk is Low (8).		
Consequence	Likelihood	Residual risk
Insignificant (F)	Possible (3)	Low (8)
Assess residual risk acceptability		
Legislative requirements There are no specific environmental guidelines/legislation regarding the environmental management of anchoring/moorings with respect to impacts on benthic communities. The rig moves and positioning plans will be developed in accordance with industry guidelines and standards, namely the Mooring Code API RP 2SK and the APPEA MODU Mooring in Australian Tropical Waters Guidelines. In accordance with s572 of the OPGGS Act (removal of property), titleholders are required to remove all structures, equipment and other property from the area, therefore any property associated with the plugged and abandoned exploration wells in the project area will be removed by INPEX. Stakeholder consultation No stakeholder concerns have been raised regarding potential impacts and risks from seabed disturbance caused by the activity. AMP management objectives and values The project area is located approximately 40 km and 90 km respectively away from the Oceanic Shoals MP and Joseph Bonaparte Gulf MP. Given the distance to these MPs, no impacts to receptors from seabed disturbance are expected in the AMPs.Conservation management plans / threat abatement plans Several conservation management plans have been considered in the development of this EP (Appendix A). The recovery plan for sawfish and river sharks specifies habitat degradation and modification as a principle threat and details actions to reduce impacts on critical sawfish and river shark habitats. There are no critical habitats for sawfish or river sharks within the project area and therefore no specific actions relating to seabed disturbance from site survey/jack-up/anchoring/mooring activities apply.		

ALARP summary

Although the level of environmental risk is assessed as Low, a detailed ALARP evaluation was undertaken to determine what additional control measures could be implemented to reduce the level of impacts and risks. No additional controls, beyond those identified during the detailed ALARP assessment can reasonably be implemented to further reduce the risk of impact.

Acceptability summary

Based on the above assessment, the proposed controls are expected to effectively reduce the risk of impacts to acceptable levels because:

- the activity demonstrates compliance with legislative requirements/industry standards
- the activity takes into account stakeholder feedback
- the activity is managed in a manner that is consistent with AMP management objectives for ecologically sustainable use and the protection of MP values
- the activity is managed in a manner that is consistent with the intent of conservation management documents
- the activity does not compromise the relevant principles of ESD
- the predicted level of impact does not exceed the defined acceptable level in that the environmental risk has been assessed as "low", the consequence does not exceed "C – significant" and the risk has been reduced to ALARP.

Environmental performance outcomes	Environmental performance standards	Measurement criteria
Seabed disturbance is limited to planned site survey and well locations.	No planned anchoring of survey or support vessels undertaking the activity.	Incident report
	INPEX will verify that the MODU contractor prepares and implements a Rig Move and Positioning Plan prior to the MODU arriving in the project area which shall include: Details of the configuration of the legs/anchors necessary to keep the MODU securely on location and provides anchor-mooring analyses and procedures for anchor mobilisation and retrieval activities. This includes: • planning and verification of well and MODU jack-up/anchoring locations.	Documentation confirming implementation of the Rig Move and Positioning Plan and any issues with leg/anchor deployment, use and recovery that could increase seabed footprint of disturbance.

	• definition of procedures for anchor deployment and recovery. • anchors will be carried to the deployment location and deployed or retrieved directly using AHSV to minimise drag.	

7.6 Social and cultural heritage protection

7.6.1 Physical presence - disruption to other marine users

Table 7-15: Impact and risk evaluation – Physical presence of MODU and vessels resulting in disruption to marine users

<table>
<tr><td colspan="2">Identify hazards and threats</td></tr>
<tr><td colspan="2">The physical presence of the MODUs and vessels in the project area has the potential to cause disruption to other marine users, including shipping operators and fisheries through the reduction of space available to conduct shipping and fisheries activities in the project area. Support vessels do not have an associated safety zone; however, MODUs are required to maintain a 500 m radius safety zone under the OPGGS Act. The safety zone will remain in place for the duration of the drilling activity while the MODU is at each well. The potential, albeit temporary, interference with and/or exclusion of other users, within the safety zone may result in a loss of revenue for commercial users including fisheries.</td></tr>
<tr><td>Potential consequence</td><td>Severity</td></tr>
<tr><td>The particular values and sensitivities with the potential to be impacted by physical presence of the MODU/vessels are:
• shipping
• commercial, recreational and traditional fisheries
• defence.

Other marine users in the vicinity of the project area may be impacted by MODU and vessel presence (including the presence of 500 m safety zone) because of the loss of navigable space available to conduct their activities. The implications of such disruptions include changes to sailing routes and journey times, or reduced ability to fish in an area. The worst-case consequence from a loss of access to an area could result in economic losses and/or potential reduction in employment levels.

A review of AMSA’s vessel traffic data for the Bonaparte Basin confirmed the absence of any major shipping lanes within the project area (Figure 4-8). A large proportion of the vessel traffic around the project area is related to supply vessels supporting offshore developments and vessels that routinely transit between the ports of Darwin and Broome on the mainland. As shown on Figure 4-8, the majority of these routes pass just to the north of the project area. Despite the absence of any major shipping lanes or petroleum supply transit routes that intersect the project area, vessel traffic will still occur in in the project area. Therefore, any vessels passing through the project area may temporarily suffer a minor loss of navigable space when the safety zone is in place during the drilling activities. Individual vessels may have to slightly alter their sailing routes to avoid the MODUs potentially leading to longer journey times. However, given the relatively small size of the safety zone in relation to the project area, any disruption to the shipping industry is expected to cause a minor impact and not result in any economic losses. Therefore, the consequence is considered to be insignificant (F).</td><td>Insignificant (F)</td></tr>
</table>

The NPF and two NT-managed fisheries are potentially active in the project area as described in Section 4.9.6. Fisheries whose fishing grounds overlap the project area and therefore may potentially have access limitations during the site survey and 150-day drilling activities are presented in Table 4-4. Fishing data from the NPF confirmed that most fishing effort in the Joseph Bonaparte Gulf has historically occurred >50 km south-west of the project area. Due to the presence of a new closure area, these key fishing grounds are now only accessible during the tiger prawn fishing season (August to December). The project area is located to the north of the closure area but overlaps waters where <5 vessels have historically fished during any year. The NT Demersal Fishery confirmed that trawl vessels consistently operate in the project area as well as waters located to the north of the project area throughout the year. A review of historic fishing effort data confirmed the other NT-managed fishery (NT Offshore Net and Line Fishery) reported either low or no fishing effort in the project area in recent years (Table 4-4). Based on the low level of identified commercial fishing activity and the relatively small spatial area occupied by the 500 m radius safety zone, in comparison to the entire extent of the fishing grounds available to commercial operators, and the relatively short-term duration of the activity (150 days), the potential loss of navigable space in which a fishing operator could conduct their activities is considered to be insignificant (F). Recreational fishing occurs in the Joseph Bonaparte Gulf; however, fishing tends to take place in estuaries (e.g. barramundi fishing) or in coastal waters. Interactions in the project area are considered unlikely due to the remoteness and predominantly deep offshore waters. Other fishing activities such as traditional Aboriginal fishing are known to occur along the NT and WA coastlines. As with recreational fishing, due to the remoteness and predominantly deep offshore waters, interactions in the project area resulting in the loss of navigable space in which to conduct fishing activities is not expected to occur. Therefore, the potential for loss of access to the recreational fishing industry or traditional fishing vessels as a result of MODU/vessel physical presence is considered to be of Insignificant consequence (F). As described in Section 4.9.8 and shown on Figure 4-9, the project area overlaps defence exercise and training areas (NAXA). During stakeholder consultation, Defence confirmed current planned military exercises in the NAXA for 2022, 2023 and 2024 and during these exercises, access to NAXA may be restricted to all vessels and aircraft. Defence requested that INPEX provide as much advance notice as possible for any planned activities by INPEX or contractors in the NAXA (approximately five to six weeks' notice). To help manage the water space, INPEX will also provide advance details in relation to the nature and scale of the activities including vessel size, MODU location and proposed dates for scheduled activities. Disruption to Defence activities from the proposed activities described in this EP will be of a minor impact (Insignificant F).	
Identify existing design and safeguards/controls measures	
• Ongoing stakeholder notifications/consultation with relevant stakeholders as per Section 9.8.3 and Table 9-7.	

• MODU and vessels fitted with lights, signals, AIS transponders and navigation equipment as required by the *Navigation Act 2012* and associated Marine Orders (consistent with COLREGS requirements).			
Propose additional safeguards/control measures (ALARP Evaluation)			
Hierarchy of control	Control measure	Used?	Justification
Elimination	Eliminate the use of MODU/vessels	No	The use of MODU/vessels to undertake the activity cannot be eliminated.
Substitution	Reduce the size of the MODU safety zone	No	The implementation of the MODU safety zone promotes the safety of other sea users and the integrity of MODUs. In accordance with the OPGGS Act, safety zones are required and cannot be reduced in size.
	Alter timing to avoid peak fishing periods	No	Vessels associated with the NPF or NT Demersal Fishery may be active in the project area throughout the year. Therefore, altering the timing of the activity is not considered an effective control. The area that stakeholders are excluded from is of limited size (500 m radius safety zone) when compared to the area available to other marine users and stakeholder consultation will be undertaken on an ongoing basis to avoid disruption during the short-term duration activity (150 days).
Engineering	None identified	N/A	N/A
Procedures & administration	None identified	N/A	N/A
Identify the likelihood			
The MODU and vessels associated with the activity in the project area will have an insignificant impact by reducing the navigable space available to shipping, fishing and vessel (oil and gas; tourism) operators. The likelihood of loss of access/space in the open ocean resulting in an economic loss or reduction in employment levels is considered to be Highly Unlikely (5). During stakeholder engagement for the EP, shipping operators were not considered as relevant stakeholders to be consulted, as the activity is outside of any shipping routes/channels. Relevant stakeholders, including fisheries, were consulted throughout the development of this EP. Commercial fisheries will continue to be informed and updated on operational activities being undertaken by INPEX. On this basis, with the controls in place, impacts to economic values from loss of revenue for fisheries due to lack of access to fishing grounds with potential reduction in employment levels is considered Highly Unlikely (5).			

Residual risk summary		
Based on a consequence of Insignificant (F) and a likelihood of Highly Unlikely (5) the residual risk is Low (10).		
Consequence	Likelihood	Residual risk
Insignificant (F)	Highly Unlikely (5)	Low (10)

Assess residual risk acceptability

Legislative requirements

While a MODU is on location, a safety zone with a 500 m radius will be maintained around it to control activities and reduce the risk of marine collisions, as required under the OPGGS Act Section 617. The OPGGS Act requires that activities do not cause interference to other users more than is reasonably necessary for carrying out rights conferred by the Act. Marine Safety Information notifications will be issued for the drilling period via AMSA, while the Australian Hydrographic Office (AHO) will issue a Notice to Mariners. The MODU and vessels will be equipped with navigation equipment as required by the *Navigation Act 2012*.

Stakeholder consultation

Fisheries stakeholder feedback during preparation of this EP was received from the NPFI (Table 5-4). INPEX does not consider it practicable to commit to undertaking the proposed activities outside of period 1 August and 1 December and a response has been provided to NPFI. During stakeholder consultation AMSA noted that there may be considerable traffic in the proposed project area and requested that all relevant notifications be adopted as controls in this EP therefore, these requirements have been adopted. All vessels are required to comply with the *Navigation Act 2012*, and associated Marine Orders, which are consistent with the COLREGS requirements. Stakeholder engagement during the development of this EP with Defence (Table 5-4) confirmed the schedule of exercises in 2022, 2023 and 2024. INPEX will adhere to Defence requirements during exercises and provide adequate notification of activities and timing. Ongoing consultation will continue with Defence throughout the implementation of this EP (refer to Section 9.8.3).

AMP management objectives and values

The project area is located approximately 40 km and 90 km respectively away from the Oceanic Shoals MP and Joseph Bonaparte Gulf MP. No impacts will occur to socio-economic values such as fisheries or shipping within the MPs.Conservation management plans / threat abatement plans

Several conservation management plans have been considered in the development of this EP (Appendix A). None of the recovery plans or conservation advice documents are relevant to the physical presence of MODUs/vessels disrupting shipping or fishing operators.

ALARP summary

Although the level of environmental risk is assessed as Low, a detailed ALARP evaluation was undertaken to determine what additional control measures could be implemented to reduce the level of impacts and risks. No additional controls, beyond those identified during the detailed ALARP assessment can reasonably be implemented to further reduce the risk of impact.

Acceptability summary

Based on the above assessment, the proposed controls are expected to effectively reduce the risk of impacts to acceptable levels because:

- the activity demonstrates compliance with legislative requirements/industry standards
- the activity takes into account stakeholder feedback
- the activity is managed in a manner that is consistent with AMP management objectives for ecologically sustainable use and the protection of MP values
- the activity is managed in a manner that is consistent with the intent of conservation management documents
- the activity does not compromise the relevant principles of ESD
- the predicted level of impact does not exceed the defined acceptable level in that the environmental risk has been assessed as "low", the consequence does not exceed "C – significant" and the risk has been reduced to ALARP.

Environmental performance outcomes	Environmental performance standards	Measurement criteria
Interference with other marine users is limited to the extent necessary for the reasonable exercise of the right conferred by the GHG assessment title.	Vessels will be fitted with lights, signals, AIS transponders and navigation and communications equipment, as required by the *Navigation Act 2012*.	Records confirm that required navigation equipment is fitted to vessels to ensure compliance with the *Navigation Act 2012*.

7.7 Loss of containment

The activity will require the handling, use and storage of chemicals and hydrocarbon materials which may include, but are not limited to:

- MGO/diesel
- hydraulic oil
- BOP/hydraulic control fluids
- grease
- drilling fluids (WBM).

Undertaking the activity introduces the potential for loss of containment events. These events may be classified as Level 1, Level 2 or Level 3 incidents, in accordance with the INPEX *Browse Regional OPEP* described in Table 8-6 of this EP.

INPEX defines an emergency condition as:

"an unplanned or uncontrolled situation that harms or has the potential to harm people, the environment, assets, Company reputation or Company sustainability and which cannot, through the implementation of Company standard operating procedures, be contained or controlled."

An evaluation of the environmental impacts and risks associated with emergency conditions is included in Section 8 of this EP.

A summary of potential loss of containment events (and emergency conditions) associated with this EP is presented in Table 7-16. Incident levels are indicative only and classifications have been assigned for the purposes of enabling the risk evaluation to be undertaken. In the event of a spill, the incident level will be classified as described in the INPEX *Browse Regional OPEP* (Table 8-6)

Table 7-16: Representative loss of containment events and emergency conditions identified for the activity

Scenario		Basis of volume calculation	Type	Indicative incident level	Section addressed
Source	**Threat**				
Management of chemicals and hydrocarbons products on board	Inappropriate use /handling/ spills Failure of hydraulic hoses on equipment	Failure/partial loss of contents of tote tank estimated to be approximately 1 m^3 Failure of hydraulic hoses estimated to be in the order of <1 m^3	Various	1	Accidental release – Table 7-17
Cargo transfers	Dropped objects	5.5 m^3 – based on the volume of a tote tank which, if lost during cargo transfer, has the potential to result in a full loss of contents	Various	1	Accidental release – Table 7-17

Scenario		Basis of volume calculation	Type	Indicative incident level	Section addressed
Source	**Threat**				
Hydrocarbon transfers	Spill during bunkering	10 m^3 – based on hose failure during transfer	Group II – MGO	1	Accidental release – Table 7-17
Helicopter refuelling	Spill during refuelling on board the MODU	4.4 m^3 – based on volume stored on board the MODU	Group I (i.e. aviation fuel)	1	Accidental release – Table 7-17
Emergency conditions (refer to Section 8)					
Vessels	Collision	250 m^3 – based on capacity of largest single fuel tank (AMSA 2015a)	Group II – MGO	2	Vessel collision – Section 8.2

7.7.1 Accidental release

Table 7-17: Impact and evaluation – loss of containment: accidental release

<table>
<tr><th colspan="2">Identify hazards and threats</th></tr>
<tr><td colspan="2">Several potential loss of containment events were identified (Table 7-16), including minor spills on board (<1 m³); loss of tote tank during cargo transfer (5.5 m³); failure of hydraulic hoses (<1 m³) and loss of hydrocarbon fuels during bunkering of vessels and helicopters (4.4 m³ to 10 m³).

Specific predictive modelling was not undertaken for the potential loss of containment events. This was based on the expected low volumes and that any predicted impacts are likely to be localised to the point of release. Given the properties of the chemicals involved (predominantly Group I/II hydrocarbons), which tend to be more volatile and less persistent in the environment any spills will rapidly disperse at the sea surface.

An accidental release overboard resulting in a spill that reaches the marine environment has the potential to result in localised changes to water quality, resulting in impacts to marine fauna and planktonic communities at the sea surface, but no impact on deeper water communities or benthic habitats would be expected.</td></tr>
<tr><th>Potential consequence</th><th>Severity</th></tr>
<tr><td>The particular values and sensitivities with the potential to be impacted by a loss of containment/accidental release are:
• EPBC-listed species
• planktonic communities.

Potential accidental releases overboard from loss of containment events may result in the exposure of marine fauna and plankton near the sea surface, to a range of chemicals and Group I/II hydrocarbons. Foreseeable loss of chemicals to the marine environment would be of small volumes (<1 – 5 m³), and impacts would generally be of low consequence (Insignificant F).

Given the anticipated volumes (worst-case 10 m³ of diesel), potential exposure is expected to be localised to the point of discharge in the project area and in some instances a portion of the spilled volume is expected to be at least partially captured within the vessel/MODU drainage system, therefore further reducing the potential spill volume. Upon release to the marine environment hydrocarbons will disperse through natural physical oceanic processes, such as currents, tides and waves, and photochemical and biological degradation. Therefore, any surface expression is expected to weather and dissipate in a relatively short time with limited potential for exposure to surfacing marine fauna or plankton at the sea surface.</td><td>Insignificant (F)</td></tr>
</table>

A marine turtle foraging BIA overlaps the project area relating to green turtles and olive ridley turtles. Flatback turtles and loggerhead turtles are also known to forage in an area approximately 20 km west of the project area at the closest point. Although overlapping the BIA, it is unlikely that the project area is the predominant foraging area for all marine turtle species given water depths range from 75 m to 100 m, which is deeper than the preferred range for foraging marine turtles which is generally less than 40 m based on NPF bycatch records (Poiner & Harris 1996). Dietary samples of olive ridley turtles from the eastern Joseph Bonaparte Gulf indicate foraging depths of less than 14 m (Conway 1994 reported in Whiting et al. 2007). Most turtle foraging is therefore expected to be associated with shallower waters within the KEFs surrounding the project area (Pinnacles of Bonaparte Basin, Carbonate Bank and Terrace System of the Sahul Shelf and Carbonate Bank and Terrace System of the Van Dieman Rise (DEWHA 2008). Satellite tracking data reviewed in recent studies (Ferreira et al. 2020; Thums et al. 2021) concluded that the spatial extents of foraging BIAs are considered to potentially underestimate the distribution of foraging turtles. In particular, flatback turtles are reported to forage in areas of the Joseph Bonaparte Gulf with bare substrate and may potentially forage in deeper waters depths (Thums at al. 2021) such as those found in the project area. Therefore, it is considered possible that green, olive ridley, flatback and loggerhead turtles may be present in the project area year-round. Given the mobile and transient nature of foraging turtles and the large size of available foraging grounds, the potential exposure is likely to be limited to individuals close to the discharge point at the time of the release and the activity is unlikely to displace turtles from the foraging grounds year-round. Worst-case impacts to exposed marine fauna may include direct toxic effects, such as damage to lungs and airways, and eye and skin lesions from exposure to oil at the sea surface (Gubbay & Earll 2000). Considering the low volumes (< 10 m^3), limited duration of exposure and the location of the discharges in the dispersive open ocean environment, a surface expression is not anticipated; therefore, impacts are considered to be of inconsequential ecological significance to EPBC-listed species and are therefore considered Insignificant (F). As a consequence of their presence close to the water surface, plankton may be exposed to any entrained/dissolved components of any hydrocarbons spilled at the sea surface, particularly in high energy seas where the vertical mixing of oil through the water column would be enhanced. The effects of oil on plankton have been well studied in controlled laboratory and field situations. The different life stages of a species often show widely different tolerances and reactions to oil pollution. Usually, eggs, larval and juvenile stages will be more susceptible than adults (Harrison 1999). Post-spill studies on plankton populations are few, but those that have been conducted, typically show either no effects or temporary minor effects (Kunhold 1978). Given the high temporal and spatial variability in plankton communities, and the small size of the area impacted by an accidental release, the potential consequence in regard to planktonic communities is considered to be Insignificant (F).	
Identify existing design and safeguards/controls measures	
• All vessels >400 GT will have a SOPEP (or SMPEP) in accordance with Marine Order 91 • Spill kits will be available on-board MODUs and vessels • Personnel will receive an induction/training to inform them of deck spill response requirements in accordance with Section 9.3.3 and Table 9-2.	

- INPEX chemical, assessment and approval procedure for selection of chemicals in accordance with Section 9.6.1 and Table 9-5.
- INPEX lifting standard and cargo transfer procedures.

Propose additional safeguards/control measures (ALARP Evaluation)			
Hierarchy of control	Control measure	Used?	Justification
Elimination	Eliminate the use of chemicals and hydrocarbons on board.	No	Chemicals and hydrocarbons are required for safe and efficient operations and cannot be eliminated. In the case of diesel, it is required as fuel and cannot be eliminated.
	No bunkering.	No	Bunkering of fuel from supply vessels to MODUs is required during the activity as space limitations/tank capacities mean that supplies need to be replenished.
	No cargo transfers.	No	Cargo transfers cannot be eliminated, as this is the only practicable option for supplying MODUs in offshore locations.
Substitution	None identified	N/A	N/A
Engineering	Prevent onboard spills through appropriate storage of hydrocarbons and chemicals including their associated waste constituents.	Yes	Through bunding of storage areas and good housekeeping practices, the storage and management of hydrocarbon and chemical products and associated wastes can reduce the potential risk of a loss of containment event occurring.
Procedures & administration	Implement hydrocarbon transfer procedures that specify keeping of hose registers, and operational requirements (e.g. minimum lighting conditions, communications, visual monitoring, dry break/break away couplings installed and used, use and maintenance of certified hoses and a permit to work (PTW) system).	Yes	The transfer of fuel will occur in accordance with strict conditions for preventing spills to the marine environment. Offshore transfers of fuel will be conducted in accordance with the MODU contractor’s transfer procedures.

	Hydraulic equipment on board MODU and vessels will be subject to routine servicing and inspection to ensure it is fit for purpose.	Yes	Routine servicing and inspection of hydraulic equipment will ensure it is fit for purpose and minimise the potential for leaks and spills to deck as a result of corrosion, and wear and tear of hydraulic hoses.

Identify the likelihood		
Based on the low volumes and expected weathering of spilled chemicals, in conjunction with the controls in place the likelihood of a loss of containment event causing harm to the identified receptors is considered to be Unlikely (4).		
Residual risk summary		
Based on a consequence of Insignificant (F) and a likelihood of Unlikely (4) the residual risk is Low (9).		
Consequence	Likelihood	Residual risk
Insignificant (F)	Unlikely (4)	Low (9)
Assess residual risk acceptability		
Legislative requirements The activities and proposed management measures are compliant with industry standards and relevant Australian legislation, specifically concerning prevention pollution, including Marine Order 91: Marine Pollution Prevention - Oil. Stakeholder consultation No stakeholder concerns have been raised regarding potential impacts and risks from accidental release/loss of containment. Spill response activities and notifications to relevant stakeholders have been identified and included in INPEX spill response processes. AMP management objectives and values The project area is located approximately 40 km and 90 km respectively away from the Oceanic Shoals MP and Joseph Bonaparte Gulf MP. Proposed control measures reduce the risk of loss of containment events and the preventative controls in place, spill response preparedness and distance to the nearest MPs mean no risk of impacts to fauna in AMPs or impacts to MP values are expected. Conservation management plans / threat abatement plans		

Several conservation management plans (Appendix A) identify oil or chemical spills as key threatening processes, through both direct/acute impacts, as well as indirect impacts through habitat degradation. The prevention of loss of containment events and reducing impacts to the marine environment through the preventative controls in place and spill response preparedness, demonstrates alignment with the various conservation management plans. ALARP summary Although the level of environmental risk is assessed as Low, a detailed ALARP evaluation was undertaken to determine what additional control measures could be implemented to reduce the level of impacts and risks. No additional controls, beyond those identified during the detailed ALARP assessment can reasonably be implemented to further reduce the risk of impact. Acceptability summary Based on the above assessment, the proposed controls are expected to effectively reduce the risk of impacts to acceptable levels because: • the activity demonstrates compliance with legislative requirements/industry standards • the activity takes into account stakeholder feedback • the activity is managed in a manner that is consistent with AMP management objectives for ecologically sustainable use and the protection of MP values • the activity is managed in a manner that is consistent with the intent of conservation management documents • the activity does not compromise the relevant principles of ESD • the predicted level of impact does not exceed the defined acceptable level in that the environmental risk has been assessed as "low", the consequence does not exceed "C – significant" and the risk has been reduced to ALARP.		
Environmental performance outcomes	**Environmental performance standards**	**Measurement criteria**
No loss of containment of hydrocarbons or chemicals to the marine environment.	Premobilisation HSE inspections confirm that MODU and vessels >400 GT have SOPEP (or SMPEP) compliant with Marine Order 91.	Premobilisation HSE inspection documentation.
	Spill kits will be available on board the MODUs and vessels.	Inspection records confirm spill kits are available and stocked.
	INPEX lifting standard and cargo transfer processes are implemented.	Training records of personnel involved in lifting and cargo transfer activities.

	Bunding around stored bulk wet chemicals or hazardous liquid waste storage areas in accordance with Australian standards.	Bunding and drainage verified by containment specialist.
	INPEX will verify the contractor implements MODU and vessel bunkering procedures for hydrocarbons that will include as a minimum: • completion of PTW for all diesel transfers. • dry break couplings/weak link breakaway couplings and flotation collars are installed on hydrocarbon bulk transfer hoses to prevent entanglement and enable early leak detection. • hydrocarbon bulk transfer hoses are certified and rated for hydrocarbons and pressure tested and maintained in a hose register. • bunkering is undertaken during daylight hours, if PTW in place and weather is good (e.g. suitable sea conditions). Night-time bunkering will not be undertaken on a routine basis. This will only be undertaken in fully lit conditions and in favourable sea states. • preventive maintenance of hydraulic equipment to ensure its integrity.	Documentation that hydrocarbon bunkering procedures approved and are implemented, e.g. undertaken during daylight hours and in appropriate sea state, etc. Hose register. Completed and approved PTW records for all diesel transfers. Documentation of maintenance recorded in the preventive maintenance system.

8 EMERGENCY CONDITIONS

An evaluation of potential loss of containment spill sources and worst-case spill scenarios (WCSS) identified a potential emergency condition related to the activity as summarised in Table 8-1.

Table 8-1: Potential emergency conditions

Scenario		**Hydrocarbon type**	**Release location**
Source	Threat		
Vessels	Collision	Group II –MGO	Surface

When considering the WCSS applicable to the activity, it was confirmed that there is no credible risk of a blowout from the reservoir formations targeted in the wells within the project area. The primary targets for the proposed wells are the Elang and Plover formations, with the Sandpiper and Cape Londonderry formations as secondary and tertiary targets. The closest offset wells to the proposed exploration wells are located in the Petrel Field (ranging from approximately 17 km to 40 km away in a south-westerly direction).

2D seismic survey data and drilling/geological logs from the Petrel Field (Figure 8-1) have shown that the Sandpiper, Elang and Plover formations are located at a similar structural level (depth below sea level) as the proposed well target locations. The Cape Londonderry and Mt Goodwin formations are located updip (shallower) in the Petrel wells compared with the proposed well target locations. Well data from Petrel Field shows that all intervals down to the Mt Goodwin Formation are hydrostatically pressured (no over-pressure which could cause a well-kick), and only minor background gas was detected in the target formations. In addition, no hydrocarbons have been interpreted from formation evaluation logs across any of these reservoir targets in the Petrel wells. There are also no interpreted structural closures, or direct hydrocarbon indicators visible on seismic survey data at these target levels, at any of the proposed well locations.

The Petrel drilling data demonstrates that the main hydrocarbon bearing formation in the Petrel Field is the Hyland Bay Group. The seismic survey data shows that the Hyland Bay Group remains approximately 500 m below the base Cape Londonderry Formation at the proposed well target locations and therefore there is no credible risk of a blowout during the drilling activities covered in this EP.

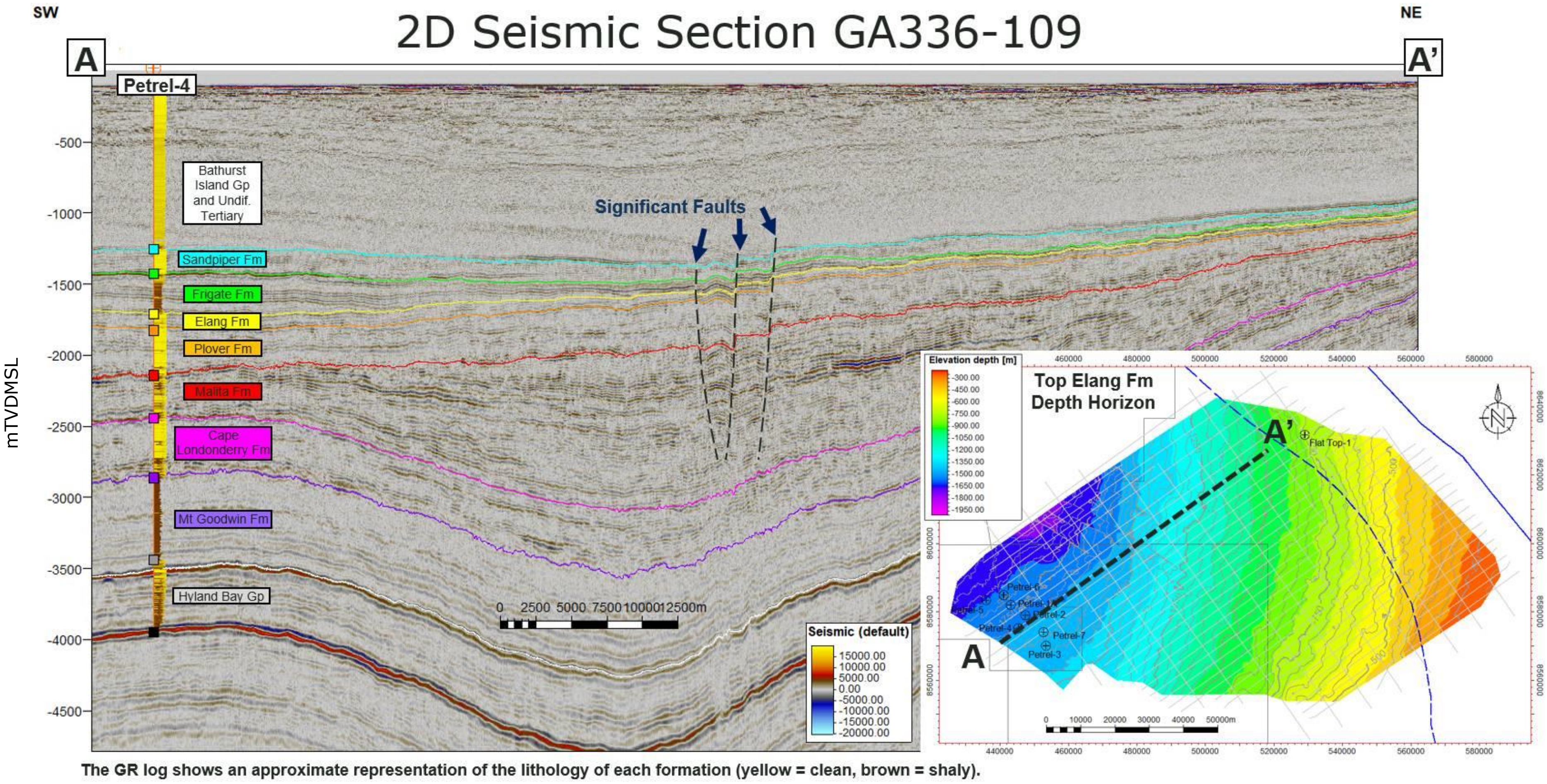

Figure 8-1: 2D seismic section from the Petrel Field

8.1 PEZ and EMBA based on oil spill modelling

As described in Section 4, the PEZ has been derived to inform the outer boundary of potential exposure for oil spill planning and scientific monitoring purposes using low thresholds described in NOPSEMA bulletin #1 (NOPSEMA 2019). The low thresholds used may not be ecologically significant as hydrocarbon exposure has the potential to result in both acute and chronic impacts to marine flora and fauna, depending on the sensitivity of organisms exposed and the concentration of exposure.

A summary of the range of concentrations of different hydrocarbon exposure thresholds adopted to conservatively identify the PEZ and EMBA (area where potential environmental impact may occur) is described in Table 8-2. These thresholds include surface, entrained, dissolved and shoreline accumulation thresholds.

Table 8-2: Hydrocarbon exposure thresholds

Threshold		Description
Surface hydrocarbon exposure	PEZ 1 g/m^2	To define the outer extent of the PEZ, a low surface exposure threshold of 1 g/m^2 has been used to provide an indication of the furthest extent at which a visible sheen may be observed on the sea surface. It is considered too low for ecological impact assessment purposes and is used to inform oil spill scientific monitoring purposes (water quality) as per NOPSEMA (2019). The low exposure threshold also provides an indication of socioeconomic receptors, such as oil and gas industry, tourism and fishing activities that may be affected by safety concerns associated with a light/visible surface expression.
	EMBA 10 g/m^2	The surface oil threshold of 10 g/m^2 to assess environmental impacts is based on research by French-McCay (2009) who has reviewed the minimum oil thickness (0.01 mm) required to impact on thermoregulation of marine species, predominantly seabirds and furred mammals (furred mammals are not present within the EMBA of this EP). Seabirds are particularly vulnerable to oil spills because their feathers easily become coated, and they feed in the upper water column. Other tropical marine megafauna species are unlikely to suffer from comparable physical oil coating because they have smooth skin. Applying the threshold for the scenarios outlined for this EP therefore, represents a conservative measure to define the EMBA. This threshold has been applied to various industry oil spill impact assessments by French-McCay (2002; 2003) and is recommended in the AMSA guidelines (AMSA 2015b).
Entrained hydrocarbon exposure	PEZ 10 ppb	The low exposure threshold of 10 ppb has been used to inform the outer extent of potential exposure to entrained hydrocarbons in the water column. It is considered too low for ecological impact assessment and is used to inform oil spill scientific monitoring purposes (water quality) as per NOPSEMA (2019).

Threshold		Description
	EMBA 100 ppb	The biological impact of entrained oil cannot be determined directly using available ecotoxicity; however, it can be derived from tests using either water-soluble fraction (WSF) of oil or oil-in-water dispersions (OWD). OWD are prepared by highly turbulent shaking of oil in water, which are allowed to separate before use, so that the test organisms are exposed to the dissolved fractions, as well as any very fine entrained oil droplets that remain in suspension. However, results are conservative because entrained droplets are less biologically available to organisms through tissue absorption than the dissolved fraction (Tsvetnenko 1998). French-McCay (2002) reviewed global ecotoxicology data for numerous species (115 for fish, 129 for crustaceans, and 34 for other invertebrates). The intent was to provide an estimate of the magnitude of toxicity effects from oil exposure to marine biota across a wide taxonomic range. These were based on both WSF and OWD tests. Under low turbulence conditions, the total PAH LC_{50} for species of average sensitivity ranges from about 300–1,000 ppb. Under higher turbulence, such as a subsea release, the total PAH LC_{50} decreased to about 64 ppb (French-McCay, 2002). Comparatively, the lowest no observed effect concentration level for unweathered Browse condensate from the north-west region was found to be 20 ppm, based on a fish imbalance and tiger prawn toxicity test (Woodside 2014). In addition to potential toxicity impacts, entrained oil droplets (although less bioavailable) may present smothering impacts to submerged receptors. Physical and chemical effects of the entrained oil droplets have been demonstrated through direct contact with receptors through physical coating of gills and body surfaces, and accidental ingestion (NRC, 2005). To be conservative, a 100 ppb entrained threshold is proposed to account for any ecological impacts (toxicity and smothering) in the EMBA.
Dissolved hydrocarbon exposure	PEZ -	As dissolved hydrocarbons are the soluble component of entrained hydrocarbons, the conservative low exposure threshold used for entrained hydrocarbons at 10 ppb encompasses the dissolved component to identify the furthest extent of potential exposure used for oil spill planning and scientific monitoring purposes (water quality) as per NOPSEMA (2019).
	EMBA 50 ppb	The 99% species protection threshold of 50 ppb for PAH (ANZG 2018) has been selected to indicate the zones where acute exposure could potentially occur over shorter durations, following a spill.

Threshold		Description
Shoreline accumulation	PEZ 10 g/m^2	Certain industries, such as tourism may be affected by visible sheen on sandy beaches, therefore a shoreline accumulation of 10 g/m^2 has been included for information purposes to inform the PEZ, that may indicate potential socioeconomic impact as per NOPSEMA (2019). However, it is considered too low for ecological impact assessment purposes.
	EMBA 100 g/m^2 (where threshold for surface or entrained/dissolved hydrocarbon exposure at that shoreline is also exceeded).	A shoreline accumulation threshold of 100 g/m^2 is recommended from the review by French-McCay (2009) based on exposure to birds and smothering of invertebrates in intertidal habitats. This threshold is also proposed to be an acceptable minimum thickness that does not inhibit recovery and is best remediated by natural coastal processes (AMSA 2015b).

As described in Section 4, the spatial extent of the PEZ, used as the basis for the EPBC Act Protected Matters database search (Appendix A), was determined using stochastic spill modelling by applying the low thresholds. The EMBA, used as the basis for the impact and risk evaluation presented in this section of the EP, was determined by applying the defined impact exposure thresholds detailed in Table 8-2.

The stochastic spill modelling results from the WCSS (vessel collision scenario) during all seasons (summer (wet), winter (dry) and transitional) and under different hydrodynamic conditions (e.g. currents, winds, tides, etc.) is presented in Figure 8-2.

Stochastic spill modelling results provide a highly conservative representation of the PEZ and EMBA and has been used to ensure that the EPBC Protected Matters database search identifies all potential receptors. As such, the actual area that may be affected from any single spill event would be considerably smaller than that represented by the PEZ and EMBA. Example model outputs from individual spill events are available in the INPEX *Browse Regional OPEP Basis of Design and Field Capability Assessment Report* (Table 8-6).

Deterministic modelling is a single spill simulation using one set of wind and weather conditions over time. Deterministic modelling runs are often paired with stochastic modelling to place the large stochastic footprint into perspective. Specific deterministic analysis or the use of a selection of worst-case individual stochastic run(s) (selected from the stochastic analysis) are utilised as the basis for developing the response plans and field capability/equipment needs for a realistic spill response as described in the INPEX *Browse Regional OPEP*.

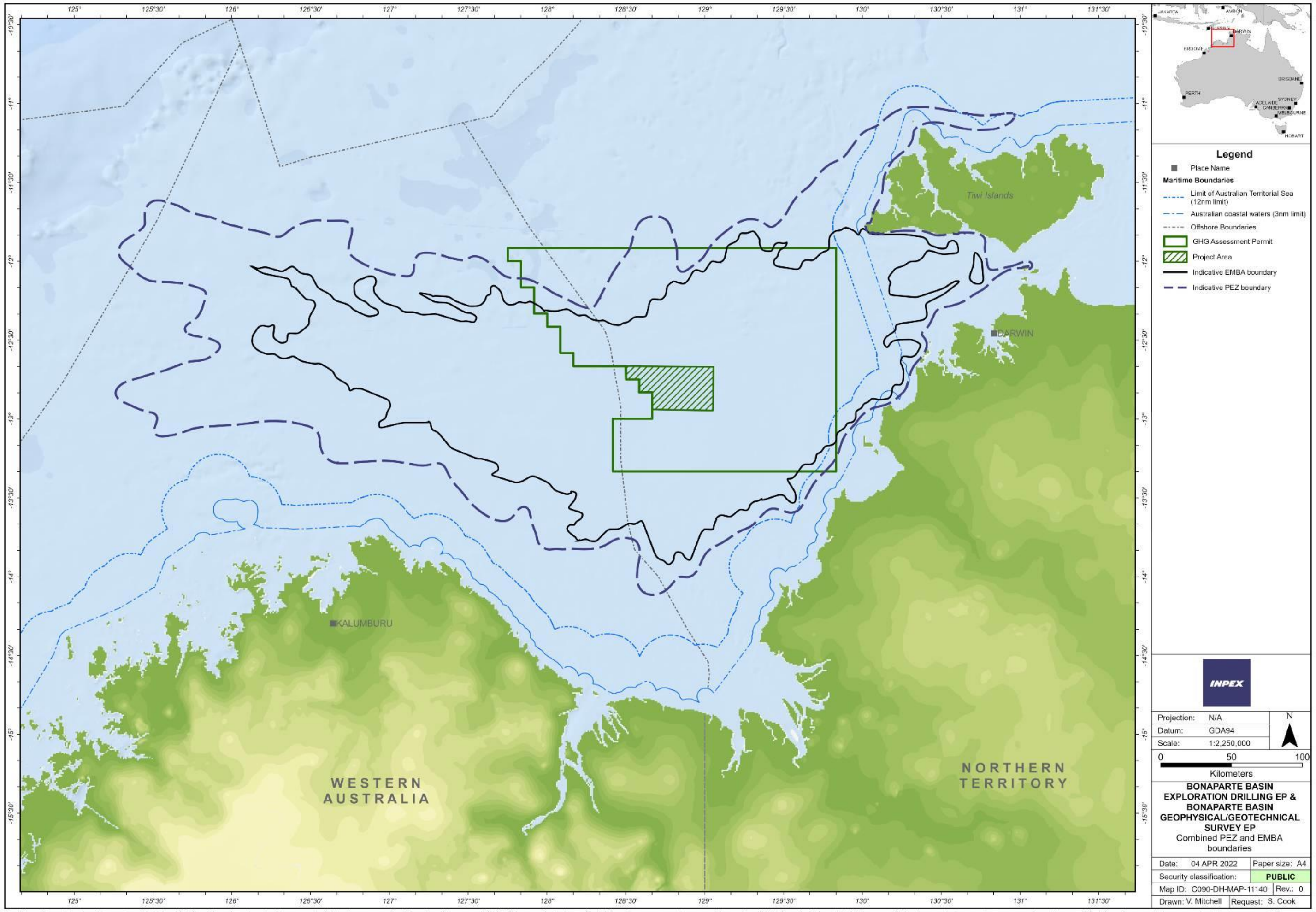

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Figure 8-2: PEZ and EMBA from the WCSS

8.2 Vessel collision

8.2.1 Location

Only vessels using MGO will be used during the activities described in this EP. Spill modelling (RPS 2022) was undertaken for a Group II hydrocarbon surface release of MGO in the project area within the Joseph Bonaparte Gulf. The release point provides indicative information only as an exact location for a vessel collision cannot be predicted.

8.2.2 Volume and duration

AMSA guidance (AMSA 2015a) recommends that the maximum credible volume spill for a vessel collision scenario be based on the volume of the largest single fuel tank. A review of the expected tank sizes associated with the activity indicated the survey vessel largest tank size to be approximately 40 m^3, and the MODU support vessels to be approximately 250 m^3. Conservatively, spill modelling of a 500 m^3 spill volume has been used (RPS 2022) with the spill modelled as an instantaneous release, with spill trajectory and fate tracked for 21 days.

8.2.3 Hydrocarbon properties

Hydrocarbon properties associated with the Group II MGO used for the modelling study are presented in Table 8-3.

Table 8-3: Group II MGO properties

Hydrocarbon type	Density at 25 ˚C (g/cm^3)	Viscosity – centipoise (cP) – at 25 ˚C	Characteristic	Volatile (%)	Semi-volatile (%)	Low volatility (%)	Residual (%)
			Boiling point (˚C)	<180	180–265	265–380	>380
MGO	0.829	4.0	% of total	6	34.6	54.4	5

8.2.4 Modelling results

Modelling results are summarised in Table 8-4 and include results taken for three modelled seasons throughout the year: October to March (summer); May to August (winter); and transitional periods April and September. For each season, 100 modelled replicates were run and therefore the results summarised represent 300 possible spill scenarios.

Under weak wind conditions (which do not generate breaking waves) a proportion of the oil mass should evaporate within the first 24 hours after the spill. Remaining oil on the surface is exposed to the atmosphere.

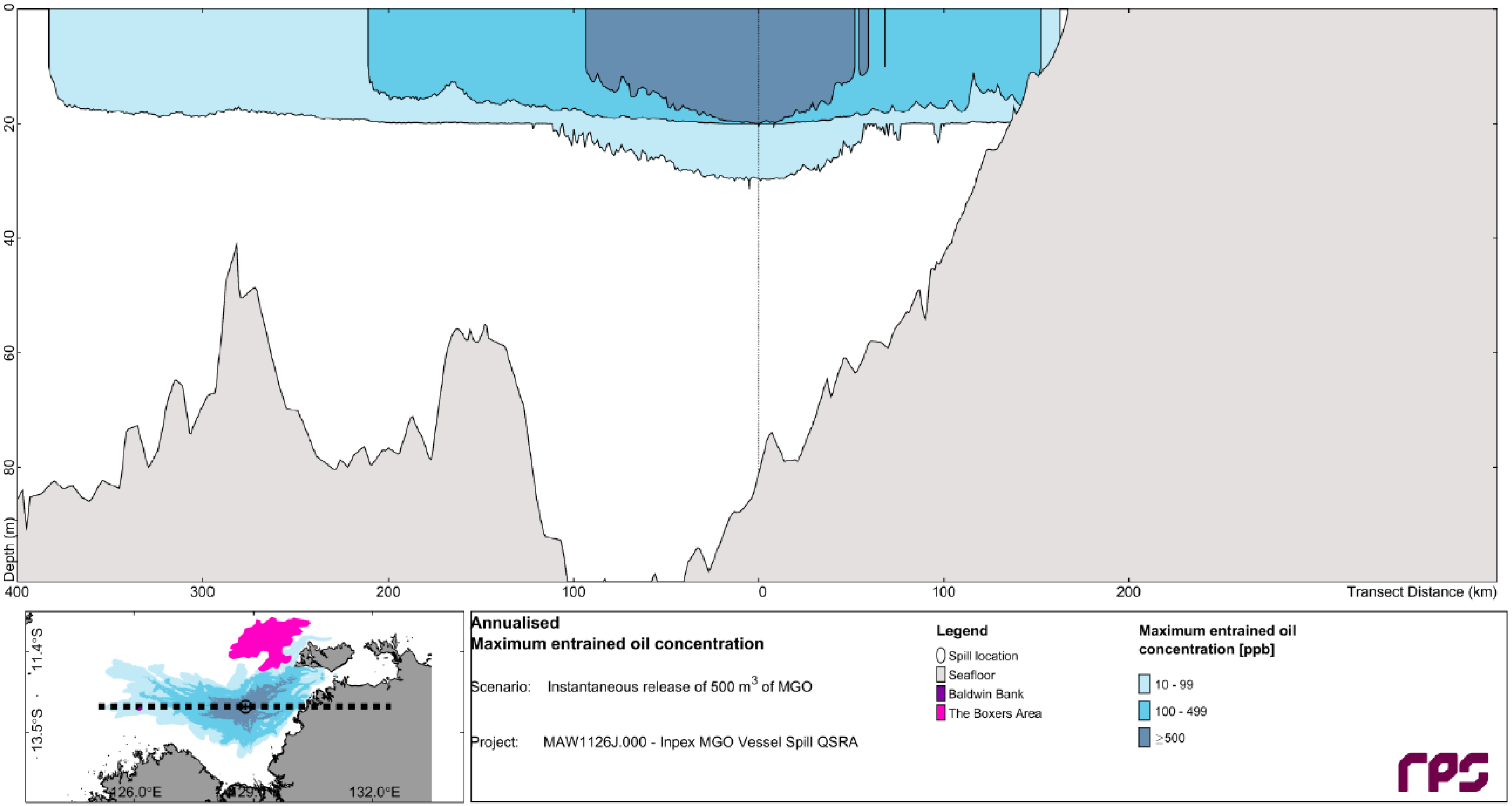
Under stronger wind conditions oil slicks are subject to dispersion into the upper water column, due to the mixing effect of breaking surface waves. Oil is maintained in suspension as entrained droplets if breaking waves persist. Once entrained, the MGO will cease to evaporate, slowing the net evaporation rate. The entrained oil will drift and disperse in the water column, where it undergoes decay.

Table 8-4: Vessel collision stochastic modelling results (RPS 2022)

Hydrocarbon exposure	Surface release of 500 m^3 MGO
Surface	The maximum distance of floating hydrocarbon, at concentrations greater than 1 g/m^2 (visible sheen), travelled by a single spill trajectory (out of 300 simulations) was approximately 88 km from the release location during any of the modelled seasons. The maximum distance travelled by a single spill trajectory (out of 300 simulations) for floating hydrocarbons at concentrations >10 g/m^2 (environmental impact threshold) were predicted to be approximately 78 km from the release location during any of the modelled seasons.
Entrained and dissolved	Entrained oil >100 ppb is predicted to occur at distances up to approximately 300 km from the release location. The worst-case instantaneous entrained oil concentration in the immediate vicinity of the release was calculated as 107,516 ppb. The worst-case instantaneous entrained oil concentration for waters surrounding emergent sensitive receptors is predicted at the Roche Reefs as 218 ppb. These values represent worst single replicates from 300 simulations. When averaged over all replicate simulations, the highest concentrations of entrained oil were predicted as 4,910 ppb in the immediate vicinity of the release. Other notable locations include: 45 ppb at Pinnacles of the Bonaparte Basin KEF (winter), 50 ppb at Flat Top Bank (summer), 44 ppb at Oceanic Shoals MP (winter), 36 ppb at Carbonate Bank and Terrace System of the Sahul Shelf KEF (winter) and 14 ppb at Carbonate Bank and Terrace System of the Van Diemen Rise KEF (summer) which are all below the 100 ppb impact threshold. Cross-sectional transects in the vicinity of the release site indicated that entrained oil concentrations at or greater than the 100 ppb threshold are not predicted to reach depths greater than approximately 20 m (Figure 8-3). Dissolved aromatic hydrocarbons > 50 ppb is predicted to occur at distances up to approximately 100 km from the release location. The worst-case instantaneous dissolved aromatic hydrocarbon concentration in the immediate vicinity of the release was calculated as 1,157 ppb. The worst-case instantaneous dissolved aromatic hydrocarbon concentration for waters surrounding emergent sensitive receptors is predicted at Bathurst Island as 8 ppb. When averaged over all replicate simulations, the highest concentrations of dissolved aromatic hydrocarbons were predicted as 34 ppb in the immediate vicinity of the release. Other notable locations include: 2 ppb at Pinnacles of the Bonaparte Basin KEF (winter), 2 ppb at Flat Top Bank (summer), 2 ppb at Oceanic Shoals MP (winter), <1 ppb at Carbonate Bank and Terrace System of the Sahul Shelf KEF (all seasons) and <1 ppb at Carbonate Bank and Terrace System of the Van Diemen Rise KEF (all seasons) which are all below the 50 ppb impact threshold. Cross-sectional transects in the vicinity of the release site indicated that dissolved aromatic hydrocarbon concentrations at or greater than the 50 ppb threshold are not predicted to reach depths greater than approximately 60 m (Figure 8-4).
Shoreline	No shoreline accumulated > 10 g/m^2 was recorded in any replicate.

Hydrocarbon exposure	Surface release of 500 m^3 MGO
	The highest accumulated concentration on any shoreline, was calculated as 0.6 g/m^2 at Joseph Bonaparte Gulf (NT) (summer) below the 100 g/m^2 impact threshold. Worst case estimates for the total volume of oil on shorelines was calculated at to be <1 m^3 across all seasons.

A)



Depth (m)
0
20
40
60
80
400
300
200
100
0
100
200
Transcect Distance (km)
11.4°S
13.5°S
126.0°E
129
132.0°E
Annualised
Maximum entrained oil concentration
Scenario: Instantaneous release of 500 m3 of MGO
Project: MAW1126J.000 - Inpex MGO Vessel Spill QSRA
Legend
Spill location
Seafloor
Baldwin Bank
The Boxers Area
Maximum entrained oil concentration [ppb]
10 - 99
100 - 499
≥500

B)

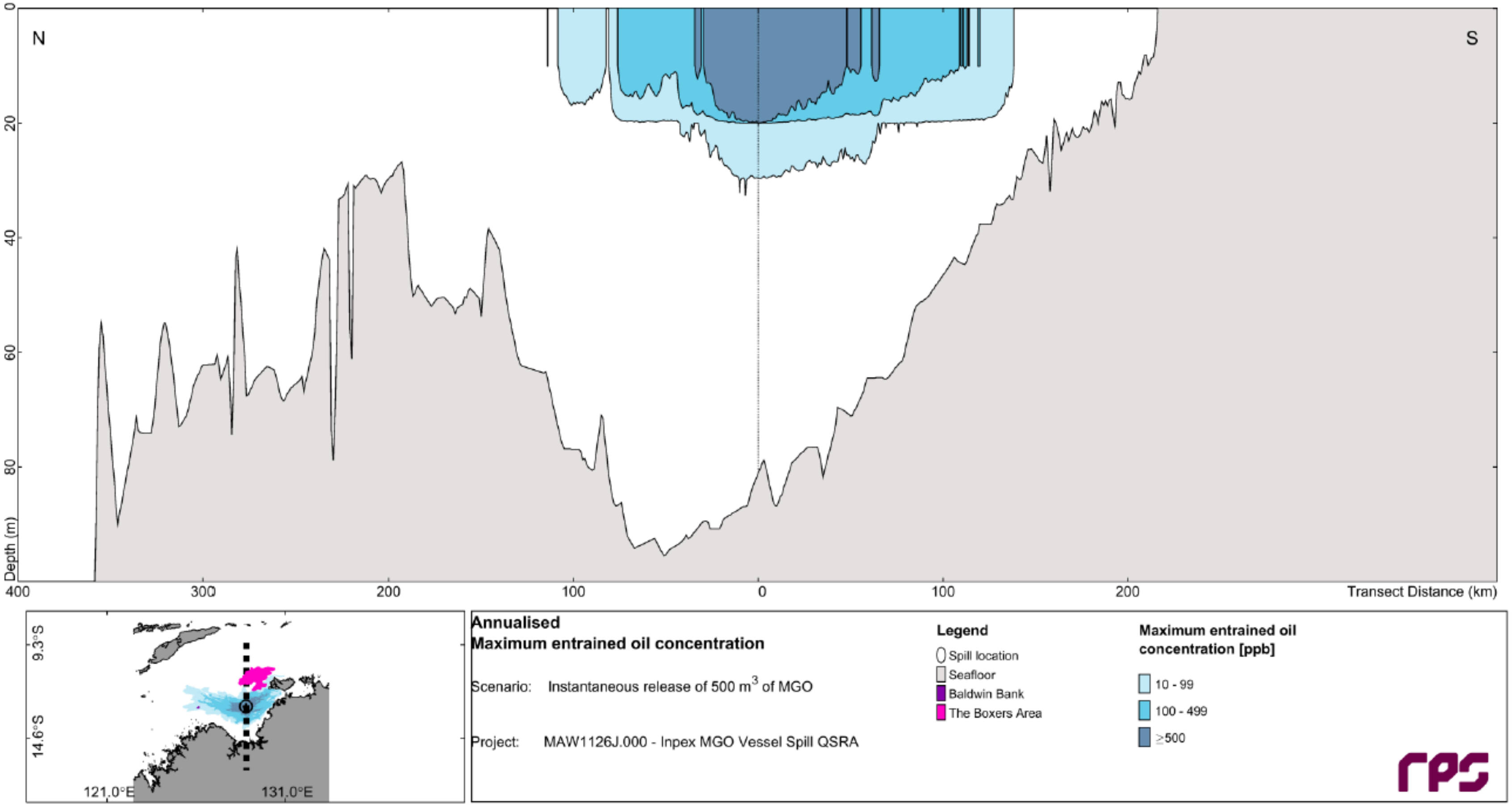
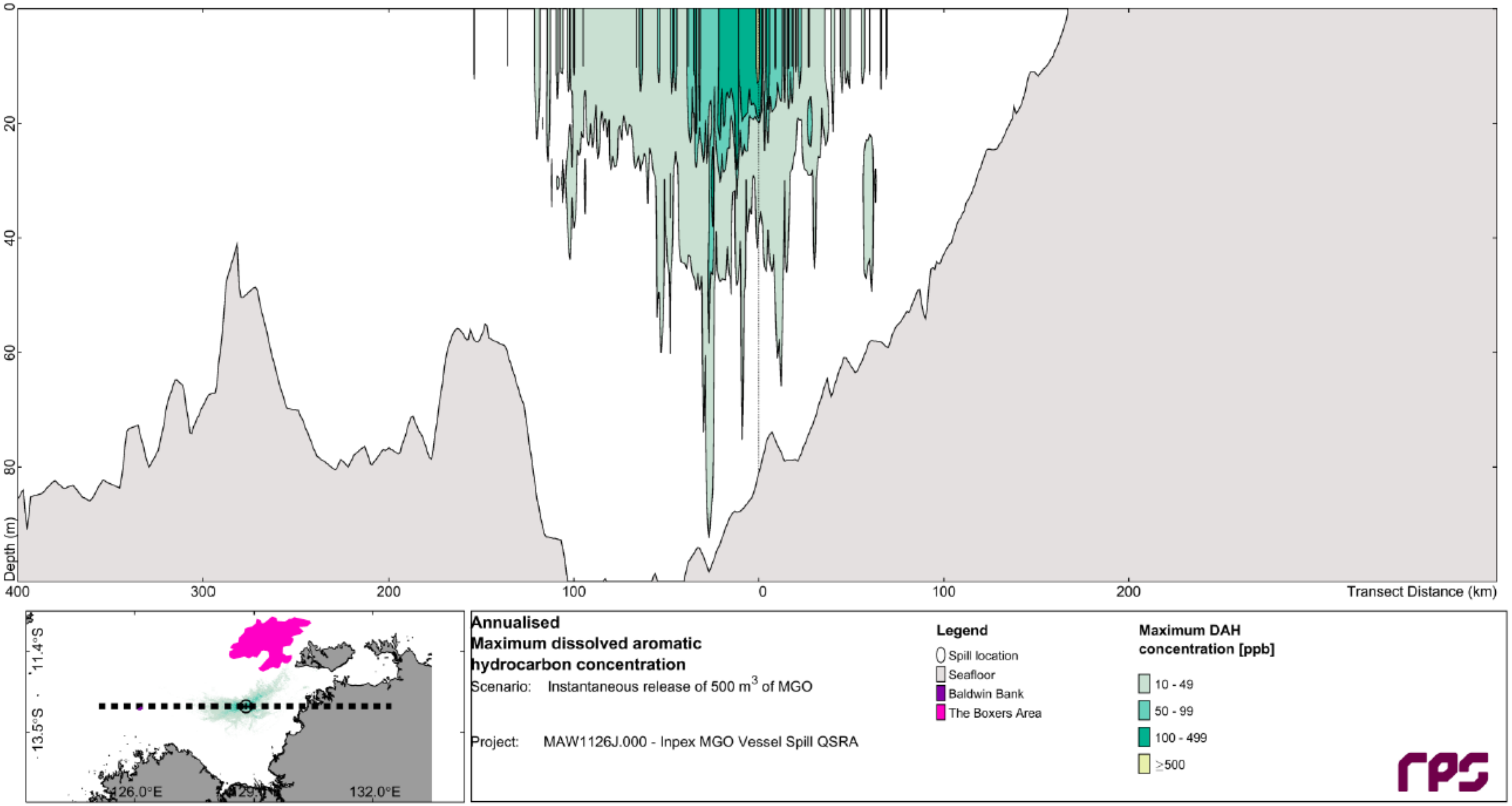


Figure 8-3: A) Annualised east-west cross-section of entrained oil concentrations B) Annualised north-south cross section of entrained oil concentrations (RPS 2022)

A)



Depth (m)
0
20
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300
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Transcript Distance (km)
11.4°S
13.5°S
126.0°E
129
132.0°E
Annualised
Maximum dissolved aromatic hydrocarbon concentration
Scenario: Instantaneous release of 500 m3 of MGO
Project: MAW1126J.000 - Inpex MGO Vessel Spill QSRA
Legend
Spill location
Seafloor
Baldwin Bank
The Boxers Area
Maximum DAH concentration [ppb]
10 - 49
50 - 99
100 - 499
≥500

B)

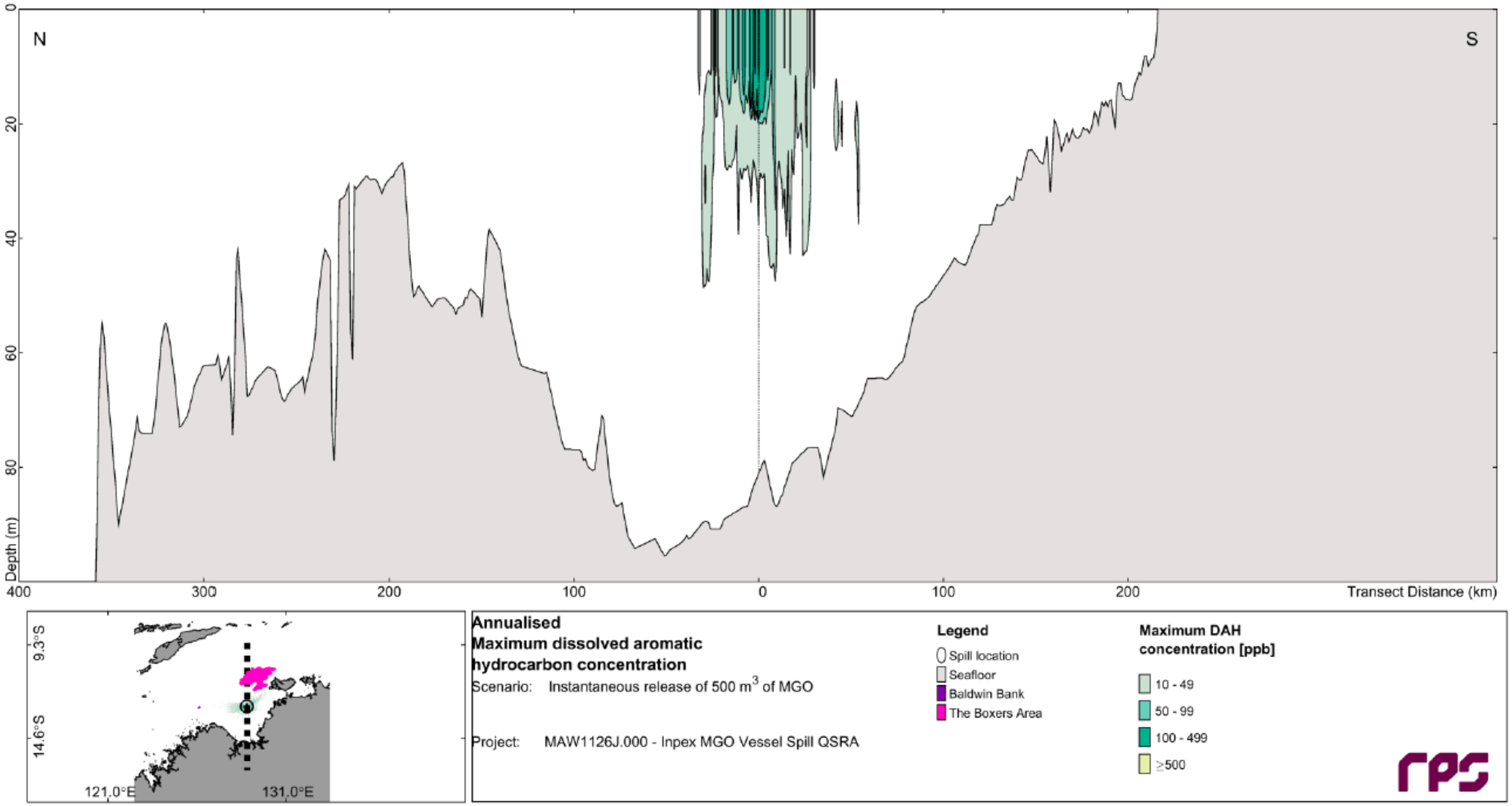

Figure 8-4: A) Annualised east-west cross-section of dissolved aromatic hydrocarbon concentrations B) Annualised north-south cross-section of dissolved aromatic hydrocarbon concentrations (RPS 2022)

8.2.5 Impact and risk evaluation

Table 8-5: Impact and evaluation – Vessel collision resulting in a Group II (MGO) spill

<table>
<tr><th colspan="2">Identify hazards and threats</th></tr>
<tr><td colspan="2">A surface release of Group II hydrocarbons has the potential to result in changes to water quality through exposure to hydrocarbons. The thresholds for impacts associated with surface, entrained/dissolved, and shoreline, hydrocarbon exposures are described in Table 8-2. The results of the predictive modelling for the vessel collision scenario are presented in Table 8-4.</td></tr>
<tr><th>Potential consequence – surface hydrocarbons</th><th>Severity</th></tr>
<tr><td>The values and sensitivities with the potential to be affected by surface hydrocarbon exposure from a surface release due to a vessel collision include:
• commercial, recreational and traditional fisheries (within 88 km from the release location based on 1 g/m² visible sheen threshold in worst-case)
• EPBC Act-listed species (within 78 km from the release location based on 10 g/m² impact threshold)
• planktonic communities (within 78 km from the release location based on 10 g/m² impact threshold).
The values and sensitivities associated with commercial, recreational and traditional fisheries (seafood quality and employment) could be impacted by a visible sheen on the sea surface. A visible sheen is predicted to possibly extend up to 88 km from the release location; however, it would not be a continuous surface expression. Exclusion zones may impede access to fishing areas for a short-to-medium term, and nets and lines could become oiled (ITOPF 2011).
The NPF and several NT-managed fisheries are potentially active in the project area as described in Section 4.9.6. Fisheries whose fishing grounds overlap the project area and EMBA/PEZ may potentially have access limitations in the event of a spill resulting from a vessel collision. Fishing data from the NPF confirmed that most fishing effort in the Joseph Bonaparte Gulf has historically occurred >50 km south-west of the project area. The NT Demersal Fishery confirmed that trawl vessels consistently operate in the project area as well as waters located to the north of the project area throughout the year. A review of historic fishing effort data confirmed the other NT-managed fishery (NT Offshore Net and Line Fishery) (Table 4-4) reported either low or no fishing effort in the project area but may be active in the EMBA/PEZ.</td><td>Minor (E)</td></tr>
</table>

Recreational fishing occurs in the Joseph Bonaparte Gulf with the majority of fishing occurring in estuaries (e.g. barramundi fishing) or in coastal waters. Recreational day-fishing is typically concentrated around the population centres and readily accessible coastal population settlements which are generally at the edge of, or outside of the PEZ, and therefore unlikely to be impacted by this type of spill. Traditional fishing activities are known to occur within the EMBA/PEZ at the Tiwi Islands and along NT coastlines. Any socioeconomic impacts are expected to be localised to within 88 km of the release location and temporary in nature given the expected evaporation and rapid dispersion of Group II hydrocarbons at the sea surface. Therefore, the consequence is considered to be Insignificant (F). Within the EMBA, several marine turtle BIAs are known to occur (Figure 4-6), and the project area overlaps a foraging BIA for green turtles and olive ridley turtles. Flatback turtles and loggerhead turtles are also known to forage in an area approximately 20 km west of the project area at the closest point. Therefore, there is a potential for marine turtles to be exposed to surface hydrocarbons within 78 km of the release location. Turtles may be exposed to hydrocarbons if they surface within the spill, resulting in direct contact with the skin, eyes, and other membranes, as well as the inhalation of vapours or ingestion (Milton et al. 2003). Floating oil is considered to have more of an effect on reptiles than entrained/dissolved oil because reptiles hold their breath underwater and are unlikely to directly ingest dissolved oil (WA DoT 2018). Other aspects of turtle behaviour, including a lack of avoidance behaviour, indiscriminate feeding in convergence zones, and large, pre-dive inhalations, make them vulnerable (Milton et al. 2003; WA DoT 2018). A range of other EPBC-listed marine fauna may also be present within this area albeit on a transient basis (Appendix A). The Indo-pacific humpback dolphin would not be expected to be exposed to surface hydrocarbons as the breeding BIA is located approximately 160 km west of the project area (Figure 4-4) where water depths range from 75 m to 100 m, and the species is mainly found in water less than 20 km from the nearest river mouth, and in water depths of less than 15 m to 20 m (DAWE 2022b). Omura's whale populations may also be present within the project area and EMBA based on vocalisations detected in the Joseph Bonaparte Gulf (McCauley 2009, 2014). BIAs associated with humpback whales and pygmy blue whales are located 410 km and 320 km respectively from the project area and therefore they are also not expected to be exposed to surface hydrocarbons. Whale sharks do not breach the surface as cetaceans do; however, they are known to swim near to the water surface. The foraging area for whale sharks (BIA) is located approximately 300 km west of the project area at its closest point. Therefore, no exposure to surface hydrocarbons is predicted for whale sharks. Based on the limited extent of the surface hydrocarbons (within 78 km where concentrations are > 10 g/m^2, noting that the spill would not represent a continuous surface expression) and the rapid evaporation of volatile components and expected weathering resulting in reduced levels of toxicity, any impacts to EPBC-listed species are expected to be on a local scale, with short-term impacts on a small portion of the population of a protected species (Minor E). Plankton may potentially be exposed to hydrocarbons on the sea surface. However, the majority of impacts would be toxicity related, associated with entrained/dissolved hydrocarbons exposure. Therefore, the impact evaluation for plankton is provided in the subsection below.	
Potential consequence – entrained/dissolved hydrocarbons	Severity

The values and sensitivities with the potential to be affected by dissolved/entrained hydrocarbon exposures are: • historic shipwrecks (within 300 km from the release location) • commercial, recreational and traditional fisheries (within 300 km from the release location) • KEFs and fish communities (within 300 km from the release location) • planktonic communities (within 300 km from the release location) • benthic communities (within 300 km from the release location) • EPBC-listed species including marine mammals, turtles, marine avifauna BIAs (within 300 km from the release location). Exposure to hydrocarbons above impact thresholds was predicted in the upper water column up to 20 m depth for entrained oil and up to 60 m depth for dissolved aromatic hydrocarbons. Two shipwrecks with protection zones under the *Underwater Cultural Heritage Act 2018* are present within the PEZ/EMBA (Section 4.9.4). They are located approximately 130 km and 195 km from the project area at the closest points. Given any release would be at the sea surface, the location of the shipwrecks on the seabed they will not be exposed to surface or entrained hydrocarbons. They may be exposed to dissolved hydrocarbons; however, there are no reports of damage to shipwrecks on the seabed from exposure to in-water hydrocarbons and therefore the consequence is considered to be Insignificant (F). Fishing grounds that overlap the EMBA may potentially be exposed to entrained/dissolved hydrocarbons above impact thresholds. The impact to fish communities from exposure to entrained and dissolved hydrocarbons above threshold values, is primarily associated with toxicity resulting in impacts to seafood quality. The level of effort in fisheries overlapping the project area is generally reported to be low, however for other fishing activities it is unknown. The commercial fisheries that may be active in the EMBA/PEZ are presented in Table 4-4. The species targeted by these fisheries include demersal, shark and invertebrate species. Recreational fishing occurs in the Joseph Bonaparte Gulf with the majority of fishing occurring in estuaries (e.g. barramundi fishing) or in coastal waters of shallow depth. Traditional fishing with the EMBA/PEZ occurs at the Tiwi Islands and NT coastlines and could be affected by impacts to fish and benthic habitats from dissolved/entrained oil. A surface release of MGO is expected to entrain predominantly within the upper water column in the top 20 m (RPS 2022); therefore, exposure is considered to be relatively limited within the water column.	Moderate (D)

Pelagic fish, site attached fish and fish associated with KEFs in the top 20 m of the water column have the potential to be exposed to entrained hydrocarbons above the impact threshold (>100 ppb) within 300 km of the release location. The highest concentrations of entrained oil when averaged over 300 modelled scenarios, was at the immediate vicinity of the release location (4,910 ppb) and the highest concentration received in the waters surrounding a sensitive receptor was 218 ppb at Roche Reefs located 140 km east of the project area. Exposure to all other receptors was below the entrained oil impact threshold of 100 ppb. Dissolved aromatic hydrocarbons above the impact threshold were predicted to extend up to 100 km of the release location within the top 60 m of the water column. The highest concentrations of dissolved aromatic hydrocarbons when averaged over 300 modelled scenarios, was at the immediate vicinity of the release location (1,157 ppb) with concentrations at all other receptor locations below the impact threshold of 50 ppb. Fish associated with KEFs or deeper benthic habitats are less likely to be exposed above impact thresholds in deeper waters. Chronic impacts to juvenile fish and larvae may occur if exposed to entrained/dissolved hydrocarbon plumes potentially resulting in lethal or sub-lethal effects or impairment of cellular functions (WA DoT 2018). Juvenile fish and larvae may experience increased toxicity upon such exposure to plumes, because of the sensitivity of these life stages, with the worst impacts predicted to occur in smaller species (WA DoT 2018). Adult fish exposed to entrained hydrocarbons are likely to metabolise the hydrocarbons and excrete the derivatives, with studies showing that fish have the ability to metabolise petroleum hydrocarbons. These accumulated hydrocarbons are then released from tissues when fish are returned to hydrocarbon free seawater (Reiersen & Fugelli 1987). Given the highly mobile nature of pelagic fish, they are not expected to remain within entrained/dissolved hydrocarbon plumes for extended periods, and limited acute impacts or risks associated with the exposure are expected. Site attached fish, such as reef fish within the EMBA in the top 60 m of the water column, may be exposed above the hydrocarbon exposure thresholds (entrained and dissolved). Therefore, local to medium scale, with short to medium term impacts could occur. As such, the consequence of entrained/dissolved hydrocarbons on fisheries (commercial, recreational and traditional), KEFs, and fish populations is considered to be Moderate (D).	

Planktonic communities may be exposed to entrained/dissolved hydrocarbon plumes, especially in high energy seas where the vertical mixing of oil through the water column would be enhanced. The effects of oil on plankton have been well studied in controlled laboratory and field situations. The different life stages of a species often show widely different tolerances and reactions to oil pollution. Usually, eggs, larval and juvenile stages will be more susceptible than adults (Harrison 1999). Post spill studies on plankton populations are few, but those that have been conducted typically show either no effects, or temporary minor effects (Kunhold 1978). The lack of observed effects may be accounted for by the fact that many marine species produce very large numbers of eggs, and therefore larvae, to overcome natural losses (such as through predation by other animals; adverse hydrographical and climatic conditions; or failure to find a suitable habitat and adequate food). A possible exception to this would be if a shallow entrained/dissolved hydrocarbon plume were to intercept a mass, synchronous spawning event. Recently spawned gametes and larvae would be particularly vulnerable to oil spill effects, since they are generally positively buoyant and would also be exposed to surface spills. Hook & Osborn (2012) reported that typically, phytoplankton are not sensitive to the impacts of oil. Although phytoplankton are not sensitive to oil, they do accumulate it rapidly because of their small size and high surface area to volume ratio and can pass oil onto the animals that consume them (Wolfe et al. 1998a, 1998b). This is also applicable to zooplankton, that are reported to accumulate oil via the ingestion of phytoplankton. However, consumption of zooplankton by fish does not appear to be an efficient means of trophic transfer, perhaps because of the metabolism of oil constituents (Wolfe et al. 2001). Under most circumstances, impacts to plankton at the sea surface is expected to be localised, with short term impacts. Therefore, the consequence is considered to be Insignificant (F). Benthic communities in the EMBA, including benthic primary producers, such as coral reefs, seagrass and mangroves could be exposed to entrained oil above impact thresholds (down to 20 m depth) and dissolved aromatic hydrocarbons (down to 60 m depth) which could result in a number of lethal or sub-lethal effects on these values and sensitivities. Shallow water communities are generally at greater risk of exposure than deep water communities (NRC 1985; WA DoT 2018). Exposure of shallow subtidal corals to entrained and dissolved hydrocarbons has the potential to result in lethal or sublethal toxic effects, resulting in acute impacts or death at moderate to high exposure thresholds (Loya & Rinkevich 1980; Shigenaka 2001; WA DoT 2018), including increased mucus production, decreased growth rates, changes in feeding behaviours and expulsion of zooxanthellae (Peters et al. 1981; Knap et al. 1985). Adult coral colonies, injured by oil, may also be more susceptible to colonisation and overgrowth by algae or to epidemic diseases (Jackson et al. 1989). A study by Nordborg et al. (2018) reported that the presence of ultraviolet radiation increases the hazard posed by dissolved hydrocarbons to tropical, shallow-water coral reefs due to phototoxicity. PAH phototoxicity occurs through the formation of radical oxygen species and/or transformation of PAHs into more toxic products. Therefore, co-exposure to ultraviolet radiation may considerably enhance negative impacts and the risks to coral larvae may be substantially underestimated in shallow-water tropical reef systems (Nordborg et al, 2018). Lethal and sublethal effects of entrained and dissolved oils have been reported for coral gametes at much lesser concentrations than predicted for adult colonies (Heyward et al. 1994; Harrison 1999; Epstein et al. 2000). Goodbody-Gringley et al. (2013) found that exposure of coral larvae to oil and dispersants negatively impacted coral settlement and survival, thereby affecting reef resilience. Roche Reefs and the southern coastline of the Bathurst Island, within the EMBA, are predicted to be exposed to entrained oil at maximum average concentrations of 218 ppb and 4 ppb respectively. The highest worst-case concentration of dissolved aromatic hydrocarbons for all locations during all seasons was predicted as 8 ppb at Bathurst Island, with the maximum average predicted as <1 ppb. The potential consequence for coral reefs is considered to be a local scale event with short-term impact (Minor E).	

Within the PEZ seagrasses are reported at the Vernon Islands and on the northern coastlines of Bathurst and Melville islands. The furthest extent of the EMBA does not overlap either of these locations and therefore exposure to entrained/dissolved hydrocarbons is not predicted. Similarly, although extensive mangrove communities are located along the NT coastline and at the Tiwi and Vernon islands, these locations do not overlap the EMBA. Therefore, exposed to entrained/dissolved hydrocarbons is not predicted. EPBC-listed species including marine mammals, marine reptiles and marine avifauna could also be impacted through entrained and dissolved hydrocarbon exposure, primarily through ingestion during foraging activities. The EMBA overlaps several BIAs for marine turtles (foraging and internesting) that may be exposed to dissolved/entrained hydrocarbons above impact thresholds (Section 4.7.4). There are no BIAs that relate to marine mammals or avifauna (including Ramsar or nationally important wetlands) within the EMBA (Appendix A). Any entrained/dissolved plume would be spatially and temporally limited in extent and as such, impacts to EPBC-listed species are expected to be on a local scale, with short-term impacts on a small portion of the population of a protected species, with the consequence considered to be Minor (E). In summary, the potential extent of entrained/dissolved hydrocarbons with concentrations above impact thresholds may result in localised, short-term exposure to the identified values and sensitivities. There would likely also be cumulative impacts as a result of interactions between surface and entrained/dissolved hydrocarbon impacts on the food web and through bioaccumulation up the food chain. On this basis, the potential consequence associated with entrained/dissolved plumes from the vessel collision spill scenario is considered to be Moderate (D).	
Potential consequence – shoreline hydrocarbons	Severity
No hydrocarbons were predicted to contact shorelines >10 g/m^2 and the highest accumulated concentration on any shoreline was calculated as 0.6 g/m^2 at Joseph Bonaparte Gulf (NT). As these concentrations are below the impact threshold (100 g/m^2) and given the worst-case estimates for the total volume of oil on shorelines was calculated at to be <1 m^3 across all seasons, the consequence is considered to be Insignificant (F). No direct impact to Aboriginal communities, cultural sites and land and sea country is anticipated from the activities covered by this EP. Worst-case predicted modelling estimated <1 m^3 of oil on shorelines during all seasons. Therefore any impacts associated with disruption and loss of access to cultural sites following a spill would be minor (Insignificant F).	Insignificant (F)
Identify existing design safeguards/controls	
• Vessels fitted with lights, signals, AIS transponders and navigation equipment as required by the *Navigation Act 2012*. • Safety zone maintained around the MODU in accordance with the OPGGS Act. • Ongoing stakeholder consultation and notifications made to relevant stakeholders as per Section 9.8.3 and Table 9-7.	
Propose additional safeguards/control measures (ALARP evaluation)	

Hierarchy of control	Control measure	Used?	Justification
Elimination	Eliminate vessels.	No	Vessels are the only form of transport that can undertake the pre-drill site survey and maintain ongoing logistical support to the MODU in a fashion that is practical and cost efficient.
Substitution	Use only Group II (MGO) fuel oils, as opposed to Group IV (IFO 180 / HFO 380) fuel oils.	Yes	Limiting vessel selection to only vessels which use Group II fuel oils may require more detailed planning to avoid delays in sourcing appropriate available vessels. However, in the event of a vessel collision, MGO fuel is less persistent than alternative heavier fuels such as HFO and IFO. Therefore, this control has been adopted.
Engineering	Drilling support vessels used will have dynamic positioning equipment.	Yes	The use of DP vessels to support the MODU and drilling activities will reduce the potential for vessel collisions. Supply vessels will also be equipped with a backup DP system as a failsafe (DP2 or greater).
	Pre-drill site survey vessels will have dynamic positioning equipment.	No	The survey vessels may not have DP capability; however, as the survey will occur several months before the MODU arrives there is no credible vessel collision scenario within the project area.
Procedures and administration	Implement INPEX *Browse Regional OPEP*.	Yes	The INPEX *Browse Regional OPEP* defines the processes that will be used to maintain oil spill preparedness and implement effective response measures, in the event of a spill. For this EP, an assessment of the vessel collision WCSS against the *Browse Regional OPEP* Basis of Design (BOD) has been conducted, as is required under BROPEP BOD/FCA, Figure 8-1 – management of change process. The vessel collision WCSS from this EP have been compared against the *Browse Regional OPEP* BOD response planning thresholds, (BROPEP BOD/FCA Table 4-5). The vessel collision data presented in Table 8-4 of this EP, are lower than the response planning thresholds, as presented in the BROPEP BOD/FCA Table 4-5.

			Therefore, the vessel collision WCSS assessed under this EP is less than the vessel collision WCSS defined in the *Browse Regional OPEP* BOD. As such, no revision to the spill preparedness/response arrangements defined in the *Browse Regional OPEP* are required.
Identify the likelihood			
Likelihood	Reported industry statistics indicate vessel failures are considered rare with 37 collisions reported out of a total of 1200 marine incidents in Australian waters between 2005 and 2012 (most recent data) (ATSB 2013). A ship collision risk assessment was undertaken to support the INPEX Ichthys Project. The study determined collision frequencies and impact energies for passing (third party) vessels, infield vessels and offloading tankers. The annual frequency of a collision with a passing vessel – i.e. one not within the control of INPEX – imparting at least 150 megajoules (sufficient impact energy) is 3.5×10^{-7}, or once every 2.9 million years. On this basis and given the controls that have been identified to minimise the potential for vessel collision and subsequent loss of containment, the likelihood of the consequence occurring is considered Highly Unlikely (5).		
Residual risk	Based on the worst-case consequence for all applicable hydrocarbon exposure mechanisms (surface, entrained and dissolved) Moderate (D) and a likelihood of Highly Unlikely (5) the residual risk is ranked as Moderate (8).		
Residual risk summary			
Consequence	Likelihood	Residual risk	
Moderate (D)	Highly Unlikely (5)	Moderate (8)	
Assess residual risk acceptability			
Legislative requirements The activities and proposed management measures are compliant with industry standards and with relevant Australian legislation, specifically concerning navigational safety requirements, including AMSA *Marine Orders – Part 30: Prevention of Collisions, Issue 8* (Order No. 5 of 2009). While a MODU is on location, a safety zone with a 500 m radius will be maintained around it to control activities and reduce the risk of marine collisions, as required under the OPGGS Act Section 617. Stakeholder consultation			

Stakeholders have been engaged throughout the development of the EP, and on an ongoing basis for the development of the INPEX *Browse Regional OPEP* for a range of spill scenarios. Where relevant, the controls in place have been developed in consultation with relevant stakeholders (e.g. WA DoT and AMSA refer to Appendix B). The controls in place are considered to manage risks associated with a vessel collision to ALARP. During stakeholder consultation AMSA requested that all relevant notifications be adopted as controls in this EP and therefore, these requirements have been adopted. First strike capabilities with respect to a vessel spill scenario has been discussed with AMSA and the INPEX *Browse Regional OPEP* updated to reflect the outcome of the engagement. All vessels are required to comply with the *Navigation Act 2012*, and associated Marine Orders, which are consistent with the COLREGS requirements.

AMP management objectives and values

The prevention of vessel collisions and oil spill response preparedness and response activities (refer INPEX *Browse Regional OPEP*) reduces the risk of a spill occurring and hydrocarbons reaching AMPs at levels that could impact significantly upon species and communities, with impacts to MP values expected to be highly unlikely.

Conservation management plans / threat abatement plans

Several conservation management plans (refer Appendix A) identify oil spills as a key threatening process, through both direct/acute impacts of oil, as well as indirect impacts through habitat degradation (which is a potential consequence of an oil spill). The prevention of vessel collisions and reducing impacts to the marine environment through oil spill response preparedness and response (refer INPEX *Browse Regional OPEP*), demonstrates alignment with the various conservation management plans.

ALARP summary

Given the level of environmental risk is assessed as Moderate, a detailed ALARP evaluation was undertaken to determine what additional control measures could be implemented to reduce the level of impacts and risks. No additional controls, beyond those identified during the detailed ALARP assessment can reasonably be implemented to further reduce the risk of impact.

Acceptability summary

Based on the above assessment, the proposed controls are expected to effectively reduce the risk of impacts to acceptable levels because:

- the activity demonstrates compliance with legislative requirements/industry standards
- the activity takes into account stakeholder feedback
- the activity is managed in a manner that is consistent with AMP management objectives for ecologically sustainable use and the protection of MP values
- the activity is managed in a manner that is consistent with the intent of conservation management documents
- the activity does not compromise the relevant principles of ESD
- the predicted level of impact does not exceed the defined acceptable level in that the environmental risk has been assessed as “moderate”, the consequence does not exceed “C – Significant” and the risk has been reduced to ALARP.

Environmental performance outcomes	Environmental performance standards	Measurement criteria
No incidents of loss of hydrocarbons to the marine environment as a result of a vessel collision.	MODU/vessels will be fitted with lights, signals, AIS transponders and navigation and communications equipment, as required by the *Navigation Act 2012.*	Records confirm that required navigation equipment is fitted to MODU/vessels to ensure compliance with the *Navigation Act 2012.*
	A 500 m safety zone, issued by NOPSEMA, will be maintained around the MODU.	Gazette notice of safety zone. Records of reporting of unauthorised entry into the safety zone.
	Only vessels using Group II/MGO/marine diesel will undertake activities described in this EP.	Vessel selection records.
	Drilling support vessels used will have dynamic positioning equipment and have a backup DP system as a failsafe.	Records confirm that vessel have DP equipment and fail-safe system in place.
Refer to the INPEX *Browse Regional OPEP* for environmental performance outcomes, standards and measurement criteria related to mitigative controls.		

8.3 Oil spill response and capability

INPEX has developed a regional OPEP for the Browse region which applies to the activity described in this EP. The INPEX *Browse Regional OPEP* (BROPEP) consists of a suite of documents as shown in Figure 8-5 and described in Table 8-6. The BROPEP covers all INPEX Australia's exploration and production activities in the Browse region.

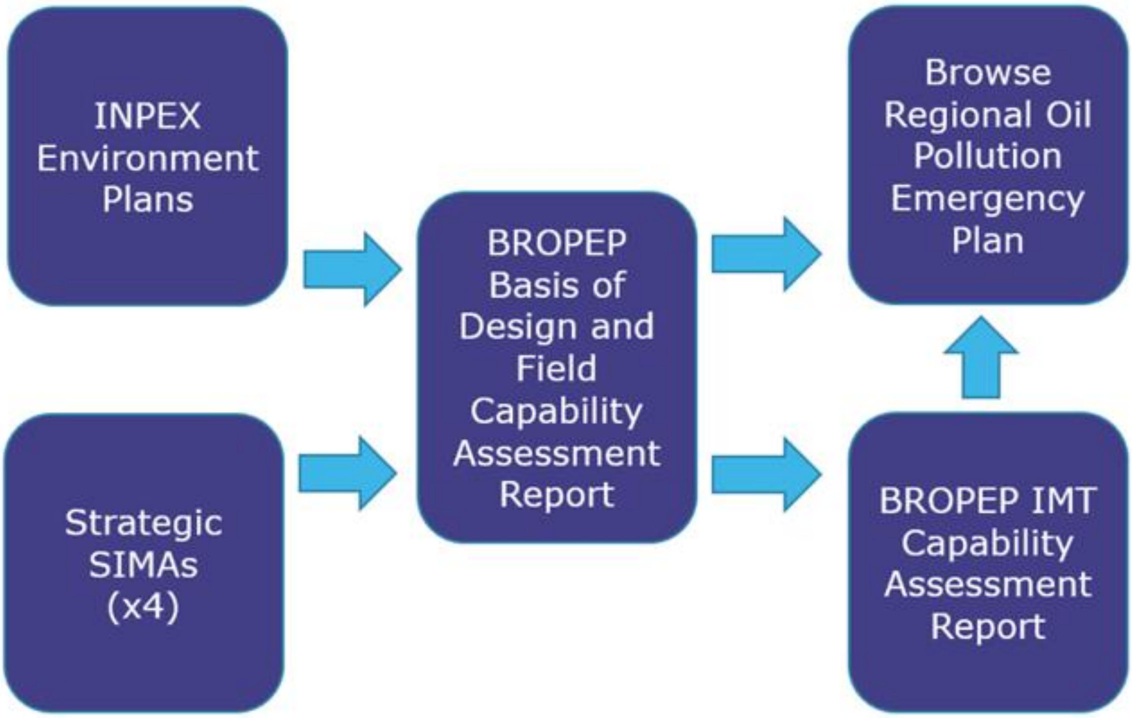

Figure 8-5: Browse Regional OPEP document structure

Table 8-6: Browse Regional OPEP documentation overview

Document title	Document number	Purpose
INPEX Environment Plans	N/A	All INPEX EPs contain a detailed activity description and activity-specific oil spill scenarios. Specifically, INPEX EPs include the following: • a description of the activity-specific spill scenarios (including the potential release rates, volumes, locations, hydrocarbon types, etc.) • activity-specific oil spill modelling (used to inform environmental risk assessments) • an assessment of oil spills risks/impacts on environmental values and sensitivities • evaluations of controls to prevent oil pollution from the specific activity.

Document title	Document number	Purpose
		• The WCSS from all INPEX EPs are included in the INPEX Australia - Browse Regional Oil Pollution Emergency Plan - Basis of Design and Field Capability Assessment.
Strategic Spill Impact Mitigation Assessments (SIMAs): • Condensate spill – instantaneous surface release • Marine gas oil/diesel spill – instantaneous surface release • Intermediate fuel oil/heavy fuel oil (HFO) spill – instantaneous surface release • Condensate/gas well or pipeline blowout – long duration subsea release.	X060-AH-LIS-60031 X060-AH-LIS-60032 X060-AH-LIS-60033 X060-AH-LIS-60034	The four INPEX Strategic SIMA documents are pre-spill planning tools. These are used to facilitate response option selection by identifying and comparing the potential effectiveness and impacts of the various oil spill response strategies on a range of environmental values and sensitivities. The Strategic SIMAs utilise a semi-quantitative process to evaluate the impact mitigation potential of each response strategy. This method provides a transparent decision-making process for determining which response strategies are most likely to be effective at minimising oil spill impacts. The SIMA process includes environmental considerations as well as a range of shared values such as ecological, socio-economic and cultural aspects.
INPEX Australia - Browse Regional Oil Pollution Emergency Plan - Basis of Design and Field Capability Assessment (BROPEP BOD/FCA)	X060-AH-REP-70016	The BROPEP BOD/FCA presents an overview of all of INPEX Australia's offshore activities and associated oil spill risks. It includes an evaluation of modelling outcomes from a series of selected WCSSs and presents an oil spill response field capability analysis. The BROPEP BOD/FCA includes the EPOs and EPSs relevant to the preparedness and environmental risk assessment of field response capability and arrangements and the broader BROPEP implementation strategy (i.e. reviews, management of change process, etc.).
INPEX Australia - Browse Regional Oil Pollution Emergency Plan – Incident Management Team Capability Assessment (BROPEP IMTCA)	X060-AH-REP-70015	The BROPEP IMTCA utilises the field capability assessments as inputs to evaluate the size and structure of the INPEX incident management team (IMT) necessary to mobilise and maintain the field capability. The BROPEP IMTCA outlines the EPOs and EPSs relevant to INPEX IMT capability and arrangements.

Document title	Document number	Purpose
INPEX Australia - Browse Regional Oil Pollution Emergency Plan (BROPEP)	X060-AH-PLN-70009	The BROPEP is the tool which will be utilised by INPEX IMT during any impending/actual oil spill event. This document assists/guides the IMT through the process of notifications, gaining/maintaining situational awareness, response strategy evaluation and incident action plan development, and mobilisation of field response capabilities. The BROPEP outlines the EPOs and EPSs related to the implementation of response strategies.

An assessment of the WCSS defined in this EP has been conducted against the INPEX *Browse Regional OPEP* BOD, within the ALARP evaluations of the WCSS (refer to Table 8-5).

The outcome of this assessment was that no change is required to the spill preparedness/response arrangements defined in the INPEX *Browse Regional OPEP* for the proposed activities covered under this EP.

8.4 Source control capability and arrangements

As described in Section 8, a well blowout from the activity is not a credible spill scenario. However, there may be a possible risk of shallow gas or other well control events and therefore source control arrangements available and in place to support the activity are described below.

INPEX's existing source control capability and arrangements do not specifically include a detailed response to a loss of well control event in the Bonaparte Basin in relation to the activity described in this EP. This is due to the absence of a hydrocarbon reservoir and therefore no well-kill modelling can be undertaken to form the basis of the assessment. However, the INPEX *Australia Source Control Capability and Arrangements Report* (D021-AH-REP-70000), provides a detailed assessment of the source control arrangements and capability maintained by INPEX more generally, to respond to a well blowout in the Browse Basin. These capabilities and arrangements can be suitably applied to the well locations in the Bonaparte Basin, as response times have been calculated to fall within those stated for Browse Basin wells. Details of those arrangements and response times for CCS exploration wells will be presented in a source control emergency response plan (SCERP), commensurate with the activity risk presented.

Source control capability and arrangements required to conduct a successful well-kill for exploration and production wells in the Browse Basin are detailed in INPEX's *Source Control Capability and Arrangements Report*. This document also provides the environmental ALARP and acceptability statements and implementation strategy, to ensure the ongoing demonstration of source control capability and arrangements.

An overview of source control documentation is provided in Table 8-7 and the purpose of the *Source Control Capability and Arrangements Report*, which is also applicable to this activity, is to:

- Present a summary of INPEX Australia's exploration and production drilling, and operations activities in the Browse Basin.

- Present a summary of the worst credible well blowout scenarios (WCWBS) which could occur from exploration/production drilling activities and from the operation of production wells.
- Provide a detailed source control capability analysis, for the selected WCWBS.
- Define EPOs and EPSs for the source control capabilities and arrangements (preparedness), and the risk assessment of the implementation of the source control capability.
- Provide an implementation strategy for this source control arrangements and risk assessment report, including management of change processes and compliance reporting requirements.
- Ensure INPEX's description of source control capability and arrangements as related to EPs is appropriately described, in accordance with the requirements of Section 3.1 of the NOPSEMA Source control planning and procedures Information Paper (NOPSEMA 2021c).

Table 8-7: Source control documentation overview

Document title	Document number	Purpose
INPEX Environment Plans	N/A	All INPEX EPs contain a detailed activity description and activity-specific oil spill scenarios. Specifically, INPEX EPs include the following: • a description of the activity-specific spill scenarios (including the potential well blowout release rates, volumes, locations, hydrocarbon types, etc.) • activity-specific oil spill modelling (used to inform environmental risk assessments) • an assessment of oil spills risks/impacts on environmental values and sensitivities • evaluations of controls to prevent well blowouts.
Well Operations Management Plan	N/A	The WOMP describes the well activities and associated management systems for the exploration wells within the project area.
INPEX Blowout Contingency Plan (BOCP)	D020-AD-PLN-10040	The purpose of the BOCP is to provide a plan for regaining control of a blowout, not blowout prevention. The BOCP specifies how INPEX will respond to a well control event where primary well control has been lost with potential, or real, complications with secondary well control, extending to the worst-case scenario of an uncontrolled blowout with significant hydrocarbon release to the environment and loss of assets.

Document title	Document number	Purpose
Source Control Emergency Response Plan (SCERP)	D020-AD-PRC-10036	The SCERP is designed as a subset of the BOCP, to support response preparations to well control emergencies and establish a process for responding to safely managing them using a standard uniform approach. It includes the equipment and procedures to address a range of well control scenarios necessitating immediate mobilisation of intervention equipment and personnel.
INPEX Australia - Browse Regional Oil Pollution Emergency Plan (BROPEP) suite of documents, including: • BROPEP BOD & FCA • BROPEP IMTCA	X060-AH-REP-70016 X060-AH-REP-70015 X060-AH-PLN-70009	The BROPEP BOD & FCA report evaluates the oil spill field response capability required for all INPEX Australia's offshore activities and associated oil spill risks. The BROPEP IMTCA report defines the required IMT capability needed to implement the field oil spill response. The BROPEP is the response document, used by the IMT, to activate and implement oil spill response capabilities during a spill scenario.

9 ENVIRONMENTAL MANAGEMENT IMPLEMENTATION STRATEGY

This section provides a description of the INPEX BMS which captures the HSE requirements to manage HSE risks and meet legislative and corporate obligations, as applicable to the implementation of this EP and its associated performance outcomes and standards.

9.1 Overview

The BMS is a comprehensive, integrated system that includes standards and procedures necessary for the management of HSE risks. Activities to manage HSE risks are planned, implemented, verified and reviewed under an iterative “plan, do, check, act” (PDCA) cycle. The PDCA cycle enables INPEX to ensure that processes are adequately resourced and managed and that opportunities for improvement are determined and acted on.

INPEX HSE requirements are designed to meet the in-principle expectation of several standards, international management frameworks, guidelines and legislation. Of particular relevance to this EP are the following:

- Commonwealth of Australia, OPGGS (Environment) Regulations 2009
- NOPSEMA Environment plan content requirements (NOPSEMA 2020e)
- International Association of Oil and Gas Producers (IOGP) 510 Operating Management System Framework for controlling risk and delivering high performance in the oil and gas industry
- IOGP 511 Operating Management System in practice
- International Standards Organisation (ISO) 9001 Quality Management Systems
- ISO 14001 Environmental Management Systems.

The components of the BMS relevant to HSE are grouped into 13 external elements (Figure 9-1). These elements must be managed and implemented properly in order to achieve the desired HSE performance and reflect a PDCA cycle, which is applied to every aspect of the 13 elements.

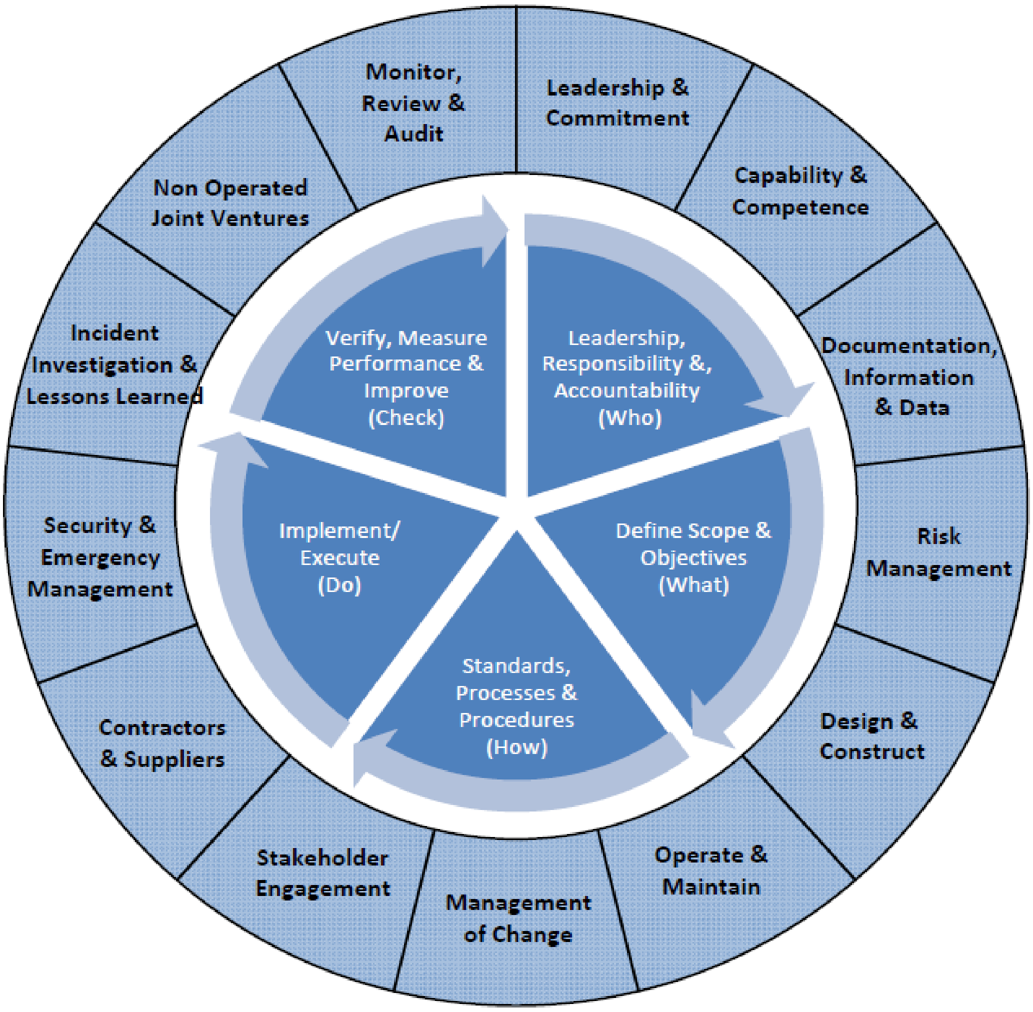

Figure 9-1: INPEX BMS: HSE requirements

9.2 Leadership and commitment

INPEX environmental performance is achieved through strong visible leadership, commitment and accountability at all levels of the organisation. Leadership includes defining performance targets and providing structures and resources to meet them. Achieving high levels of HSE performance is defined within the highest levels of management system documents (policies) and is cascaded through subsidiary documents.

The INPEX Environmental Policy (as amended from time to time) (Figure 9-2) solidifies this commitment and states the minimum expectations for environmental performance. The policy applies to all INPEX controlled activities in Australia. All personnel, including contractors, are required to comply with the policy.

The policy (as amended) is available on the INPEX intranet and displayed at all INPEX workplaces including the MODU and all contractor vessels in the project area. It is communicated to personnel involved in the activities, including contractors, through inductions.

Environmental Policy

Objective

INPEX is a worldwide oil and gas exploration, development and production company committed to conducting each of its activities in a manner that is environmentally responsible.

Our objective is to develop an environment culture that is recognised as amongst "best in industry" that will exceed the performance expectations of our stakeholders.

We recognise our responsibility to adhere to the principles of sustainable development and we acknowledge that we owe a duty of care to both the natural environment and the communities in which we operate.

Strategy

To accomplish this, INPEX will:

- comply with applicable laws and regulations, environmental plans and commitments and apply appropriate INPEX standards
- maintain a culture where people are empowered to intervene to prevent environmental harm
- set, measure and review environmental performance objectives and targets and ensure appropriate management of change processes are followed
- ensure our personnel have the necessary awareness, training, knowledge, resources and support, to meet environmental objectives and targets
- identify, manage and review environmental hazards and risks associated with our current and future business activities and manage these to levels that are 'as low as reasonably practicable' (ALARP)
- implement, maintain and regularly test control measures associated with major environmental events
- maintain and regularly test emergency management processes and procedures, including with industry and government emergency response partners
- engage with and communicate openly on environmental issues with internal and external stakeholders
- provide clearly defined environmental performance expectations for our contractors and suppliers, and work collaboratively with them to attain these
- endeavour to prevent pollution and seek continual improvement with respect to emissions, discharges, wastes, energy efficiency and resource consumption
- actively promote the reduction of greenhouse gas emissions across our operations in a safe, technically and commercially viable manner
- endeavour to protect biodiversity and to contribute to increased understanding of our natural environment
- drive continual improvement in environmental performance through monitoring, auditing and reviews.

Application

This policy applies to all INPEX controlled activities in Australia and related project locations. It will be displayed at all company workplaces and on the company's intranet and it will be reviewed regularly.

Hitoshi Okawa
President Director, Australia

Rev: 3
April 2019

Figure 9-2: INPEX environmental policy

9.3 Capability and competence

INPEX appoints and maintains competent personnel to manage environmental risks and provide assurance that the INPEX Environmental Policy, objectives and performance expectations will be achieved. This applies to individual competencies established in position descriptions and competency plans that set expectations, track progress and monitor results. It also applies to the overall capability of the organisation through well-defined organisational structures and provision of resources.

9.3.1 Organisation

Figure 9-3 and Figure 9-4 illustrate the organisational structure for onshore and offshore roles for both the pre-drill site survey and the exploration drilling activity respectively. During the pre-drill site survey, the drilling superintendent will ensure the implementation of this EP with support from the survey manager and offshore resources, namely the vessel master and party chief.

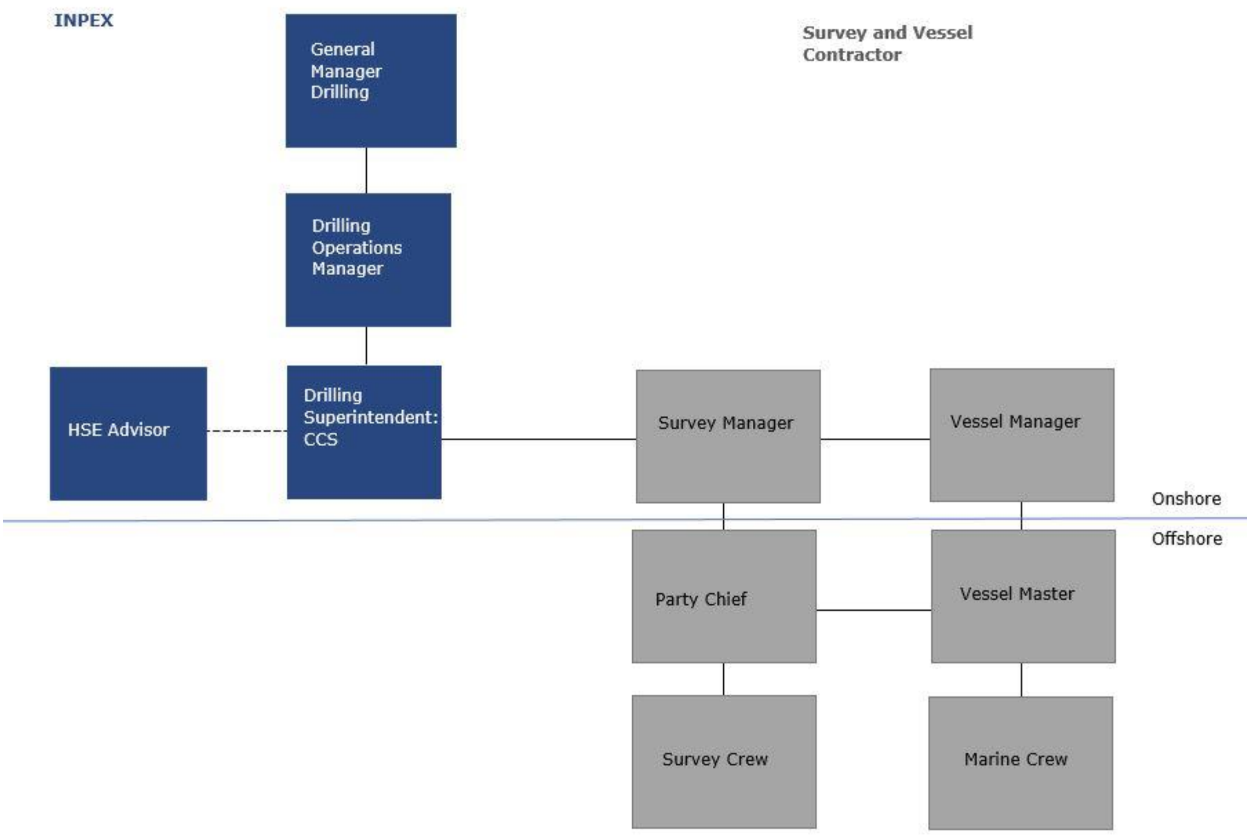

Figure 9-3: Pre-drill site survey organisational structure

Work activities for the exploration drilling will be conducted by the drilling contractor and service contractors, under the direction of the INPEX drilling supervisor via written work instructions and work programs.

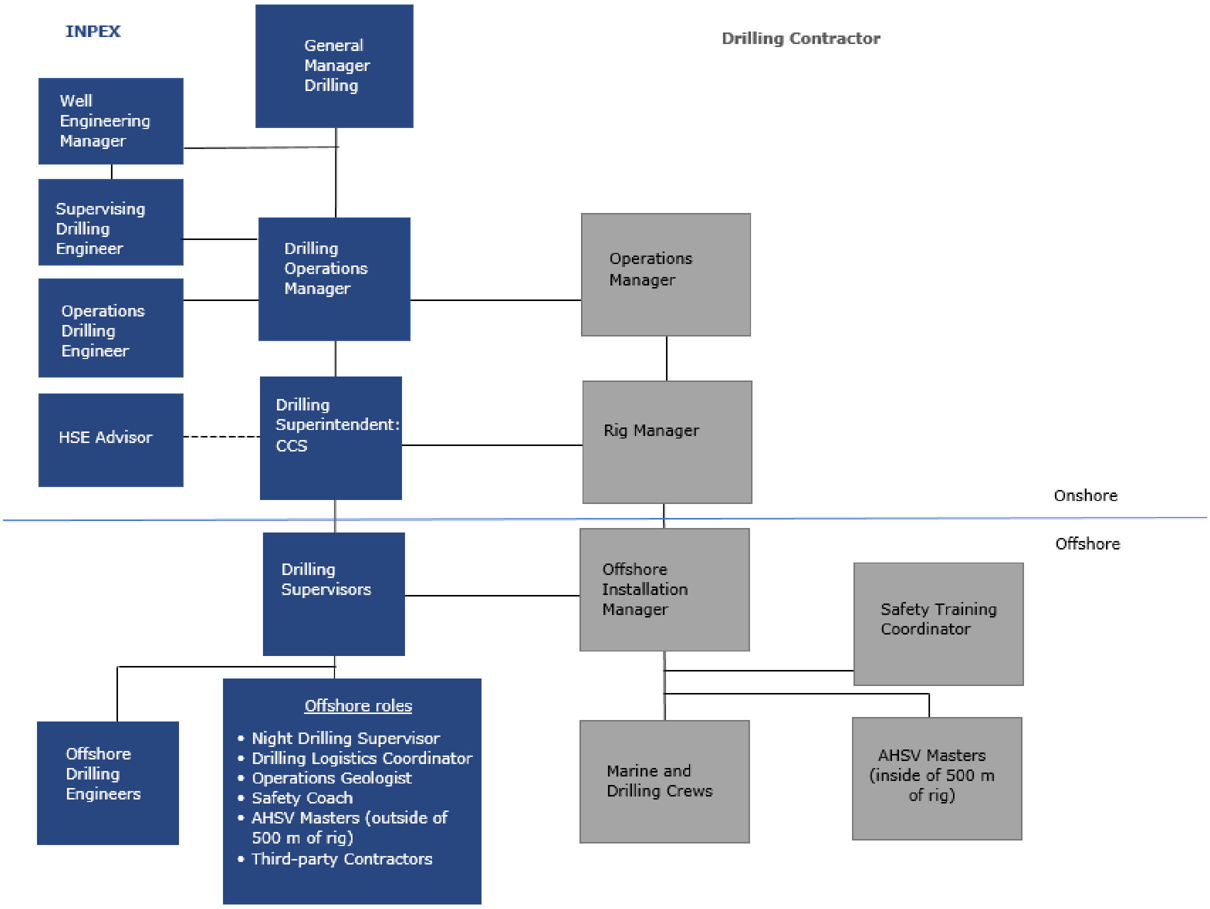

Figure 9-4: Exploration drilling organisational structure

9.3.2 Roles and responsibilities

INPEX has established and implements standards, procedures, and systems to build and maintain a trained and competent workforce capable of fulfilling its assigned roles and responsibilities, as well as meeting its legislative and regulatory requirements. The selection process for the key INPEX personnel identified in Table 9-1 includes consideration of their previous work experience and recognised qualifications when compared with the INPEX minimum competency standards. Key personnel are provided with a position description to formalise their role and define their responsibilities.

The key roles in Table 9-1 are responsible for collecting and maintaining the required evidence and monitoring data as specified in the environmental performance standards detailed in sections 7, 8 and 9 of this EP. Additional roles and responsibilities related to the implementation of HSE requirements are also listed in Table 9-1.

Prior to mobilisation of site survey and drilling personnel (MODU and vessel), those in key roles (Table 9-1) will be informed of their respective responsibilities in relation to this EP. This information will be disseminated by INPEX (e.g. through workshops, one-on-one sessions or by email) to ensure EP/INPEX *Browse Regional OPEP* awareness and that appropriate competencies and training requirements are met.

INPEX conducts training needs analysis for each of the key roles listed in Table 9-1 to define minimum training requirements. The analysis is used to develop training plans which document, schedule, and record completion of specific HSE training for individuals.

Table 9-1: Key personnel and support roles and responsibilities

Key role	Responsibilities
INPEX General Manager Drilling (Onshore)	Ensures overall compliance with the INPEX BMS HSE requirements including environmental performance outcomes and standards.
INPEX Drilling Operations Manager (Onshore)	Ensures relevant INPEX BMS HSE requirements, including environmental performance outcomes and standards are communicated to INPEX Drilling contractors. Ensures the INPEX Drilling Superintendent: CCS is provided with the resources required to ensure environmental performance outcomes and standards are met and maintained.
INPEX Drilling Superintendent: CCS (Onshore)	Ensures activities are undertaken in accordance with this EP. Ensures any changes to the activity that may affect the performance outcomes and environmental management procedures detailed in this EP are communicated to the INPEX HSE team. Ensures vessel masters are provided with the resources required to ensure that the commitments in this EP are undertaken. Ensures the INPEX Drilling Supervisor is provided with the resources required to ensure that the commitments in this EP are undertaken. Ensures reporting of environmental incidents meets external reporting requirements and INPEX incident reporting requirements. Ensures corrective actions raised from environmental audits are tracked and closed out.
INPEX Drilling Supervisor (Offshore)	Ensures contractors perform operations in a manner consistent with the performance outcomes and environmental management procedures detailed in this EP. Ensures the implementation of the INPEX Environment Policy, through application of this EP. Ensures the Offshore Installation Manager (OIM), vessels masters and all crews adhere to the requirements of this EP. Ensures that the INPEX drilling superintendent is alerted to any changes in activities that could have a negative impact on environmental performance. Reports incidents to the INPEX Drilling Superintendent: CCS.
INPEX HSE Adviser/ Environmental Adviser (Onshore)	Ensures that environmental audits are undertaken. Ensures that waste management and containment equipment audits are undertaken. Ensures that the OIM and vessels masters have been provided copies of personnel responsibilities as set out in this EP. Ensures that any changes to the proposed activity that may affect EP mitigation and management measures are captured via the management of change (MoC) process.

Key role	Responsibilities
Offshore Installation Manager (Offshore)	Ensures the MODU management system and procedures are implemented. Ensures personnel starting work on the MODU receive an HSE induction that meets the requirements specified in this EP. Ensures personnel are competent to undertake the work they have been assigned. Ensures emergency drills are conducted as per the MODU's schedule. Ensures the MODU's emergency response team has been given sufficient training to implement the MODU's SOPEP/SMPEP. Ensures any environmental incidents or breaches of performance outcomes, standards, or criteria, are reported immediately to the INPEX Drilling Supervisor.
Vessel masters (Offshore)	Conduct vessel operations in accordance with this EP. Implement the vessel's SOPEP/SMPEP in an emergency. Implements relevant performance standards stated within this EP. Ensure that environmental incidents or breaches of performance outcomes, standards, or criteria on vessels, are reported.
Support role	**Responsibilities**
All crew (Offshore)	Work in accordance with accepted MODU and vessel HSE systems and procedures. Comply with EP requirements as applicable to assigned role. Report any hazardous condition, near miss, unsafe act, accident, or environmental incident immediately to supervisors. Attend HSE meetings and training when required.

9.3.3 Training and inductions

Inductions are conducted for all personnel (including INPEX representatives, contractors, subcontractors, and visitors) before they start work at any of the MODUs/vessels described in this EP. Inductions cover the HSE requirements under the INPEX BMS, including information about the commitments contained in this EP. A summary of the inductions and training programs in place to ensure relevant personnel are aware of their responsibilities under accepted EPs is presented in Table 9-2. In addition, environmental awareness is communicated to all personnel through a number of different mechanisms including environmental alerts, environmental bulletin posts on INPEX intranet site and posters displayed at work locations.

Table 9-2: Inductions and training course summary

Induction/training course	Target audience	EP relevant content
INPEX Australia HSE Induction	All INPEX Australia employees	Overview of INPEX Environment Policy, OPGGS (E) Regulations 22009 and requirement to adhere to EP commitments.

Induction/training course	Target audience	EP relevant content
Drilling campaign induction (online or face to face)	All campaign personnel (survey and drilling activities)	Overview of the exploration drilling campaign EP including: • environmental values and sensitivities • environmental aspects/risk from offshore activities • controls to manage emissions, discharges and wastes • reporting requirements.
INPEX Australia Offshore EPs Support Vessels Induction	All personnel working onboard support vessel for exploration drilling activities.	Overview of the management controls for emissions, discharges and wastes from support vessels (which are consistent throughout INPEX EPs) including: • environmental values and sensitivities • environmental aspects/risk from offshore activities • controls to manage emissions, discharges and wastes • reporting requirements.
INPEX Australia Browse Regional Oil Pollution Emergency Plan Induction	OIM, vessel masters and any other relevant crew.	Overview of the *Browse Regional OPEP* requirements related to support vessels (which are consistent throughout INPEX EPs).
INPEX Australia Support Vessels Marine Fauna Awareness Training	All vessel bridge personnel.	Overview of the marine fauna management requirements (which are consistent with this EP).

Table 9-3: Environmental performance outcome, standard and measurement criteria for inductions and training

Environmental performance outcome	Environmental performance standard	Measurement criteria
INPEX personnel including staff, contractors and visitors are aware of their responsibilities under this EP.	The training and awareness material described in Table 9-2 is delivered.	Records that inductions, training and awareness material have been provided.

9.4 Documentation, information and data

INPEX implements and maintains document and records management procedures and systems. These are in place to ensure that the information required to support safe and reliable drilling operations, is current, reliable and available to those who need it. It also ensures that organisational knowledge and learning is captured and preserved to enable the effective operations of processes to maintain compliant management of HSE information.

Documents and records are stored electronically in INPEX document management systems and databases. This EP and associated documentation are maintained within a database, with current versions also available via the controlled document repository.

Records to demonstrate implementation of the INPEX BMS HSE requirements and compliance with legislative requirements and other obligations are identified and maintained for at least five years. These records include:

- written reports – including risk assessment reports, hazard and risk registers, monitoring reports, ALARP demonstrations and audit and review reports– about environmental performance or implementation strategies
- records relating to environmental performance or the implementation strategies
- records of environmental emissions and discharges
- management of change records
- incident and/or near miss investigation reports
- lessons learned records
- improvement plans (corrective actions, key performance indicators)
- records relating to training and competency in accordance with this EP.

9.5 Risk management

A robust, structured process is applied by INPEX to identify hazards and ensure that HSE risks arising from assets and operations are systematically identified, assessed, evaluated and controlled to levels as low as reasonably practicable.

The risks and impacts associated with the activity are detailed in Section 7 and Section 8. Additional risk assessments will be undertaken on an ongoing basis when triggered by any of the following circumstances:

- when there is a proposed change to the activity, as identified by an INPEX MoC request
- when identified as necessary following the investigation of an event
- when additional information about environmental impacts or risks becomes available (e.g. through better knowledge of the receptors present within the EMBA, new scientific information/papers, results of monitoring, other industry events or studies)
- if there is a change in regulations, as necessary
- during scheduled reviews of the documentation associated with this EP.

The risk assessments will be carried out in line with the assessment process described in Section 6 and are aligned to the HSE requirements of the INPEX BMS. This ensures that risks related to the activity are systematically identified, assessed, evaluated and controlled.

An environmental risk register for the activity is reviewed on a quarterly basis. The review includes assessment of any new information and other changes that have been recorded throughout the previous quarter. Where this review results in a change, the changes are documented and communicated.

9.6 Operate and maintain

9.6.1 Chemical assessment and approval

Chemicals discharged during the drilling campaign will be selected to meet both technical and environmental criteria. The environmental criteria are specified in the INPEX Chemical Assessment and Approval Guideline as summarised below:

- The chemical product is listed in the OSPAR list of substances/preparations used and discharged offshore which are considered to PLONOR. This list is based on assessment of the intrinsic properties of a chemical product and in order for a product to be included on the list the OSPAR Commission must consider that it PLONOR to the environment.
- The chemical product is GOLD or SILVER-rated under the OCNS CHARM model. The CHARM model calculates the ratio of predicted environmental concentration against no effect concentration. This is expressed as a HQ, which is then used to rank the product.
- The chemical product (if not CHARM-rated, e.g. inorganics, hydraulic fluids or pipeline chemicals) has an OCNS group rating of D or E. Non-CHARM products with a D or E grouping are either readily or inherently biodegradable.
- The chemical product (if not OCNS registered) is assessed as 'green' via the INPEX pseudo ranking system in line with the OCNS CHARM/ non-CHARM criteria (refer Table 9-4).

The assessment process requires that chemical products requested for use on INPEX sites or facilities which would be released to the marine environment under normal operating conditions shall be reviewed by an INPEX environmental adviser.

The INPEX pseudo ranking system, designed for those chemicals that are not OCNS registered, is a chemical assessment tool used to determine a chemical's inherent environmental hazard potential. This is determined by considering toxicity in conjunction with bioaccumulation and biodegradation potentials in line with the OCNS CHARM/non-CHARM criteria. Chemicals falling within the 'green' range are considered to present a low inherent hazard potential as shown in Table 9-4.

Table 9-4: INPEX chemical assessment tool

		Bioaccumulation					
		$LogP_{ow}$[1] <3 or BCF[2] ≤100 and with a molecular weight ≥700			$LogP_{ow}$[1] ≥3 or BCF[2] >100 and with a molecular weight <700		
Toxicity (ppm)		Biodegradation (in 28 days)					
Aquatic	Sediment	≥60%	≥20% to <60%	<20%	≥60%	≥20% to <60%	<20%
<1	<10						
1≤ to <10	10≤ to <100						
10≤ to <100	100≤ to <1000						
100≤ to <1000	1000≤ to <10000						
≥1000	≥10000						

Cells highlighted in green represent chemical characteristics associated with low environmental hazard levels.

1 Octanol–water partition coefficient.

2 Bioconcentration factor.

In addition, the assessment process is to consider whether the product, regardless of the ranking, carries with it an OCNS substitution warning. Triggering this would require a further risk assessment of the product in accordance with the INPEX risk management process, which includes consideration of the INPEX Risk Management Standard (0000-A0-STD-60020).

Those chemical products considered as having a moderate or above residual risk will be assessed as unsuitable for use and will not be processed for approval and use during the drilling activity. Successful chemical requests will proceed to the approval stage, conducted within the chemical product database where all relevant records are maintained.

An EPO and EPS related to the implementation of the chemical assessment procedure is presented in Table 9-5.

Table 9-5: Environmental performance outcome, standards and measurement criteria for implementation of chemical assessment and approval procedure

Environmental performance outcome	Environmental performance standard	Measurement criteria
No discharge of unapproved chemicals.	All chemicals assessed in accordance with the procedure.	Chemical assessments recorded and retained in a database.

9.6.2 Biofouling risk assessment for domestic movements

The biofouling risk assessment process for domestic vessel movements includes aspects of the vessels history with respect to IMS risk e.g. vessels origin from within Australian waters and previous locations of operation (including whether these Australian locations have reported IMS occurrences), periods out-of-water and inspections/cleaning undertaken, age of anti-fouling coatings, presence and condition of internal treatment systems etc.

While undertaking the INPEX biofouling risk assessment for domestic movements (Figure 9-5), in any instances where potential risks are identified e.g. no anti-fouling coating or extended stays in port, the process requires INPEX to engage an independent IMS expert and if required a further risk assessment may be undertaken.

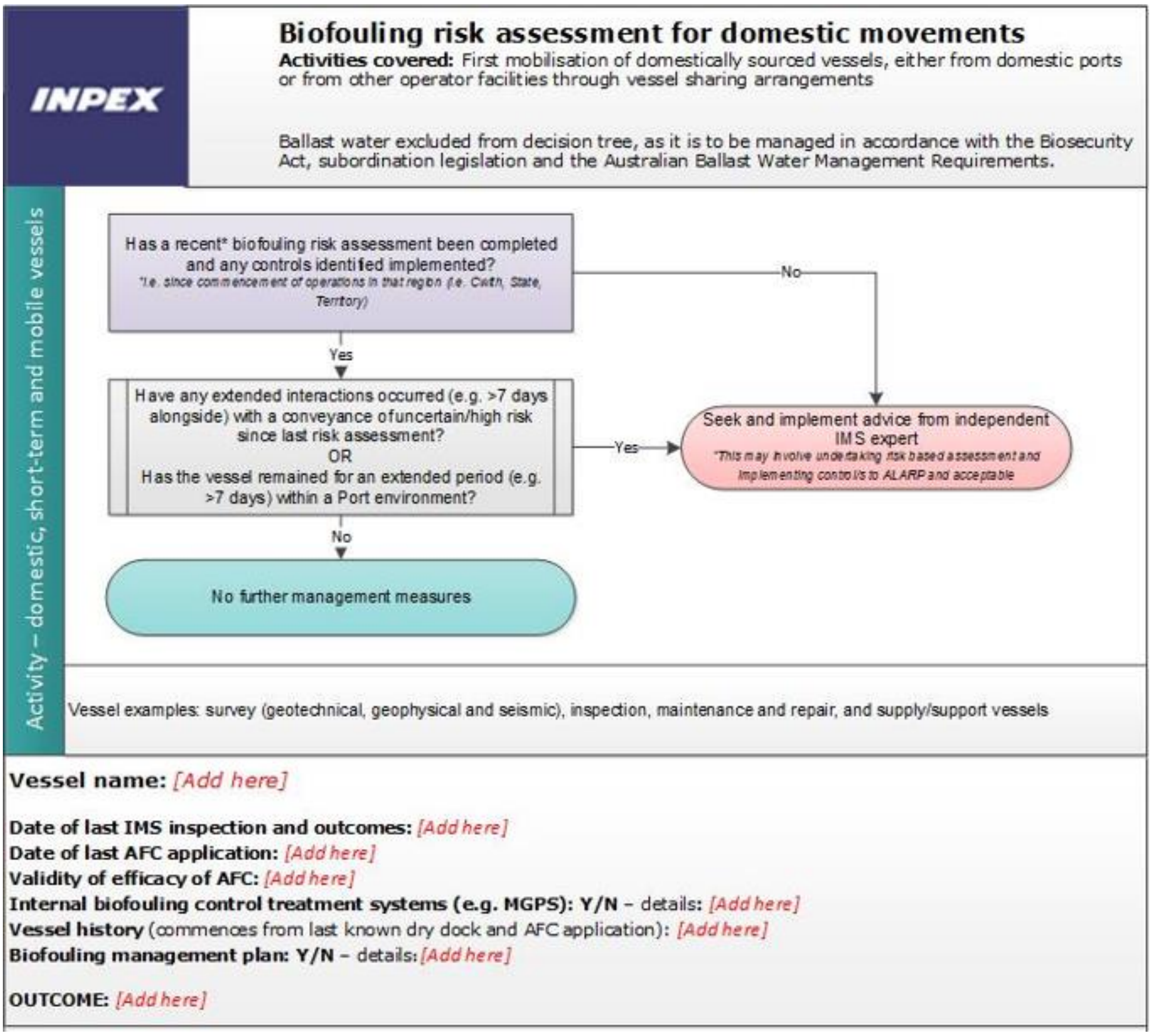

Figure 9-5: INPEX biofouling risk assessment for domestic movements

9.7 Management of change

Changes to this EP will be managed in accordance with the INPEX Australia MoC standard, and related procedures and guidelines. Where a change to management of an activity is proposed, it will be logged. Internal notification will be communicated via a MoC request. The request will identify the proposed change(s) along with the underlying reasons and highlight potential areas of risk or impact. In accordance with the INPEX business rules, it is mandatory to undertake an environmental risk assessment in every case for changes that could affect the environment. The MoC request will be managed by an environmental adviser who will then determine the necessary approval/endorsement pathway, in consultation with the environmental approvals advisor. Minor changes (such as updating a document or process) that do not invoke a revision trigger are endorsed by the General Manager Drilling (or delegate) and the change is implemented.

In accordance with Regulation 17 of the OPGGS (E) Regulations 2009, a revision of this EP will be submitted to NOPSEMA where:

- a change is considered to represent a new activity

- a change is considered to represent a significant modification to, or a new stage of, an existing activity
- a change will create a significant new environmental impact or risk that is not provided for in the current EP; or
- a change will result in a series of new (or increased) environmental impacts or risks that, together, will result in a significant new environmental impact or risk, or a significant increase in an existing environmental impact or risk.

The MoC request process will be periodically checked against NOPSEMA guidance to ensure ongoing compliance and will be undertaken as part of the management review process described in Section 9.13.

9.8 Stakeholder engagement

Communications with stakeholders are designed to be inclusive and effective, and ensure appropriate information is provided to stakeholders. Stakeholders include INPEX Corporation, INPEX employees, contractors, regulators, external industry bodies, shareholders, joint venture participants, suppliers, customers, non-government organisations, indigenous groups, financiers and members of the community.

9.8.1 Legislative and other requirements

INPEX maintains an approvals and compliance tracking system which identifies future approval requirements and when they must be in place, as well as compliance with existing approvals. Through this system, responsible persons are provided with alerts for required actions and time frames to avoid non-compliance and ensure there are no gaps in approvals.

In addition, INPEX personnel participate in industry and regulator forums, as well as maintain current knowledge of industry practices and proposed regulatory changes. Changes to legislative and other requirements are reviewed for potential impacts to business operations and communicated, as required, to personnel managing potentially affected activities.

Updates to matters relating to the EPBC Act, including policy statements and conservation management documentation is achieved through subscription to automated email notifications provided by the DCCEEW. In addition, updates following the Government’s independent AMP review, such as AMP management plans will also be reviewed for relevance against this EP. Where required, updates to this EP will be conducted in accordance with the MoC process described in Section 9.7.

9.8.2 Communication

INPEX HSE requirements and matters are communicated throughout the organisation. This facilitates the cascading and implementation of business policies and standards through the business, and on to contractors who work on behalf of INPEX.

INPEX and its contractors adopt a number of methods to ensure that information relating to HSE risks and impacts are communicated to personnel, including:

- daily toolbox meetings
- MODU HSE meetings
- use of noticeboards, intranet, HSE alerts and newsflashes, e.g. environmental aspects and events
- internal and external reporting.

9.8.3 Ongoing stakeholder consultation

In relation to an EP implementation strategy, Regulation 14(9) of the OPPGS (E) Regulations 2009 specifies a requirement for consultation with relevant authorities of the Commonwealth, a state or territory, and other relevant interested persons or organisations. Any objections or claims received from stakeholders while the activity is ongoing will be considered and assessed as detailed in Section 5, using the same process and criteria described for the stakeholder consultation undertaken during the development of this EP. Mechanisms that provide ongoing opportunities for consultation with stakeholders, in relation to the implementation of this EP, are summarised in Table 9-6 and an environmental performance outcome and standard is presented in Table 9-7.

Table 9-6: Ongoing stakeholder consultation

Stakeholder	Information supplied	Frequency
Australian Hydrographic Office (Cwlth)	The AHO will be notified of the activity commencement and cessation via datacentre@hydro.gov.au, for promulgation of fortnightly Notice to Mariners.	4 weeks prior to commencement and upon completion
AMSA JRCC (Cwlth)	INPEX to notify AMSA JRCC for promulgation of radio-navigation warnings 24-48 hours before operations commence and upon completion of the survey (Email: rccaus@amsa.gov.au; Phone: 1800 641 792 or +61 2 6230 6811). AMSA's JRCC require the vessel names, IMO vessel numbers and call signs, and Maritime Mobile Service Identity numbers.	24-48 hours before operations commence and upon completion
DCCEEW (Cwlth) formerly DAWE	Completion of a 'Questionnaire for Biosecurity Exemptions for Biosecurity Control Determination'.	4 weeks prior to commencement of activities
Defence (Cwlth)	INPEX to provide advance details in relation to the nature and scale of the activities including vessel size, MODU location and proposed dates for scheduled activities in the project area.	5 to 6 weeks prior to commencement of activities
NOPSEMA (Cwlth)	NOPSEMA will be notified of the activity commencement and cessation, using the Regulation 29 Notification Form available at https://www.nopsema.gov.au/environmental management/notification-and-reporting/	At least 10 days prior to commencement and within 10 days of completion
National Offshore Petroleum Titles Administrator (NOPTA) (Cwlth)	NOPTA will be notified of the activity commencement and cessation via reporting@nopta.gov.au	48 hours prior to commencement and upon completion
DMIRS (WA)	DMIRS will be notified of the activity commencement and cessation.	As required

Table 9-7: Environmental performance outcome, standards and measurement criteria for implementation of ongoing stakeholder consultation

Environmental performance outcome	Environmental performance standard	Measurement criteria
Where requested, relevant stakeholders will be kept informed of activities.	Ongoing stakeholder consultation with relevant stakeholders undertaken in accordance with Table 9-6.	Stakeholder consultation records.

9.9 Contractors and suppliers

Selection and management processes are in place to ensure that contractors working for, or on behalf of, INPEX are able and willing to meet the minimum business expectations of INPEX, including those related to HSE and risk management.

Contractors and suppliers are selected based on their capabilities and managed throughout the scope of works to deliver on HSE and process safety performance expectations.

The processes for pre-qualification, selection and management of suppliers and contractors are detailed within the INPEX BMS such that:

- HSE and process safety risks associated with the scope of work are identified and known
- contractors and suppliers are selected based on their organisational capability and personnel competence to execute the scope of work, including effective management of HSE and process safety risks
- roles and responsibilities, and minimum performance expectations are communicated to contractors and suppliers, and form part of contractual obligations
- contractors are partnered to deliver desired HSE and process safety performance targets, and monitored for compliance with contractual requirements
- lessons learned from each scope of work are applied to future activities.

9.10 Security and emergency management

Regulation 14(8) of the OPGGS (E) Regulations requires the implementation strategy to contain an OPEP and the provision for the OPEP to be updated. In accordance with Regulation 14 (8AA)) the OPEP must include arrangements to respond to and monitor oil pollution, including:

- the control measures necessary for a timely response to an oil pollution emergency
- the arrangements and response capability to implement a timely implementation of those controls, including ongoing maintenance of that capability
- the arrangements and capability for monitoring the effectiveness of the controls and ensuring that performance standards for those controls are met
- the arrangements and capability for monitoring oil pollution to inform response activities
- the provision for the OPEP to be updated.

These requirements are addressed through the INPEX *Browse Regional OPEP*, a summary of which is provided in Section 8.3 of this EP.

9.11 Incident investigation and lessons learned

HSE and process safety incidents and high potential hazards must be reported and investigated to identify and address the root causes, and apply lessons learned to improve designs, systems and work practices.

9.11.1 HSE performance measurement and reporting

HSE performance data is monitored in accordance with the INPEX BMS. This enables the status of conformance with HSE obligations and goals to be determined, and also ensures HSE risks are being effectively managed to support continuous improvement. HSE is regularly reviewed by senior management.

9.11.2 Environmental incident reporting – internal

INPEX refers to environmental incidents and hazards as "environmental events", which all personnel, including contractors, are required to report as soon as is reasonably practicable. Reporting must be in accordance with the INPEX *Incident Reporting and Investigation Standard* and associated procedure.

All events will be documented and reviewed for their actual and potential consequence severity levels and investigated as appropriate. Corrective or preventative actions will be identified and documented, and their completion verified in an action register. These actions may include changes to the risk registers, standards, or procedures, or the need for training, different tools or equipment. Any actions will be recorded and tracked.

9.11.3 Environmental incident reporting – external

For the purposes of regulatory reporting to NOPSEMA, an incident is classified as either "Reportable" or "Recordable" based on the definitions contained in Regulation 4 of the OPGGS (E) Regulations 2009.

A "Reportable" incident is defined as "an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage." Environmental damage (or the potential to cause damage) includes social, economic and cultural features of the environment. For the purposes of this EP, such an incident is considered to have an environmental consequence level of Moderate (D) to Catastrophic (A) as defined in the INPEX Risk Matrix (Figure 6-1).

Based on the consequence assessments described in sections 7 and 8 of this EP, incidents identified as having the potential to be "Reportable" (i.e. Moderate (D) or above on the INPEX Risk Matrix; Figure 6-1) include:

- the introduction of IMS
- vessel collision.

A "Recordable" incident is defined as "a breach of an environmental performance outcome or environmental performance standard … that is not a reportable incident." In terms of the activities within the scope of this EP, it is a breach of the performance standards and outcomes listed in Section 7, Section 8 or Section 9 of this EP and the INPEX *Browse Regional OPEP*.

For the purposes of regulatory reporting to DCCEEW, any significant impact to MNES, as classified using the INPEX Risk Matrix, will be reported to DCCEEW. The DNP will be notified of any oil/gas pollution incidences within or likely to impact an AMP as soon as possible (refer to INPEX *Browse Regional OPEP*).

Reportable incidents

Initial verbal notification

In the event of a reportable incident, INPEX will give NOPSEMA an initial verbal notification of the occurrence as soon as is practicable; and in any case, not later than two hours after the first occurrence of the reportable incident; or if it is not detected at the time of the first occurrence, within two hours of the time that INPEX becomes aware of the incident.

The initial verbal notification will contain:

- all material facts and circumstances concerning the reportable incident that are known or can, by reasonable search or enquiry, be found out
- any action taken to avoid or mitigate any adverse environmental impacts of the reportable incident
- the corrective action that has been taken, or is proposed to be taken, to stop, control or remedy the reportable incident.

Written notification

As soon as possible after an initial verbal notification of a reportable incident, INPEX will provide a written record of the notification to:

- NOPSEMA
- NOPTA (Cwlth)
- WA DMIRS or NT DIPL, depending on the jurisdiction.

In the event of a significant impact to MNES, INPEX will provide an initial notification to DCCEEW within 24 hours of becoming aware of the event.

In the event of a reportable incident, INPEX will provide a written report to NOPSEMA as soon as is practicable; and in any case, not later than three days after the first occurrence of the incident. If, within the three day period, NOPSEMA specifies an alternative reporting period, INPEX will report accordingly. The report will contain:

- all material facts and circumstances concerning the reportable incident that are known or can, by reasonable search or enquiry, be found out
- any action taken to avoid or mitigate any adverse environmental impacts of the reportable incident
- the corrective action that has been taken, or is proposed to be taken, to stop, control or remedy the reportable incident
- the action that has been taken, or is proposed to be taken, to prevent a similar incident occurring in the future.

Within seven days of giving a written report of a reportable incident to NOPSEMA, INPEX will provide a copy of the report to:

- NOPTA (Cwlth)
- WA DMIRS or NT DIPL, depending on the jurisdiction.

Following submission of the above, NOPSEMA may, by notice in writing, request INPEX to submit an additional report(s) of the incident. Where this is the case, NOPSEMA will identify the information to be contained in the report(s) or the matters to be addressed and will specify the submission date for the report(s). INPEX will prepare and submit the report(s) in accordance with the notice given.

In the event of a significant impact to MNES, INPEX will provide a written notification to DCCEEW (Cwlth) within three days of becoming aware of the event, and provide additional information as available, if requested by DCCEEW. This includes reporting any vessel strike incidents to the National Ship Strike Database at <https://data.marinemammals.gov.au/report/shipstrike>.

Suspected or confirmed presence of any marine pest or disease will be reported for NT waters by email (aquaticbiosecurity@nt.gov.au). For WA waters, WA DPIRD will be notified within 24 hours by email (biosecurity@fish.wa.gov.au) or telephone. This includes any organism listed in the WA prevention list for introduced marine pests and any other non-indigenous organism that demonstrates invasive characteristics.

Recordable incidents

Reporting

In the event of a recordable incident, INPEX will report the occurrence to NOPSEMA as soon as is practicable after the end of the calendar month in which it occurs; and in any case, not later than 15 days after the end of the calendar month. The report will contain:

- a record of all the recordable incidents that occurred during the calendar month
- all material facts and circumstances concerning the recordable incidents that are known or can, by reasonable search or enquiry, be found out
- any action taken to avoid or mitigate any adverse environmental impacts of the recordable incidents
- the corrective action that has been taken, or is proposed to be taken, to stop, control or remedy the recordable incident
- the action that has been taken, or is proposed to be taken, to prevent a similar incident occurring in the future.

9.11.4 Annual performance reporting – external

In accordance with Regulation 14(2) of the OPGGS (E) Regulations 2009, INPEX will undertake a review of its compliance with the environmental performance outcomes and standards set out in this EP and will provide a written report of its findings for the reporting period 1 January to December 31, to NOPSEMA on an annual basis, as agreed with NOPSEMA. The annual submission date for the environmental performance report will be April 1 of each year.

9.12 Monitor, review and audit

HSE performance must be monitored through audits, reviews, validation, verification and assurance checks, to correct at risk situations and deliver improved performance.

9.12.1 Management system audit

An audit and inspection program will be developed and implemented in accordance with the INPEX business standard for auditing. The program will include:

- self-assessment HSE audits against the INPEX BMS
- regular inspections of workplace equipment and activities
- reviews to evaluate compliance with legislative and other requirements.

Unscheduled audits may be initiated by INPEX in the event of an incident, non-compliance or for other valid reasons.

Audit teams will be appropriately qualified, experienced and competent in auditing techniques. They will include relevant technical expertise, as required, and the audit team structure will be commensurate with the scope of the audit. HSE audit and inspection findings will be summarised in a report. Non-conformances, actions and improvement plans resulting from audits will be managed in an action tracking system.

9.12.2 MODU and vessel inspections

Pre-mobilisation inspections will be conducted prior to site survey and drilling activities on relevant MODUs and vessels.

During the activity, operational compliance against relevant EPO/EPSs will be assessed and maintained through the implementation of respective monthly environmental inspection checklists.

Non-conformances and relevant findings during the inspections will be converted into actions that will be tracked within an action tracking database until closed.

9.13 Management review

Through a process of adaptive management, lessons from management outcomes will be used for continual improvement. Formal reviews of the effectiveness and appropriateness of the HSE requirements as per the INPEX BMS are performed by senior management on a periodic basis. Learnings from this process, and iterative decision-making will then be used as feedback to improve future management.

Together with the annual environmental performance report described in Section 9.11.4, EP management reviews will enable the review of environmental performance, as well the efficacy of the implementation strategy used during the activity.

Management reviews of this EP shall assess whether:

- the environmental impacts and risks of the activity continue to be identified and reduced to a level that is ALARP
- control measures detailed in this EP are effective in reducing the environmental impacts and risks of the activity to ALARP and an acceptable level
- implementation of the MoC process has remained consistent with the commitment to ensuring impacts and risks are reduced to ALARP and are acceptable
- any changes in legislation, or matters relating to the EPBC Act, including policy statements and conservation management documentation, have occurred which affect or need to be taken into consideration in relation to this EP
- any changes in NOPSEMA guidance which may affect or need to be taken into consideration in relation to this EP
- the Operational and Scientific Monitoring Program (within the *Browse Regional OPEP*) remains fit for purpose
- lessons learned have been communicated and, where applicable, applied across all titleholder activities, as relevant.

Where the documented findings of the EP management reviews have implications for this EP, the EP will be updated in accordance with the EP MoC process.

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Appendix A-
EPBC Act Protected Matters Reports & Species Risk Evaluation

APPENDIX A: EPBC ACT PROTECTED MATTERS REPORT AND SPECIES RISK EVALUATION

A.1 EPBC Act Protected Matters report

1. Project area

2. PEZ

NB: The EPBC Act Protected Matters Search Tool (https://pmst.awe.gov.au) now relies on a 32 km grid square for data across marine regions. Therefore, a 32 km buffer is essentially applied to the boundaries of the project area, EMBA and PEZ shapefiles used in the searches, which is highly conservative with regard to the potential for species that may potentially use or pass through these areas. In relation to key ecological features, marine parks and other environmental sensitivities such as biologically important areas, the grid square sizing (32 km) may result in the reporting of false overlap of features that are within the same grid square even if they don’t actually overlap.

Australian Government

Department of Agriculture,
Water and the Environment

EPBC Act Protected Matters Report

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

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

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

PROJECT AREA: Report created: 08/04/22 13:00:47

No Image Available

Coordinates
Buffer: 1.0Km

No Image Available

Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	17
Listed Migratory Species:	34

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	59
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	None
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	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 the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
North

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Mammals		
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Species or species habitat may occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Sharks		
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Glyphis garricki Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat may occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may 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	Species or species habitat may occur within area

Listed Migratory Species

[Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		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 borealis Sei Whale [34]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat may occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely 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 likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area
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

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

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

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
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

Name	Threatened	Type of Presence
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
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area
Fish		
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 suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		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
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 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

Name	Threatened	Type of Presence
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
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely 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
Enhydrina schistosa Beaked Seasnake [1126]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
Hydrophis atriceps Black-headed Seasnake [1101]		Species or species habitat may occur within area
Hydrophis coggeri Slender-necked Seasnake [25925]		Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis inornatus Plain Seasnake [1107]		Species or species habitat may occur within area
Hydrophis mcdowelli null [25926]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Hydrophis pacificus Large-headed Seasnake, Pacific Seasnake [1112]		Species or species habitat may occur within area
Lapemis hardwickii Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Parahydrophis mertoni Northern Mangrove Seasnake [1090]		Species or species habitat may occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		

Name	Status	Type of Presence
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat may occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat may occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

Caveat

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

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

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

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

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-12.665281 128.501221,-12.66528 129.055589,-12.939197 129.055589,-12.939197 128.667893,-12.831905 128.667892,-12.831905 128.584549,-12.748573 128.584549,-12.748573 128.501221,-12.665281 128.501221

Acknowledgements

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

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

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

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

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

PEZ: Report created: 21-Feb-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:	53
Listed Migratory Species:	63

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

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

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

Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	105
Whales and Other Cetaceans:	25
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	6
Habitat Critical to the Survival of Marine Turtles:	2

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:	1
EPBC Act Referrals:	52
Key Ecological Features (Marine):	4
Biologically Important Areas:	14
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	Buffer Status
EEZ and Territorial Sea	In feature area
Extended Continental Shelf	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anous tenuirostris melanops			
Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris canutus			
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris tenuirostris			
Great Knot [862]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Charadrius leschenaultii			
Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius mongolus			
Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat known to occur within area	In feature area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area	In feature area
Geophaps smithii smithii Partridge Pigeon (eastern) [64441]	Vulnerable	Species or species habitat known to occur within area	In feature area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area	In feature area
Melanodryas cucullata melvillensis Tiwi Islands Hooded Robin, Hooded Robin (Tiwi Islands) [67092]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area	In feature area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Tyto novaehollandiae melvillensis Tiwi Masked Owl, Tiwi Islands Masked Owl [26049]	Endangered	Species or species habitat known to occur within area	In feature area
FISH			
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area
MAMMAL			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Antechinus bellus Fawn Antechinus [344]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In feature area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Conilurus penicillatus Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma [132]	Vulnerable	Species or species habitat known to occur within area	In feature area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area	In feature area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Mesembriomys gouldii melvillensis Black-footed Tree-rat (Melville Island) [87619]	Vulnerable	Species or species habitat known to occur within area	In feature area
Petrogale concinna canescens Nabarlek (Top End) [87606]	Endangered	Species or species habitat may occur within area	In feature area
Phascogale pirata Northern Brush-tailed Phascogale [82954]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Saccolaimus saccolaimus nudicluniatus			
Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Sminthopsis butleri			
Butler's Dunnart [302]	Vulnerable	Species or species habitat known to occur within area	In feature area
Trichosurus vulpecula arnhemensis			
Northern Brushtail Possum [83091]	Vulnerable	Species or species habitat known to occur within area	In feature area
Xeromys myoides			
Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat likely to occur within area	In feature area
PLANT			
Burmannia sp. Bathurst Island (R.Fensham 1021)			
[82017]	Endangered	Species or species habitat likely to occur within area	In feature area
Hoya australis subsp. oramicola			
a vine [55436]	Vulnerable	Species or species habitat known to occur within area	In feature area
Typhonium jonesii			
a herb [62412]	Endangered	Species or species habitat likely to occur within area	In feature area
Typhonium mirabile			
a herb [79227]	Endangered	Species or species habitat likely to occur within area	In feature area
Xylopia monosperma			
a shrub [82030]	Endangered	Species or species habitat likely to occur within area	In feature area
REPTILE			
Acanthophis hawkei			
Plains Death Adder [83821]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Aipysurus foliosquama			
Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area	In feature area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding known to occur within area	In feature area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area	In feature area
SHARK			
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area	In feature area
Glyphis garricki Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat may occur within area	In feature area
Glyphis glyphis Speartooth Shark [82453]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area	In feature 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	In feature area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area	In feature area

Listed Migratory Species

[Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area	In feature area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area	In feature area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area	In feature area
Sternula albifrons Little Tern [82849]		Breeding known to occur within area	In feature area
Migratory Marine Species			
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat known to occur within area	In feature area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In feature area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In feature area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area	In feature area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area	In feature area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area	In feature area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In feature area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area	In feature area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area	In feature area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding known to occur within area	In feature area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat likely to occur within area	In feature area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat likely to occur within area	In feature area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area	In feature area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area	In feature area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In feature area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area	In feature area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area	In feature 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	In feature area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rhincodon typus			
Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Sousa sahulensis as Sousa chinensis			
Australian Humpback Dolphin [87942]		Breeding known to occur within area	In feature area
Tursiops aduncus (Arafura/Timor Sea populations)			
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area	In feature area
Migratory Terrestrial Species			
Cecropis daurica			
Red-rumped Swallow [80610]		Species or species habitat may occur within area	In feature area
Cuculus optatus			
Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area
Hirundo rustica			
Barn Swallow [662]		Species or species habitat likely to occur within area	In feature area
Motacilla cinerea			
Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Motacilla flava			
Yellow Wagtail [644]		Species or species habitat likely to occur within area	In feature area
Rhipidura rufifrons			
Rufous Fantail [592]		Species or species habitat likely to occur within area	In feature area
Migratory Wetlands Species			
Acrocephalus orientalis			
Oriental Reed-Warbler [59570]		Species or species habitat may occur within area	In feature area
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat likely to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
Calidris alba Sanderling [875]		Species or species habitat likely to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat likely to occur within area	In feature area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area	In feature area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Limnodromus semipalmatus Asian Dowitcher [843]		Species or species habitat may occur within area	In feature area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat likely to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Numenius phaeopus Whimbrel [849]		Species or species habitat likely to occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area	In feature area
Pluvialis squatarola Grey Plover [865]		Species or species habitat likely to occur within area	In feature area
Thalasseus bergii Greater Crested Tern [83000]		Breeding likely to occur within area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Defence		
Defence - QUAIL ISLAND BOMBING RANGE [70003]	NT	In feature area

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Acrocephalus orientalis Oriental Reed-Warbler [59570]		Species or species habitat may occur within area overfly marine area	In feature area
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area	In feature area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area	In feature area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area overfly marine area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat likely to occur within area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
Calidris alba Sanderling [875]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area	In feature area
Cecropis daurica as Hirundo daurica Red-rumped Swallow [80610]		Species or species habitat may occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat likely to occur within area	In feature area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area	In feature area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area	In feature area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Hirundo rustica Barn Swallow [662]		Species or species habitat likely to occur within area overfly marine area	In feature area
Limnodromus semipalmatus Asian Dowitcher [843]		Species or species habitat may occur within area overfly marine area	In feature area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat likely to occur within area overfly marine area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Motacilla flava			
Yellow Wagtail [644]		Species or species habitat likely to occur within area overfly marine area	In feature area
Numenius madagascariensis			
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Numenius phaeopus			
Whimbrel [849]		Species or species habitat likely to occur within area	In feature area
Pandion haliaetus			
Osprey [952]		Species or species habitat known to occur within area	In feature area
Pluvialis squatarola			
Grey Plover [865]		Species or species habitat likely to occur within area overfly marine area	In feature area
Rhipidura rufifrons			
Rufous Fantail [592]		Species or species habitat likely to occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato)			
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Sternula albifrons as Sterna albifrons			
Little Tern [82849]		Breeding known to occur within area	In feature area
Thalasseus bengalensis as Sterna bengalensis			
Lesser Crested Tern [66546]		Breeding known to occur within area	In feature area
Thalasseus bergii as Sterna bergii			
Greater Crested Tern [83000]		Breeding likely to occur within area	In feature area
Tringa nebularia			
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area	In feature area
Fish			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bhanotia fasciolata Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area	In feature area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area	In feature area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area	In feature area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area	In feature area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area	In feature area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area	In feature area
Corythoichthys haematopterus Reef-top Pipefish [66201]		Species or species habitat may occur within area	In feature area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area	In feature area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area	In feature area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area	In feature area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area	In feature area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area	In feature area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area	In feature area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area	In feature area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area	In feature area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area	In feature area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area	In feature area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area	In feature area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area	In feature area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area	In feature area
Hippichthys parvicarinatus Short-keel Pipefish, Short-keeled Pipefish [66230]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area	In feature area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area	In feature area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area	In feature area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area	In feature area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area	In feature area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area	In feature area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area	In feature area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area	In feature area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area	In feature area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area	In feature area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Trachyrhamphus longirostris			
Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area	In feature area
Mammal			
Dugong dugon			
Dugong [28]		Species or species habitat known to occur within area	In feature area
Reptile			
Acalyptophis peronii			
Horned Seasnake [1114]		Species or species habitat may occur within area	In feature area
Aipysurus duboisii			
Dubois' Seasnake [1116]		Species or species habitat may occur within area	In feature area
Aipysurus eydouxii			
Spine-tailed Seasnake [1117]		Species or species habitat may occur within area	In feature area
Aipysurus foliosquama			
Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat may occur within area	In feature area
Aipysurus laevis			
Olive Seasnake [1120]		Species or species habitat may occur within area	In feature area
Astrotia stokesii			
Stokes' Seasnake [1122]		Species or species habitat may occur within area	In feature area
Caretta caretta			
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Chelonia mydas			
Green Turtle [1765]	Vulnerable	Breeding known to occur within area	In feature area
Chitulia inornata as Hydrophis inornatus			
Plain Seasnake [87379]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Chitulia ornata as Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [87377]		Species or species habitat may occur within area	In feature area
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnstone's Crocodile [1773]		Species or species habitat may occur within area	In feature area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In feature area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area	In feature area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area	In feature area
Emydocephalus annulatus Turtle-headed Seasnake [1125]		Species or species habitat may occur within area	In feature area
Enhydrina schistosa Beaked Seasnake [1126]		Species or species habitat may occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area	In feature area
Hydrelaps darwiniensis Black-ringed Seasnake [1100]		Species or species habitat may occur within area	In feature area
Hydrophis atriceps Black-headed Seasnake [1101]		Species or species habitat may occur within area	In feature area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hydrophis macdowelli as Hydrophis mcdowelli			
Small-headed Seasnake [75601]		Species or species habitat may occur within area	In feature area
Lapemis curtus as Lapemis hardwickii			
Spine-bellied Seasnake [83554]		Species or species habitat may occur within area	In feature area
Leioselasma coggeri as Hydrophis coggeri			
Black-headed Sea Snake, Slender-necked Seasnake [87373]		Species or species habitat may occur within area	In feature area
Leioselasma pacifica as Hydrophis pacificus			
Large-headed Seasnake, Pacific Seasnake [87378]		Species or species habitat may occur within area	In feature area
Lepidochelys olivacea			
Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding known to occur within area	In feature area
Natator depressus			
Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area	In feature area
Parahydrophis mertoni			
Northern Mangrove Seasnake [1090]		Species or species habitat may occur within area	In feature area
Pelamis platurus			
Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area	In feature area

Whales and Other Cetaceans

[Resource Information]

Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
Balaenoptera borealis			
Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Balaenoptera edeni			
Bryde's Whale [35]		Species or species habitat may occur within area	In feature area
Balaenoptera musculus			
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In feature area

Current Scientific Name	Status	Type of Presence	Buffer Status
[Balaenoptera physalus](#) Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Delphinus delphis](#) Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In feature area
[Feresa attenuata](#) Pygmy Killer Whale [61]		Species or species habitat may occur within area	In feature area
[Globicephala macrorhynchus](#) Short-finned Pilot Whale [62]		Species or species habitat may occur within area	In feature area
[Grampus griseus](#) Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In feature area
[Kogia breviceps](#) Pygmy Sperm Whale [57]		Species or species habitat may occur within area	In feature area
[Kogia sima as Kogia simus](#) Dwarf Sperm Whale [85043]		Species or species habitat may occur within area	In feature area
[Megaptera novaeangliae](#) Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Orcaella heinsohni as Orcaella brevirostris](#) Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area	In feature area
[Orcinus orca](#) Killer Whale, Orca [46]		Species or species habitat may occur within area	In feature area
[Peponocephala electra](#) Melon-headed Whale [47]		Species or species habitat may occur within area	In feature area

Current Scientific Name	Status	Type of Presence	Buffer Status
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area	In feature area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area	In feature area
Sousa sahulensis as Sousa chinensis Australian Humpback Dolphin [87942]		Breeding known to occur within area	In feature area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area	In feature area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area	In feature area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area	In feature area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area	In feature area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In feature area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area	In feature area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In feature area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area	In feature area

Australian Marine Parks

[Resource Information]

Park Name	Zone & IUCN Categories	Buffer Status
Oceanic Shoals	Habitat Protection Zone (IUCN IV)	In feature area
Joseph Bonaparte Gulf	Multiple Use Zone (IUCN VI)	In feature area
Kimberley	Multiple Use Zone (IUCN VI)	In feature area
Oceanic Shoals	Multiple Use Zone (IUCN VI)	In feature area
Joseph Bonaparte Gulf	Special Purpose Zone (IUCN VI)	In feature area
Oceanic Shoals	Special Purpose Zone (Trawl) (IUCN VI)	In feature area

Habitat Critical to the Survival of Marine Turtles

Scientific Name	Behaviour	Presence	Buffer Status
Aug - Sep			
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur	In feature area
May - Jul			
Lepidochelys olivacea Olive Ridley Turtle [1767]	Nesting	Known to occur	In feature area

Extra Information

Nationally Important Wetlands [Resource Information]

Wetland Name	State	Buffer Status
Finniss Floodplain and Fog Bay Systems	NT	In feature area

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Australia-ASEAN Power Link	2020/8818	Controlled Action	Proposed Decision	In feature area
Bonaparte Liquified Natural Gas Project	2011/6141	Controlled Action	Post-Approval	In feature area
Clarence Strait Offshore Tidal Energy Project	2008/4660	Controlled Action	Assessment Approach	In feature area
Development of Blacktip Gas Field	2003/1180	Controlled Action	Post-Approval	In feature area
Hardwood Plantation	2001/229	Controlled Action	Post-Approval	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Ichthys Gas Field, Offshore and onshore processing facilities and subsea pipeline	2008/4208	Controlled Action	Post-Approval	In feature area
Kilimiraka Mineral Sands and Associated Infrastructure (Bathurst Island), NT	2012/6587	Controlled Action	Assessment Approach	In feature area
PTTEP AA Floating LNG Facility	2011/6025	Controlled Action	Completed	In feature area
Not controlled action				
2D seismic survey, exploration permit NT/P67	2004/1587	Not Controlled Action	Completed	In feature area
2D Seismic Survey in Permit Areas WA-318-P & WA-319-P, near Cape Londonderry	2004/1687	Not Controlled Action	Completed	In feature area
Audacious-3 oil drilling well	2003/1042	Not Controlled Action	Completed	In feature area
Backpacker-1 Offshore Hydrocarbon Exploration Well	2001/300	Not Controlled Action	Completed	In feature area
Construction and operation of Radar Infrastructure	2004/1406	Not Controlled Action	Completed	In feature area
Drilling of Marina-1 Exploration Well	2007/3586	Not Controlled Action	Completed	In feature area
Exploration Drilling in AC/P17, AC/P18 and AC/P24	2001/359	Not Controlled Action	Completed	In feature area
Marine Survey for the Australia-ASEAN Power Link AAPL	2020/8714	Not Controlled Action	Completed	In feature area
Nexus Drilling Program NT-P66	2007/3745	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
2D and 3D Seismic Survey	2011/6197	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
2D and 3D Seismic Survey WA-405-P	2009/5104	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
2D and 3D Seismic Survey WA-405-P	2008/4133	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action (particular manner)				
2D Marine Seismic Survey	2009/4728	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
2D marine seismic survey of Braveheart,Kurrajong,Sunshine and Crocodile	2006/2917	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
2D marine seismic survey within permit area WA-318-P	2007/3879	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
2D Seismic survey	2009/5076	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
2D Seismic Survey in WA Permit Area TP/22 and Commonwealth Permit Area WA-280-P	2005/2100	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
3D Marine Seismic Survey	2009/4681	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
3D Seismic Survey, petroleum exploration permit AC/P33	2006/2918	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
3D seismic survey of AC/P4, AC/P17 and AC/P24	2006/2857	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Bonaparte 2D & 3D marine seismic survey	2011/5962	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Bonaparte Basin Seabed Mapping Survey	2009/4951	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Bonaparte Seismic and Bathymetric Survey	2012/6295	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Drilling of Audacious-5 appraisal well	2008/4327	Not Controlled Action (Particular	Post-Approval	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action (particular manner)				
		Manner)		
Exploration Drilling in Permit Areas WA-402-P & WA-403-P	2010/5297	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Fishburn2D Marine Seismic Survey	2012/6659	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Floyd 3D and Chisel 3D Seismic Surveys	2011/6220	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Gold 2D Marine Seismic Survey Permit Areas WA375P and WA376P	2009/4698	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Joseph Bonaparte Gulf Seabed mapping survey	2010/5517	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Kingtree & Ironstone-1 Exploration Wells	2011/5935	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Malita West 3D Seismic Survey WA-402-P and WA-403-P	2007/3936	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Marine Environmental Survey 2012	2012/6310	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Nova 3D Seismic Survey	2013/6825	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
NT/P77 3D Marine Seismic Survey	2009/4683	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
NT/P80 2010 2D Marine Seismic Survey	2010/5487	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action (particular manner)				
Offshore Fibre Optic Cable Network Construction & Operation, Port Hedland WA to Darwin NT	2014/7223	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Petrel MC2D Marine Seismic Survey	2010/5368	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Removal of Potential Unexploded Ordnance within NAXA	2012/6503	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Santos Petrel-7 Offshore Appraisal Drilling Programme (Bonaparte Basin)	2011/5934	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Sonar and Acoustic Trials	2001/345	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Vampire 2D Non Exclusive Seismic Survey, WA	2010/5543	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Referral decision				
2D Marine Seismic Survey	2008/4623	Referral Decision	Completed	In feature area
Nova 3D Seismic Survey, WA 442-NT/P81, Joseph Bonaparte Gulf	2013/6820	Referral Decision	Completed	In feature area

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	Buffer Status
Carbonate bank and terrace system of the Sahul Shelf	North-west	In feature area
Carbonate bank and terrace system of the Van Diemen Rise	North	In feature area
Pinnacles of the Bonaparte Basin	North-west	In feature area

Name	Region	Buffer Status
Pinnacles of the Bonaparte Basin	North	In feature area

Biologically Important Areas

Scientific Name	Behaviour	Presence	Buffer Status
Dolphins			
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Breeding	Known to occur	In feature area
Marine Turtles			
Caretta caretta Loggerhead Turtle [1763]	Foraging	Known to occur	In feature area
Chelonia mydas Green Turtle [1765]	Foraging	Known to occur	In feature area
Chelonia mydas Green Turtle [1765]	Internesting	Likely to occur	In feature area
Lepidochelys olivacea Olive Ridley Turtle [1767]	Foraging	Known to occur	In feature area
Lepidochelys olivacea Olive Ridley Turtle [1767]	Foraging	Likely to occur	In feature area
Lepidochelys olivacea Olive Ridley Turtle [1767]	Internesting	Likely to occur	In feature area
Natator depressus Flatback Turtle [59257]	Foraging	Known to occur	In feature area
Natator depressus Flatback Turtle [59257]	Internesting	Likely to occur	In feature area
Natator depressus Flatback Turtle [59257]	Internesting buffer	Known to occur	In feature area
Seabirds			
Fregata ariel Lesser Frigatebird [1012]	Breeding	Known to occur	In feature area
Thalasseus bengalensis Lesser Crested Tern [66546]	Breeding	Known to occur	In feature area
Thalasseus bergii Crested Tern [83000]	Breeding (high numbers)	Known to occur	In feature area

Scientific Name	Behaviour	Presence	Buffer Status
Sharks			
Rhincodon typus Whale Shark [66680]	Foraging	Known to occur	In feature area

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.

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A.2 EPBC-listed species risk evaluation table

This table was developed by:

- Searching the Species Profile and Threats database (SPRAT) (http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl) for every species identified in the EPBC search related to this EP.
- Through the SPRAT database, identifying the relevant conservation management documents.
- Determining the relevant aspects / threats from the conservation management documents related to the activity
- Listing where the aspect / threat has been addressed in the EP.

Fauna Type	Conservation management documents	Summary of relevant aspects/threats identified from conservation management documents	Summary of relevant actions from conservation management documents	Relevant exposure / risk evaluation section of EP
EPBC-listed fishes and sharks	Whale shark management. 2013. Wildlife management program no. 57. Department of Parks and Wildlife. State of Western Australia. Threatened Species Scientific Committee. 2015. Approved Conservation Advice for Rhincodon typus (whale shark). Commonwealth of Australia. Department of Sustainability, Environment, Water, Population and Communities. 2013. Recovery Plan for the White Shark (Carcharodon carcharias). Commonwealth of Australia. Threatened Species Scientific Committee. 2014. Approved Conservation Advice for Glyphis garricki (northern river shark). Commonwealth of Australia. Threatened Species Scientific Committee. 2009. Commonwealth Conservation Advice on Pristis clavata (Dwarf Sawfish). Commonwealth of Australia. Threatened Species Scientific Committee. 2008. Approved Conservation Advice for Pristis zijsron (Green Sawfish). Commonwealth of Australia. Department of the Environment. 2015. Sawfish and River Sharks - Multispecies Recovery Plan. Commonwealth of Australia. Department of Environment and Energy. 2018. Threat abatement plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans. Commonwealth of Australia. Department of Sustainability, Environment, Water, Population and Communities (DSEWPac). 2012. Marine bioregional plan for the North-west Marine Region. DSEWPac, Canberra, ACT. Department of Sustainability, Environment, Water, Population and Communities (DSEWPac). 2012. Marine bioregional plan for the North Marine Region. DSEWPac, Canberra, ACT. Threatened Species Scientific Committee. 2014. Approved Conservation Advice for Glyphis glyphis (speartooth shark). Commonwealth of Australia. Recovery Plan for the Grey Nurse Shark (Carcharias taurus) (2014)	• Waste / marine debris • Noise and vibration • Introduced Marine Species • Vessel strike • Benthic habitat degradation / seabed disturbance • Emissions and discharges • Oil spill	• Identify populations and areas of high conservation priority (sawfishes). • Ensure there is no anthropogenic disturbance / implement measures to reduce adverse impacts of habitat degradation and/or modification (northern river shark). • Ensure all future developments will not significantly impact upon sawfish and river shark habitats critical to the survival of the species or impede upon the migration of individual sawfish or river sharks. Implement measures to reduce adverse impacts of habitat degradation and/or modification. • Review and assess the potential threat of introduced species, pathogens and pollutants. • Minimise offshore developments and transit time of large vessels in areas close to marine features likely to correlate with whale shark aggregations (Ningaloo Reef,) and along the northward migration route that follows the northern WA coastline along the 200 m isobath. • Contribute to the long-term prevention of the incidence of harmful marine debris.	• EP Section 7.2 – Waste management • EP Section 7.3 - Noise and vibration • EP Section 7.4.1 - Introduction of invasive marine species • EP Section 7.4.2 - Interaction with marine fauna • EP Section 7.5 - Seabed disturbance • EP Section 7.1.3 - Routine discharges • EP Section 8 - Emergency conditions (oil spills).

Fauna Type	Conservation management documents	Summary of relevant aspects/threats identified from conservation management documents	Summary of relevant actions from conservation management documents	Relevant exposure / risk evaluation section of EP
EPBC-listed marine reptiles	Department of the Environment and Energy 2017. Recovery Plan for Marine Turtles in Australia, Commonwealth of Australia 2017. Threatened Species Scientific Committee. 2011. Commonwealth Conservation Advice on Aipysurus apraefrontalis (Short-nosed Seasnake). Commonwealth of Australia. Threatened Species Scientific Committee. 2011. Commonwealth Conservation Advice on Aipysurus foliosquama (Leaf-scaled Seasnake). Commonwealth of Australia. Department of Environment and Energy. 2018. Threat abatement plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans. Commonwealth of Australia. Department of Sustainability, Environment, Water, Population and Communities (DSEWPac). 2012. Marine bioregional plan for the North-west Marine Region. DSEWPac, Canberra, ACT. Department of Sustainability, Environment, Water, Population and Communities (DSEWPac). 2012. Marine bioregional plan for the North Marine Region. DSEWPac, Canberra, ACT. Department of the Environment and Energy. 2020. Light pollution guidelines – National light pollution guidelines for wildlife: Including marine turtles, seabirds and migratory shorebirds. Commonwealth of Australia, Canberra, ACT. Department of the Environment and Energy. 2017. National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Fauna. Commonwealth of Australia, Canberra, ACT.	• Waste / marine debris • Noise and vibration • Introduced Marine Species • Vessel strike • Benthic habitat degradation / seabed disturbance • Emissions and discharges • Oil spill • Light emissions	• Manage artificial light from onshore and offshore sources to ensure biologically important behaviours of nesting adults and dispersing hatchlings can continue. • Artificial light within or adjacent to habitat critical to the survival of marine turtles will be managed such that marine turtles are not displaced from these habitats and implementation of best practice light management guidelines for developments adjacent to marine turtle nesting beaches. • Identify the cumulative impact on turtles from multiple sources of onshore and offshore light pollution. • Support retrofitting of lighting at coastal communities and industrial developments, including imposing restrictions around nesting seasons. • Manage anthropogenic activities to ensure marine turtles are not displaced from identified habitat critical for survival. • Contribute to the reduction in the source of marine debris. • Ensure that spill risk strategies and response programs include management for turtles and their habitats, particularly in reference to slow to recover habitats, e.g. seagrass meadows or corals. • Implement best practices to minimise impacts to turtle health and habitats from chemical discharges. • Identify populations and areas of high conservation priority (sea snakes). • Ensure there is no anthropogenic disturbance / implement measures to reduce adverse impacts of habitat degradation and/or modification (sea snakes). • Increased reporting of vessel collision (a requirement of the EPBC Act). • Reduce risk of collision with cetaceans (and turtles) such as maintaining look out, consider reducing vessel speed and course alterations away from sightings.	• EP Section 7.1.1 - Light emissions • EP Section 7.2 – Waste management • EP Section 7.3 - Noise and vibration • EP Section 7.4.1 - Introduction of invasive marine species • EP Section 7.4.2 - Interaction with marine fauna • EP Section 7.5 - Seabed disturbance • EP Section 7.1.3 - Routine discharges • EP Section 8 - Emergency conditions (oil spills).
EPBC-listed seabirds and	Department of the Environment. 2015. EPBC Act Policy Statement 3.21 - Industry guidelines for	• Waste / marine debris • Noise and vibration	• Reduce risk of rodents gaining access to key vessels at key ports	• EP Section 7.1.1 - Light emissions • EP Section 7.1.2 - Atmospheric emissions

Fauna Type	Conservation management documents	Summary of relevant aspects/threats identified from conservation management documents	Summary of relevant actions from conservation management documents	Relevant exposure / risk evaluation section of EP
shorebirds	avoiding, assessing and mitigating impacts on EPBC listed migratory shorebird species. Department of the Environment. 2015. Wildlife conservation plan for migratory shorebirds. Commonwealth of Australia. Department of the Environment. 2015. Draft referral guideline for 14 birds listed as migratory under the EPBC Act. Commonwealth of Australia. Department of Sustainability, Environment, Water, Population and Communities. 2012. Species group report card - seabirds and migratory shorebirds. Supporting the marine bioregional plan for the North-west Marine Region. Prepared under the Environment Protection and Biodiversity Conservation Act 1999. Commonwealth of Australia. Department of the Environment, Water, Heritage and the Arts. 2009. Threat abatement plan to reduce the impacts of exotic rodents on biodiversity on Australian offshore islands of less than 100 000 hectares. Commonwealth of Australia. Department of Environment and Energy. 2018. Threat abatement plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans. Commonwealth of Australia. Department of Sustainability, Environment, Water, Population and Communities (DSEWPac). 2012. Marine bioregional plan for the North-west Marine Region. DSEWPac, Canberra, ACT. Department of Sustainability, Environment, Water, Population and Communities (DSEWPac). 2012. Marine bioregional plan for the North Marine Region. DSEWPac, Canberra, ACT. Threatened Species Scientific Committee. 2016. *Calidris tenuirostris* (Great Knot) Approved Conservation Advice. Commonwealth of Australia. Threatened Species Scientific Committee. 2016. *Calidris canutus* (Red Knot) Approved Conservation Advice. Commonwealth of Australia. Threatened Species Scientific Committee. 2016. *Charadrius leschenaultii* (Greater Sand Plover)	• Introduced Marine Species • Introduced Terrestrial Pests (rodents) • Benthic habitat degradation / seabed disturbance • Emissions and discharges • Oil spill • Light emissions	• Contribute to the long-term prevention of the incidence of harmful marine debris • Identify threats to important (migratory shorebird) habitat and develop conservation measures for managing them. • Avoid degradation of migratory shorebird habitat that may occur through the introduction of exotic species, changes to hydrology or water quality (including toxic inflows), fragmentation of habitat or exposure to litter, pollutants and acid sulphate soils. Minimise human disturbance, a major threat to migratory shorebirds • Best practice waste management should be implemented.	• EP Section 7.2. – Waste management • EP Section 7.3 - Noise and vibration • EP Section 7.4.1 - Introduction of invasive marine species • EP Section 8 - Emergency conditions (oil spills) • EP Section 7.1.3 - Routine discharges.

Fauna Type	Conservation management documents	Summary of relevant aspects/threats identified from conservation management documents	Summary of relevant actions from conservation management documents	Relevant exposure / risk evaluation section of EP
	Approved Conservation Advice. Commonwealth of Australia. Threatened Species Scientific Committee. 2016. *Charadrius mongolus* (Lesser Sand Plover) Approved Conservation Advice. Commonwealth of Australia. Threatened Species Scientific Committee. 2016. *Fregata andrewsi* (Christmas Island Frigatebird) Approved Conservation Advice. Commonwealth of Australia. Threatened Species Scientific Committee. 2016. *Hypotaenidia philippensis andrewsi* (Buff-banded Rail) Approved Conservation Advice. Commonwealth of Australia. Threatened Species Scientific Committee. 2016. *Limosa lapponica menzbieri* — Northern Siberian Bar-tailed Godwit. Approved Conservation Advice. Commonwealth of Australia. Threatened Species Scientific Committee. 2015. *Calidris ferruginea* (Curlew Sandpiper) Approved Conservation Advice. Commonwealth of Australia. Threatened Species Scientific Committee. 2001. Commonwealth listing advice on *Macronectes giganteus.* Commonwealth of Australia. Threatened Species Scientific Committee. 2015. Papasula abbotti — Abbott's Booby. Approved Conservation Advice. Commonwealth of Australia. Department of the Environment. 2015. Conservation advice *Numenius madagascariensis* (eastern curlew). Commonwealth of Australia. Department of the Environment. 2014. Conservation Advice *Phaethon lepturus fulvus* white-tailed tropicbird (Christmas Island) Commonwealth of Australia. Threatened Species Scientific Committee. 2015. *Pterodroma arminjoniana* — Round IslandPetrel. Approved Conservation Advice. Commonwealth of Australia. Threatened Species Scientific Committee. 2015. *Pterodroma mollis* — Soft-plumaged petrel. Approved Conservation Advice. Commonwealth of Australia.			

Fauna Type	Conservation management documents	Summary of relevant aspects/threats identified from conservation management documents	Summary of relevant actions from conservation management documents	Relevant exposure / risk evaluation section of EP
	Threatened Species Scientific Committee. 2015. Approved Conservation Advice for *Anous tenuirostris melanops* (Australian lesser noddy). Commonwealth of Australia. Threatened Species Scientific Committee. 2002. Commonwealth Listing Advice on *Sterna albifrons sinensis* (Little Tern (western Pacific)). Commonwealth of Australia. Department of Sustainability, Environment, Water, Population and Communities. 2013. Approved Conservation Advice for *Rostratula australis* (Australian painted snipe). Canberra, ACT. Department of Sustainability, Environment, Water, Population and Communities. 2011. Approved Conservation Advice for *Sternula nereis nereis* (Fairy Tern). Canberra, ACT. Department of the Environment and Energy. 2020. Light pollution guidelines – National light pollution guidelines for wildlife: Including marine turtles, seabirds and migratory shorebirds. Commonwealth of Australia, Canberra, ACT. Draft National Recovery Plan for albatrosses and petrels. 2021. Commonwealth of Australia.			
EPBC-listed cetaceans	Department of the Environment. 2015. Conservation Management Plan for the Blue Whales - A Recovery Plan under the Environment Protection and Biodiversity Conservation Act 1999 (2015-2025). Commonwealth of Australia. Threatened Species Scientific Committee. 2015. Balaenoptera borealis (Sei Whale) Conservation Advice. Commonwealth of Australia. Threatened Species Scientific Committee. 2022. Listing Advice for Megaptera novaeangliae (humpback whale). Commonwealth of Australia. Threatened Species Scientific Committee. 2015. Approved Conservation Advice for Balaenoptera physalus — Fin Whale. Commonwealth of Australia. EPBC Act Regulations 2000. Part 8 Interacting with cetaceans and whale watching. Division 8.1 Interacting with cetaceans. Commonwealth of Australia.	• Waste / marine debris • Noise and vibration • Introduced Marine Species • Vessel strike • Benthic habitat degradation / seabed disturbance • Emissions and discharges • Oil spill	• Ensure all vessel strike incidents are reported in the National Ship Strike Database. • Ensure the risk of vessel strikes on blue whales is considered when assessing actions that increase vessel traffic in areas where blue whales occur and, if required, appropriate mitigation measures are implemented. • Protect habitat important to the survival of the species (humpback whales); assess and manage physical disturbance and development activities (such as ship-strike and pollution). • Ensure the risk of vessel strike on humpback whales is considered when assessing actions that increase vessel traffic in areas where humpback whales occur and, if required appropriate mitigation measures are implemented to reduce the risk of vessel strike.	• EP Section 7.2 – Waste Management • EP Section 7.3 - Noise and Vibration • EP Section 7.4.1 - Introduction of invasive marine species • EP Section 7.4.2 - Interaction with marine fauna • EP Section 7.5 - Seabed disturbance • EP Section 7.1.3 - Routine discharges • EP Section 8 - Emergency conditions (oil spills).

Fauna Type	Conservation management documents	Summary of relevant aspects/threats identified from conservation management documents	Summary of relevant actions from conservation management documents	Relevant exposure / risk evaluation section of EP
	Department of the Environment and Heritage, 2005. Australian National Guidelines for Whale and Dolphin Watching - Information Sheet. Commonwealth of Australia. Department of Environment and Energy. 2018. Threat abatement plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans. Commonwealth of Australia. Department of Sustainability, Environment, Water, Population and Communities (DSEWPac). 2012. Marine bioregional plan for the North-west Marine Region. DSEWPac, Canberra, ACT. Department of Sustainability, Environment, Water, Population and Communities (DSEWPac). 2012. Marine bioregional plan for the North Marine Region. DSEWPac, Canberra, ACT. Department of the Environment and Energy. 2017. National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Fauna. Commonwealth of Australia, Canberra, ACT.		• Environmental assessment processes must ensure that existing information about coastal habitat requirements of humpback whales, environmental suitability of coastal locations, historic high use and emerging areas are taken into consideration. • Contribute to the long-term prevention of the incidence of harmful marine debris . • if a whale or dolphin surfaces in the vicinity of a vessel travelling for a purpose other than whale and dolphin watching, take all care necessary to avoid collisions. This may include stopping, slowing down and/or steering away from the animal. • Increased reporting of vessel collision (a requirement of the EPBC Act). • Reduce risk of collision with cetaceans (and turtles) such as maintaining look out, consider reducing vessel speed and course alterations away from sightings.	

Appendix B-
Stakeholder Consultation Log

STAKEHOLDER	Date of Correspondence	Type of Correspondence	Summary of Correspondence / Objection / Claim / Query	Attachments	Assessment of Merit
Authorities					
Australian Fisheries Management Authority (AFMA) (Cwth)	17/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
Australian Hydrographic Office (AHO)	6/04/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
	7/04/2022	Email/ Letter from Stakeholder	Confirmation of reciept. The data supplied will now be registered, assessed, prioritised and validated in preparation for updating AHO's navigational Charting products.	N/A	No objection/claim raised - general correspondence only
Australian Maritime Safety Authority (AMSA) - Nautical Advice (Cwth)	21/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX

		1/04/2022	Email/ Letter from Stakeholder	AMSA thanked INPEX for notification. Stated that INPEX's proposed Offshore Greenhouse Gas Storage Exploration snd Assessment Activities have been reviewed, and as apart of this review process AMSA has analysed the shipping traffic in the area. AMSA noted there is considerable traffic in the proposed area. Conventional cargo ships, tankers and support do pass consistently through the northern section. Fishing, passenger, and some cargo and tanker vessels are recorded passing through the rest of the proposed areas. Much of this traffic is entering Darwin from WA coast and the offshore oil and gas activities in NW WA. AMSA advised that due to this traffic in the proposed area it is important that INPEX's activities are communicated effectively and in a timely manner to mariners. Requested INPEX notify AMSA's Joint Rescue Coordination Centre (JRCC) and provided contact details (Phone and Email) for promulgation of radio-navigation warnings 24-48 hours before operations commence. Outlined that AMSA's JRCC will require the rig details (including name, callsign and Maritime Mobile Service Identity (MMSI)), satellite communications details (including INMARSAT-C and satellite telephone), area of operation, requested clearance from other vessels and need to be advised when operations start and end. Reminded INPEX that the Australian Hydrographic Office should also be contacted and provided contact details (Email) no less than four working weeks before operations commence for the promulgation of related notices to mariners.	N/A	Relevant matters raised - INPEX has noted there is considerable traffic in proposed area. INPEX will provide notice to mariners in a timely manner, and notify AMSA's JRCC and provide contact details, rig details, satellite communication details, area of operation, requested clearance from other vessels and advise when operations start and end. INPEX will contact AHO and provide contact details no less than four working weeks before activities commence as detailed in Section 9.8.3 of the EP.
	Australian Maritime Safety Authority (AMSA) - first strike capabilities	14/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the national proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
		3/06/2022	Email/Letter to Stakeholder from INPEX	Email sent to stakeholder as a written record of conversation earlier in the week regarding Petroleum Titleholder (TH) activation of 'first strike' capabilities under a TH OPEP, in relation to a 'vessel spill', where AMSA is the Control Agency. The key points we discussed were: -Vessel spill scenario – AMSA is Control Agency – however AMSA position is that TH should activate all TH OPEP 'first strike' capabilities, where there is no 'risk' of additional environmental harm, associated with the mobilisation/activation of that capability. -TH mobilised capabilities can be 'turned-off' at any time, as directed by AMSA. -Whilst initially mobilised by the TH, operational control of these capabilities will be taken over by AMSA as the Control Agency, as the scenario evolves and IMT's become established. Transfer of control of THs capabilities to AMSA will occur via consultation between the TH IMT and the AMSA IMT. -Therefore, in the case of a Group IV vessel spill in the Ichthys field, INPEX will: -TH Field – Deploy satellite tracker buoys -TH Field – proactively mobilise vessel based dispersant capability -Move dispersant onto vessels -Set-up spray equipment -Complete JHAs/ review SOPs etc -NO test-spray or operational dispersant spray until given the direction from AMSA	N/A	N/A - Correspondence sent by INPEX

			-TH IMT – activate oil spill trajectory modelling -TH IMT – identify/mobilise/activate aerial surveillance capability (TH helicopters, third-party fixed wing aircraft, AMOSC trained aerial observers) -TH IMT – proactively mobilise Containment and Recovery capability including: -equipment from AMOSC Broome Stockpile -identify/mobilise suitable C&R vessels to Broome wharf -identify/mobilise AMOSC Core-Group personnel to Broome -TH IMT – proactively commence mobilisation for Fixed Wing Aerial Dispersant (FWAD) capability (via AMOSC) -commence mobilisation of dispersant stockpile to a nominated airfield -commence process for mobilisation of crop-dusters -commence other such planning processes, under the AMOSC Northern Australia Air Operations Plan -NO test-spray or operational dispersant spray until given the direction from AMSA Whist this is a written record of the conversation, INPEX requested stakeholder reply that the AMSA agree with the above statements.		
	3/06/2022	Email/Letter from stakeholder	AMSA agreed with the following amendment: 1. INPEX will advise AMSA of the commencement and completion of each step as listed in previous email. 2. INPEX will note that cost recovery will be against the polluters insurance (i.e. ship). 3. FWAD will be activated through AMSA contract and control for ship-sourced incident.	N/A	Relevant matter raised - INPEX will advise AMSA of the commencement and completion of each step as outlined in previous email. INPEX noted that cost recovery will be against the polluters insurance (i.e. ship). FWAD will be activated through AMSA contract and control for ship-sourced incident. The INPEX *Browse Regional OPEP* has been updated to reflect these requirements.
	3/06/2022	Email/ Letter to Stakeholder from INPEX	INPEX thanked stakeholder for feedback. INPEX accepted the amendments	N/A	N/A - Correspondence sent by INPEX
	8/06/2022	Email/ Letter to Stakeholder from INPEX	To finalise correspondence, INPEX sent attachment of INPEX's Browse Regional OPEP, covering all of INPEX's activities in northern WA/ NT waters, replacing all previous INPEX OPEPs submitted to AMSA.	Yes- INPEX's Browse Regional OPEP	N/A - Correspondence sent by INPEX
Director of National Parks - Marine Parks	15/03/2022	Email/ Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway. -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2. The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. Name of the Company and titleholder EP: INPEX Browse E&P Pty Ltd, as Operator of the Bonaparte CCS Assessment Joint Venture. There are potentially three EPs that will be submitted: Exploration Drilling Bonaparte Basin Environment Plan 3D Seismic Bonaparte Basin Environment Plan Geophysical/Geotechnical Site Survey Bonaparte Basin Environment Plan. Note, the names of EPs may change. INPEX provided contact details for titleholder representative As noted above the permit/title is yet to be awarded; however, it will be the extent of the GHG21-1 release area. The location of GHG21-1 release area is shown in Figure 1 of the attached fact sheet. INPEX will update relevant stakeholders with the permit/title details once awarded. The activity overview for 3D seismic and exploration drilling activities is provided in the attached fact sheet.	N/A	N/A - Correspondence sent by INPEX

	Date	Method	Summary	Attachment	Response
			INPEX provided the following description of the operational area including a map showing location of the activity relative to marine park boundaries: The GHG21-1 release area overlaps the Oceanic Shoals Marine Park (Multiple Use Zone; IUCN VI) in the north-west extent of the release area boundary. Further, the Joseph Bonaparte Gulf Marine Park is located to the south and south-west of the release area boundary (~71 km at its closest point). The actual proposed operational/project areas for the 3D seismic and exploration drilling/site survey activities (refer to figures 2 and 3 in the attached fact sheet) do not overlap any marine park: The seismic operational area is located ~32km (at its closest point) from the Oceanic Shoals Marine Park boundary, and ~60km (at its closest point) from the Joseph Bonaparte Gulf Marine Park boundary. The drilling project area is located ~43km (at its closest point) from the Oceanic Shoals Marine Park boundary, and ~87km (at its closets point) from the Joseph Bonaparte Gulf Marine Park boundary. A brief description of any planned aspects of the activity within or that may impact on the values of an Australian Marine Park No planned aspects of the activities are expected to impact on values of any Australian Marine Park. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).		
	20/06/2022	Email/ Letter from Stakeholder	The DNP requested INPEX to provide further detail regarding the identification and management of risks to natural values, including, but not limited to, the Flatback, Loggerhead and Olive Ridley turtles which are present and display behaviours including foraging and migration within the acreage and proposed operational areas. The DNP requested that matters addressed should include activity timing, cumulative impacts with other known activities within the region, noise interference, vessel disturbance and light pollution. INPEX should ensure that the EP: -Identifies and manages all impacts and risks on Australian marine park values (including ecosystem values) to an acceptable level and has considered all options to avoid or reduce them to ALARP. -Clearly demonstrates that the activity will not be inconsistent with the management plan. Noting the values present within and adjacent to the proposed operational area, the DNP make the following claims and objections, that INPEX provide DNP: •Further detail regarding the identification and management of risks to natural values, including, but not limited to, the Flatback, Loggerhead and Olive Ridley turtles which are present and display behaviours including foraging and migration within the acreage and proposed operational areas. Matters addressed should include activity timing, cumulative impacts with other known activities within the region, noise interference, vessel disturbance and light pollution. •Confirm that equipment would be stowed (such as seismic streamers) when entering and exiting the operational area within the Oceanic Shoals Marine Park to minimise potential impact. Providing this information will enable DNP to finalise any claims and objections and ensure adequate consultation has occurred with the DNP as a 'relevant person' under the OPGGS Act.	N/A	Relevant matter raised - Information provided with respect to the values associated with the closest AMPs have been described in Section 4.2 and 4.3 of the EP. Section 4.7.4 describes all marine turtle species that may be present as identified in the EPBC Protected Matters database search. BIAs, critical habitats, seasonality, migratory and foraging behaviours are all described in Section 4.7.4. To be conservative, in Sections 7 and 8, the impact and risk assessments have been completed on the basis that marine turtles may be present in the project area on year-round. Sections 7 and 8 assess the impacts and risks associated with the activity and demonstrate that with the defined controls in place all impacts and risks will be reduced to ALARP and acceptable levels for all relevant identified values and sensitivities which align with AMP values. The activity will be managed in accordance with AMP management plan objectives. In the event of a spill, INPEX oil spill notifications are aligned with the DNP requirements as described in Section 4.3, Section 9.11.3 and the INPEX Browse Regional OPEP.
			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. Notification should be provided to the 24 hour Marine Compliance Duty Officer on 0419 293 465. 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. Note that the DNP may request daily or weekly Situation Reports, depending on the scale and severity of the pollution incident.		

		23/06/2022	Email/Letter to Stakeholder from INPEX	INPEX provided the request information through provision of the drafts EPs to the DNP, noting: **Drilling and Pre-drill Geophysical/Geotechnical survey activities** Please find attached Draft EPs for the Exploration Drilling and Pre-drill Geophysical/Geotechnical Survey, which include the information requested in item 1 above for these activities. A summary of where relevant information can be found in each of the EPs is provided in the Table below. INPEX understands that item 2 of the request is specific to the seismic activity. **Information (EP section)** -Key ecological features including the Pinnacles of the Bonaparte Basin (Section 4.2) -Australian marine park values (Section 4.3) -Marine fauna including marine turtles: covering biologically important areas/critical habitats, nesting, migratory and foraging behaviours and the timing/locations of such behaviours are described for each individual turtle species. (Section 4.7.4) -Impact and risk assessment including noise, light pollution and vessel disturbance (interaction with marine fauna) for the identified values and sensitivities defined in Section 6.2 of the EP. These receptors include benthic primary producer habitat, regionally important areas of high diversity, EPBC listed threatened and migratory species and BIAs, which align with AMP values including ecosystem values. (Section 7) -Emergency conditions risk assessment for an unplanned vessel collision spill with respect to the identified values and sensitivities (Section 6.2) which align with AMP values including ecosystem values. (Section 8). **Emergency response** INPEX has developed a single oil pollution emergency plan (the INPEX Browse Regional Oil Pollution Emergency Plan) to cover its activities in the Canning (offshore), Browse and Bonaparte basins. The requirement to notify the DNP (including information requirements, contacts and timing) in the event of spill impacting on a marine park is incorporated in the INPEX Browse Regional Oil Pollution Emergency Plan.	Yes - copy of draft EPs	N/A - Correspondence sent by INPEX
		22/07/2022	Email/Letter to Stakeholder from INPEX	Email to confirm if DNP needed any further information on the proposed activities	No	N/A - Correspondence sent by INPEX
		27/07/2022	Email/ Letter from Stakeholder	DNP thanked INPEX for the response to the claims and objections raised and noted that cumulative impacts had not been addressed in respect to other GHG and petroleum activities that may be occurring within the proposed activity timeframes. DNP requested that where applicable, this may include identifying any concurrent activities and mitigating impacts upon values that are present in the nearby marine parks. This request is consistent with the Director of National Parks' consultation response to the 2021 GHG release – that activities within this acreage would need to address cumulative impacts, noting the proximity of petroleum and GHG acreages and actives adjacent / near this acreage.	No	Relevant matter raised - INPEX updated Section 7 of the EP to provide an assessment of cumulative impacts to marine fauna from concurrent petroleum or GHG activities overlapping or adjacent to the permit area within the timeframe of the EP.
		28/07/2022	Email/Letter to Stakeholder from INPEX	INPEX confirmed the potential petroleum and GHG activities that may occur in adjacent or overlapping titles by consulting with NOPTA's NEATS database. INPEX also provided the distances to other known petroelum production operations (ENI Blacktip) and proposed exploration drilling activities (Beehive-1 exploration well) known to be active/occur within the timeframe of the EP. Based on the distancse (over 100 km) and the oceanic currents, discharge plumes associated with the production facility or Beehive-1 exploration well and INPEX's exploration drilling activities in the project area will not overlap. Similarly, potential disruption associated with vessel and MODU presence (light, noise and potential for vessel strike) is not expected given the distance. INPEX confirmed the draft Exploration Drilling EP will be amended to include an assessment of potential cumulative impacts associated with any proposed petroleum/GHG activities with a particular focus on those permits that either overlap or are adjacent to the project area. This will include but not be limited to the potential for discharge plumes to overlap, physical presence and light and noise impacts. Consideration will be given to the potential for both spatial and temporal cumulative impacts to sensitive receptors. With respect to the Pre-drill Geophysical/Geotechnical Survey EP, given the short duration of the survey and lack of significant sources of discharges, above that of any other standard vessel operating offshore such as fishing vessels, It is not considered there would be any potential for cumulative impacts to occur.	N/A	N/A - Correspondence sent by INPEX
		28/07/2022	Email/ Letter from Stakeholder	DNP noted the information provided regarding activities in the vicinity to the proposed activity and that the risk of cumulative impacts will be addressed in the environment plan. Also confirmed that the Director of National Parks has no further claims and objections at this time.	N/A	N/A

	Department of Agriculture, Water and Environment (DAWE) now Department of Climate Change, Energy, the Environment and Water (DCCEEW)	17/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
		21/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
		10/04/2022	Email/ Letter from Stakeholder	Email response from stakeholder requesting INPEX provide information on what interactions the project vessels/installations will have with domestic vessels during the proposed activities and how they will be managed.	N/A	Request for information (no objection of claim raised)
		11/04/2022	Email/ Letter from Stakeholder	In addition to previous email, stakeholder requested INPEX populate the attached assessment questions.	Yes - assessment questions document	Request for information (no objection of claim raised)
		10/06/2022	Email/Letter to Stakeholder from INPEX	Email to confirm that at present the vessels for the proposed activity have not been contracted and therefore INPEX cannot provide the requested information. INPEX will provide the requested information 4 weeks prior to the commencement of activities.	N/A	Relevant matter raised - the requirement to provide the requested information to DCCEEW has been detailed in Section 9.8.3 of the EP.
	Department of Climate Change, Energy, the Environment and Water (DCCEEW) - Environmental Approvals Division, Sea Dumping Section	4/07/2022	Email/Letter to Stakeholder from INPEX	Following a meeting with the Department on 15/06/2022, INPEX provided an Evaluation of Potential Sea Dumping Permit Requirements wirth respect to the exploration drilling activities proposed in the Bonaparte Basin.	Yes - INPEX's Evaluation of Potential Sea Dumping Permit Requirements	N/A - Correspondence sent by INPEX
		3/08/2022	Email/ Letter from Stakeholder	The Department confirmed they had reviewed the document and concluded that the activities covered by the EP are considered as part of normal operations and are therefore excluded from the requirements for a sea dumping permit.	N/A	No objection/claim raised

	Department of Biodiversity Conservation and Attractions (DBCA) - Environmental Management Branch (WA)	23/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on caron capture storage (CCS). INPEX advised they will refer to the Commonwealth Department of Agriculture, Water and the Environment's National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds for managing potential impacts of light pollution on marine fauna and will refer to the guideline when developing the risk assessment and controls adopted.	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
				INPEX inquired whether the current DBCA Kimberley office phone number on the INPEX Australia Emergency contacts list can contnue to be used. INPEX advised they will include this notification requirement within the Notifications section of INPEX's OPEP for this activity Advised that within INPEX's OPEPs, it is acknowledged that any spill/impact to WA/NT waters/shorelines is managed in accordance with relevant state/territory management plans and INPEX acknowledges that any DBCA involvement in oiled wildlife response within State waters will only be under the direction of the relevant Control Agency. Advised that as required under the OPGGS Act and associated regulations, INPEX maintains financial assurance against oil spill events, ensuring adequate cost-recovery associated with oil spill response. Outlined that INPEX includes monitoring of impacts, and determination of secondary response actions including shoreline clean-up and oiled wildlife response, and ongoing scientific monitoring post response termination, as part of all INPEX OPEPs. This includes all potentially impacted WA/NT waters/shorelines, including all DBCA interests.		
		12/04/2022	Email/ Letter from Stakeholder	Stakeholder thanked INPEX for providing information in relation to INPEX's upcoming activities in exploration permit GHG21-1 within Commonwealth waters. Based on the documentation provided for review and other readily available information, DBCA has no comments in relation to its Conservation and Land Management Act 1984 and Biodiversity Conservation Act 2016 related responsibilities, beyond that previously provided to INPEX in relation to other petroleum related activities as acknowledged below. Stakeholder confirmed the phone number for the DBCA Kimberley office and requested INPEX continue to use this number for regional communication with DBCA. Provided email address for INPEX to continue to provide all future notifications.	N/A	No objection/claim raised

	Department of Defence (Cwth)	6/04/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on caron capture storage (CCS). INPEX advised they will refer to the Commonwealth Department of Agriculture, Water and the Environment's National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds for managing potential impacts of light pollution on marine fauna and will refer to the guideline when developing the risk assessment and controls adopted. INPEX inquired wether the current DBCA Kimberley office phone number on the INPEX Australia Emergency contacts list can contnue to be used.	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
				INPEX advised they will include this notification requirement within the Notifications section of INPEX's OPEP for this activity Advised that within INPEX's OPEPs, it is acknowledged that any spill/impact to WA/NT waters/shorelines is managed in accordance with relevant state/territory management plans and INPEX acknowledges that any DBCA involvement in oiled wildlife response within State waters will only be under the direction of the relevant Control Agency. Advised that as required under the OPGGS Act and associated regulations, INPEX maintains financial assurance against oil spill events, ensuring adequate cost-recovery associated with oil spill response. Outlined that INPEX includes monitoring of impacts, and determination of secondary response actions including shoreline clean-up and oiled wildlife response, and ongoing scientific monitoring post response termination, as part of all INPEX OPEPs. This includes all potentially impacted WA/NT waters/shorelines, including all DBCA interests.		
		17/05/2022	Email/Letter to Stakeholder from INPEX	INPEX thanked stakeholder for taking time to meet with INPEX. Followed up on a point made in meeting, outlining that the overall project schedule has been revised very recently to reflect the potential for a marine seismic campaign in Q2 2023. Attched high level schedule to email.	Yes- High level schedule	N/A - Correspondence sent by INPEX
		27/05/2022	Email/Letter to Stakeholder from INPEX	INPEX thanked stakeholder for their time on the 17th May to discuss INPEX's proposed assesment program in the NAXA as described in the fact sheet provided to Defence on 6th April 2022. INPEX acknowledged from the meeting that current plans for military exercises include: - Operation Kakadu - September 2022, and - Operation Talisman-Sabre - mid 2023 (major international activity over a much roader spatial area). Both are likely to include patrol boats and live firing exercises. INPEX acknowledged stakeholders request to provide as much advance notice as possible for any planned activities by INPEX or contractors in the NAXA (i.e.five to six weeks' notice was suggested). To help manage the water space, INPEX will also provide advance details in relation to the nature and scale of the activities including vessel size, Mobile Offshore Drilling Unit (MODU) location, and for the proposed seismic survey, also include the length of the seismic vessel streamers, approximate water depth, noise levels (frequencies) and proposed dates for scheduled activity. INPEX recognises these activities are contingent upon a successful bid for acreage GHG 21-1, which is due for determination in the coming weeks.	N/A	N/A - Correspondence sent by INPEX

		31/05/2022	Email/ Letter from Stakeholder	Stakeholder thanked INPEX for email. In addition to the two listed major activties below will Exercise Singaroo conducted immediately following Kakadu in the same areas and will also include live firings. For the Patrol Boats, they regularly conduct training in the NAXA area that includes live firings however these are not usually programed until six to eight weeks prior and will be included in the NOTAMs that were mentioned during the meeting and recommend these are checked regularly (they are a weekly document).	N/A	Relevant matter raised - INPEX notes current plans for scheduled military exercises and defence activities and that these will be published in NOTAMs. These requirements have been considered in Section 7.6.1 of the EP. INPEX will provide the required notifications to Defence as detailed in Section 9.8.3 of the EP.
	Department of Infrastructure, Planning and Logistics - Transport - Marine Safety Branch (DIPL) (NT)	14/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submiteed for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
	Department of Mines, Industry Regulation and Safety (DMIRS) (WA)	21/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
		29/04/2022	Email/Letter from stakeholder	Acknowledgement of receipt. DMIRS notes that the proposed activity will be assessed under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 and regulated by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA). DMIRS has reviewed the notification and does not require any further information at this stage. DMIRS requested INPEX provide pre-start notification confirming the start date of the proposed activity and a cessation notification to inform DMIRS upon completion of the activity. DMIRS provided contact details (email address) for notification to be sent to. DMIRS advised INPEX see the Consultation Guidance Note for information pertaining to the reporting of incidents that could potentially impact on any land or water under State jurisdiction.	N/A	Relevant matter raised - INPEX notes the consultation guidance note. INPEX will provide pre start notification to DMIRS confirming the start date and end date of proposed activity as detailed in Section 9.8.3 of the EP.

	Department of Primary Industries and Regional Development (DPIRD) - Aquatic Environment section (WA)	17/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
	Department of Primary Industries and Regional Development (DPIRD)	14/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
		14/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet resent to stakeholder as stakeholder was on leave, asking for best contact details to re-direct to.	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
	Department of Primary Industries and Regional Development (DPIRD) (WA) - Fisheries data	16/02/2022	Email/Letter to Stakeholder from INPEX	Email sent to DPIRD with attached fiheries data request. INPEX requested DPIRD confirm that the request and licence agreement include all of the details needed and INPEX will sign and send through as a PDF final.	Yes - Fisheries data request	N/A - Correspondence sent by INPEX
		25/02/2022	Email/Letter to Stakeholder from INPEX	Email sent to DPIRD requesting to confirm that the data request sent on February 16th has been recieved. Requested that if the details of the request are sufficient, DPIRD advise, and INPEX can sign the licence agreement.	N/A	N/A - Correspondence sent by INPEX
		31/03/2022	Email/ Letter from Stakeholder	Response recieved. DPIRD apologised for delay in response and explained that DPIRD has been working on refreshing FishCube data as a priority and it has delayed the process of data requests. DPIRD queried if INPEX still require the data for this data request.	N/A	No objection/claim raised
		31/03/2022	Email/Letter to Stakeholder from INPEX	Response from INPEX informing DPIRD that the data is still needed. INPEX queries when they will recieve the data and whether DPIRD require any agreements signed off.	N/A	N/A - Correspondence sent by INPEX
		1/04/2022	Email/ Letter from Stakeholder	Stakeholder responded stating the data should be provided early next week. Advised that once DPIRD has the data they will let INPEX know if the agreement needs to be revised or not.	N/A	No objection/claim raised
		1/04/2022	Email/ Letter from INPEXEmail/Letter to Stakeholder from INPEX	INPEX thanked stakeholder for response	N/A	N/A - Correspondence sent by INPEX
		8/04/2022	Email/ Letter from Stakeholder	Stakeholder advised that a signature is needed on the data licence agreement and requested INPEX to organise for it to be signed.	N/A	No objection/claim raised
		10/04/2022	Email/Letter to Stakeholder from INPEX	INPEX responded advising they amended dates and signed as requested	N/A	N/A - Correspondence sent by INPEX

		12/04/2022	Email/ Letter from Stakeholder	Stakeholder sent email with attached fisheries data and data licence agreement. Advised that there are aquaculture sites active within the North Coast Bioregion but DPIRD cannot disclose more specific details of their locations or production due to privacy concerns.	Yes - Fisheries data	No objection/claim raised. Provision of data.
		14/04/2022	Email/Letter to Stakeholder from INPEX	INPEX thanked DPIRD for providing data and queried the following: Requested DPIRD clarify what 'Open Access' and FBL Condition 74' are? Do these relate to specific fisheries, or are they a standalone type of fishery/licence? The 5 year aggregate spreadsheets have the suffixes 'Daily' and 'Monthly'. INPEX is unsure what this means if it is a 5 year aggregate. Also, the monthly spreadsheet has the fishery set out by 60 NM blocks; Asked if it is possible to get this broken down to 10 NM scale, but advised will wait for your answer about the differences between these two spreadsheets in case I have misunderstood. Pilbara trap, Pilbara line, Pilbara crab, Open Access, Kimberley Gillnet and FBL Condition 74 data are all at the 60 NM scale. Queried if any of these are available in a smaller block size. If not, is this because the fisheries only report at the 60 NM level or is there some other confidentiality/restriction that prevents this? Regarding aquaculture, INPEX appreciates that some of this data cannot be shared. We INPEX is aware of the following two DPIRD datasets: Aquaculture sites (provided links); and Pearling leases and holding sites (provided links). Requested DPIRD confirm if these datasets include all existing sites? Or if this isn't possible, requested INPEX confirm that all sites are in State coastal waters (within the 3 NM limit)? As long as none are in Commonwealth waters in the Joseph Bonaparte Gulf, then INPEX shouldn't need any further information.	N/A	N/A - Correspondence sent by INPEX
		14/04/2022	Email/ Letter from Stakeholder	DPIRD provided the following response to INPEX's queries: Open Access indicates catch that is not attributed to any particular managed fishery licence. FBL Condition 74 is a condition on some Fishing Boat Licences. In this case FBL Condition 74 is a Fish Trapping condition. The datasets were too large to fit in one spreadsheet so they had to be broken up. The 5 year aggregate ones were divided up by the fisheries that report monthly and those that report with Daily returns. Fisheries that report via monthly returns report via 60x60NM blocks. They do not report at the 10x10NM block scale only fisheries that submit daily returns do. See above Advised they can't view the links provided but when checked the aquaculture and pearling lease sites in our Corporate Map Portal (which are provided by our GIS section) confirm that there are no aquaculture sites or pearl leases in the Joseph Bonaparte Gulf and that aquaculture/pearling sites will only be seen beyond the 3NM boundary from Broome westwards.	N/A	No objection/claim raised. Provision of information.
	Department of Transport (WA)	8/06/2022	Email/Letter to Stakeholder from INPEX	As part of consultation requirements under INPEX's EP, INPEX sent attachment of INPEX's Browse Regional OPEP, which is now accepted by NOPSEMA, and replaces all previous INPEX OPEPs for petroleum activities in commonwealth waters.	Yes - INPEX's Browse Regional OPEP	N/A - Correspondence sent by INPEX
		17/06/2022	Email/Letter from stakeholder	WA DoT acknowledged that although they had been consulted during the development of the Browse Regional OPEP they now request to review all of the Browse Regional OPEP documents in full.		Request for information (no objection of claim raised)
		20/06/2022	Email/Letter to Stakeholder from INPEX	INPEX confirmed that the Browse Regional OPEP is now INPEX's single OPEP and welcomed the review by WA DoT.		N/A - Correspondence sent by INPEX
		22/07/2022	Email / letter from Stakeholder	WA DoT provided detailed comments on the BROPEP noting that the information generally presneted in OPEP's is not presented in the usual format. A discussion was proposed to discuss how risks to the State can be managed accordingly.	Yes - WA DoT review of BROPEP	Relevant matter raised- Following the review of the BROPEP by WA DoT, a meeting will be held between INPEX and WA DoT in September 2022. This meeting will confirm required updates to the BROPEP and supportting documents.
		27/07/2022	Email/Letter to Stakeholder from INPEX	INPEX also confirmed that some of the information identifed by WA DoT as not being presented in the BROPEP is now contained within other BROPEP supportting documents. INPEX confirmed they would like to request a meeting so that updates to the BROPEP can be made and the information made available to other titleholders who are collaboratively working together to adopt regional OPEPs. Dates for proposed meeting in September 2022.		N/A - Correspondence sent by INPEX

	National Offshore Petroleum Titles Administrator (NOPTA) (Cwth)	21/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
		22/03/2022	Email/ Letter from Stakeholder	Confirmation of reciept.	N/A	N/A - General Correspondence only
	NT Pollution	16/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
	Northern Territory Government - Chief of Staff to the Deputy Chief Minister	22/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX

NT Government	16/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
NT Minister	16/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
NT Environmental Protection Authority (EPA)	14/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
	14/03/2022	Email / letter from Stakeholder	Confirmation of reciept. Stakeholder referred email for consideration by the Environment Division of the Department of Environment Parks and Water Security acting on behalf of the NT EPA.	N/A	No objection/claim raised - general correspondence only

	NT Department of Industry, Tourism and Trade (DITT) - Fisheries	14/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
		29/03/2022	Email/ Letter from Stakeholder	Stakeholder thanked INPEX for the opportunity to provide comment on the proposed Offshore Greenhouse Gas Storage Exploration and Assessment activities in the Bonaparte Basin. Noted that the permit area is contained primarily within NT waters and consequently there are Northern Territory commercial fisheries operating within the area. Advised it should be noted that the stock structure of many commercially and recreationally important fish species is not well understood and any potential impact on aquatic life within the permit area, as a result of this work, could potentially negatively impact on fish stocks across the NT or those shared stocks that straddle the WA/NT border. Outlined that the NT Fisheries is particularly concerned about potential impacts from any seismic exploration conducted as part of the assessment. To date, valuable research work conducted into this matter has resulted in a greater understanding of the range of potential impacts to fish from seismic, including impacts to audio organs, larval survival and other varying spatial and temporal impacts. Whilst our understanding of the impacts of seismic testing on fisheries is improved, several areas of concern remain. Stated that the NT Fisheries understands and acknowledges that seismic surveying is a key component of oil and gas exploration and is often fundamental to this development in the marine environment. However, requested that any seismic work necessary to be undertaken through this assessment, does not occur within the warmer months of the year which generally coincide with many tropical fish species spawning seasons. Provided contact details (Phone number) to contact Fisheries division within Department of Primary Industry and Fisheries, for further information.	N/A	Relevant matter raised - INPEX notes that NT commercial fisheries operate within proposed area. NT DITT's concerns are in relation to the seismic survey, not the exploration drilling and associated activities.
		29/03/2022	Email/Letter to Stakeholder from INPEX	INPEX thanked stakeholder for providing feedback. Outlined that INPEX is seeking to better understand potential impacts and would like to further discuss Stakeholders concern. INPEX requested stakeholder provide more specific detail and what they mean by warmer months, and wether this indicated a period of 6 moths or potentially only one to two months. INPEX inquired wether data request previously lodged with DITT will be made available soon in preperation for the potential impact assessment within the EP, and to investigate optimal timeframes for the survey (referring to attached email which includes a copy of the fact sheet and fisheries data request). INPEX noted that the NT Seafood council advised that Development Fishry licence holder may be active in the area, and requested DITT advise whether the licences are still active or if the NT fisheries are looking to transtion the development licence holders into a fishery. Included table outlining fisheries data request.	Yes - Email sent to DITT on 14/03/2022	N/A - Correspondence sent by INPEX

	30/03/2022	Email/ Letter from Stakeholder	Stakeholder thanked INPEX for email Advised that the warmer months reffered to is the period from about September until the end of March. Given there are a range of tropical species that spawn during this period the actual spawning window is quite protracted (6 months). Advised that the best option from NT Fisheries point of view would be to conduct the 6-10 week seismic survey soon after the wet season ends (and spawning ceases) i.e from March/April onwards. Advised that conducting the survey later in the year (September onwards) would potentially lead to negative impacts on fish stocks just prior to a spawning event and therefore should be avoided where possible. In relation to the requested data, DITT stated thay have forwarded it to the Licensing area who will add the licence holder contact details and then on-forward all the data to INPEX. As for Development Fishery licences, DITT advised that the only current one is the small pelagic. Outlined that Specific information on this licence has been provided within the data request. Requested INPEX note, there is a strong likelihood that this development licence will transition to a stand-alone fishery in the future. No other development licences are current, although NT Fisheries do periodically receive applications for a development permit/licence that we consider on a case-by case basis. Stakeholder outlined they were not copied into your email of 14 March.	N/A	No objection/claim raised. Advice provided regarding timing of the seismic survey to reduce impacts on fish spawning periods. NT DITT's concerns are in relation to the seismic survey, not exploration drilling.
	30/03/2022	Email/Letter to Stakeholder from INPEX	INPEX thanked stakeholder for the feedback. Thanked stakeholder for forwarding on the info to the Licensing area. INPEX apologised for not copying in stakeholder, outlined which email address INPEX had been using for the request and stated INPEX will update my contact register for future engagement so stakeholder is not missed.	N/A	N/A - Correspondence sent by INPEX
	31/03/2022	Email/ Letter from Stakeholder	DITT attached fisheries data as requested. Outlined that due to low licence numbers operating in some of these fisheries, much of the catch information is confidential. Effort data has been provided to give an indication of the relative importance of a grid to the fishery. Requested INPEX let DITT know if they would like to revisit this data and amalgamate catch across years in an effort to remove some of the confidentiality issues. DITT provided attached an update on potential merger of TRF and NT Demersal and how this will affect management areas and access. Refer to attached update DITT provided details of the small pelagic gear type, target species, number of licence holders and location. DITT outlined that the Pearl Oyster Fishery is still operating as well as the jigging fishery with one active licence in the Jigging Fishery.	Yes - Fisheries data request, licence holder contact details, data sharing agreement, update on potential merger of TRF and NT Demersal.	No objection/claim raised. Provision of information.
	31/03/2022	Email/ Letter from Stakeholder	Stakeholder re-sent email without final data agreement which will be sent seperatley.	Yes - Fisheries data request, licence holder contact details, update on potential merger of TRF and NT Demersal.	N/A - General Correspondence only

12/04/2022	Email/Letter to Stakeholder from INPEX	INPEX thanked DITT for sending through the data and information. INPEX reviewed data and asked the following questions: 1)INPEX notes that the Jigging Fishery has reported effort in 60 nautical mile block 1229, overlapping INPEX's proposed activities. There does not appear to be information on this fishery on the department's website. INPEX requested DITT confirm the following information so that INPEX has an understanding of theses fishing activities: Fishing licence area Key target/indicator species Gear type – presumably just jigs 2)INPEX queried how the A14 small pelagic development fishery and the A17 jigging fishery differ from the A19 Small Pelagic Fish & Squid Fishery Licence? 3)There are a great many other fisheries and licence types listed in the 'Licence type description.csv' file that DITT provided that are not on the department's website and some that INPEX were not previously aware of. INPEX requested DITT confirm if any of the other licence types (additional to those DITT have already provided data for) have 2016 – 2020 fishing effort that overlaps the location of our proposed activities? (this includes parts of 60 nm blocks 1228, 1229, 1328 and 1329.) 4)INPEX querried If the data is available in a better resolution than the 60 nm blocks? For example, 10 nm blocks. INPEX appreciates that this scale will return more confidential results, but it is fishing effort that INPEX are primarily interested in, not catch. INPEX queried If it is available, how long would DITT need to be able to provide the data?	N/A	N/A - Correspondence sent by INPEX
12/04/2022	Email/ Letter from Stakeholder	DITT provided answers and comments to INPEX questions as below: 1) Jigging Fishery Fishing licence area – all of AFZ Key target/indicator species - squid Gear type – presumably just jigs – squid jigs 2) The A19 is not yet a recognized fishery – therefore no effort. 3) The other licenses or permit types are either no longer active or are not active in the area of your proposed activities. 4) Data is available at 10 nm blocks for some fisheries (not all). It is worth noting however that reporting to 10nm blocks is not a standard reporting function from our database and the extraction therefore requires a level of GIS capability to extract via GPS coordinates. With current staff absences DITT would need until end of April before they could accommodate this request.	N/A	No objection/claim raised. Provision of information.
14/04/2022	Email/ Letter to Stakeholder from INPEX	INPEX thanked stakeholder for response. INPEX reponded that INPEX would like to go ahead with the request for the 10 NM block size data as this may make a significant difference to our assessments. If available at this scale, INPEX requested data for • Demersal Fishery • Timor Reef Fishery • Spanish Mackerel • Offshore Net & Line • Aquarium • Development - Small Pelagic • Pearl Oyster • Jigging fishery • Fishing Tour Operators In addition, if C2 pearl oyster culture industry licence is referring to pearl farm leases and holding sites in coastal waters, INPEX requested to get the locations of these sites, if possible.	N/A	N/A - Correspondence sent by INPEX

		5/05/2022	Email/ Letter from Stakeholder	Stakeholder provided Subgrid data attached as requested. Stakeholder informed INPEX that catch data has been removed from the dataset (and replaced with 'NA') where less than 5 licences are operating within a Subgrid in a given year. Effort data is provided in its entirety. Additionally, Stakeholder attached a map of the fishery Subgrids and within each dataset provided the lat and long of each Subgrid centroid to assist in mapping of the data. To assist in INPEX's understanding of the C2 Pearl Oyster Culture Industry Licence, stakeholder included four maps depicting where known pearl leases occur within the NT. Stakeholder advised it should be noted that records pertaining to aquaculture leases and holding areas are not maintained by the Fisheries Division. Leases overlying the sub-tidal sea floor are issued and controlled by the Crown Lands Department and it may be better to contact them to ensure you get a comprehensive understanding of all leased areas in NT waters.	Yes – Subgrid data, map of fishery subgrids, maps of pearl leases in NT.	No objection/claim raised. Provision of information.
	NT Department of Industry, Tourism and Trade (DITT) - Agribusiness and Aquaculture	22/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
	NT Department of Industry, Tourism and Trade (DITT) - Mining and Energy	22/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
	Minister for Primary Industry and Resources (NT)	22/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX

Minister for Resources (NT)	22/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
Business					
Australian Marine Oil Spill Centre (AMOSC)	14/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
	8/06/2022	Email/Letter to Stakeholder from INPEX	As part of consultation requirements under INPEX's EP, INPEX sent attachment of INPEX's Browse Regional OPEP, which is now accepted by NOPSEMA, and replaces all previous INPEX OPEPs for petroleum activities in commonwealth waters.	Yes - INPEX's Regional Browse OPEP	N/A - Correspondence sent by INPEX
Australia Bay Seafoods Darwin	31/03/2022	Email / letter from Stakeholder	Stakeholder outlined that their sister company westmored recieved a letter from INPEX notifying them of the proposed activity. Stakeholder outlined that the proposed area of INPEXs exploration survey overlaps one of the stakeholders main fishing grounds that they work at all year. Stakeholder attached an overlay of the proposed area over their fishing grounds. Advised they have major concerns with this proposal area as they work in the area 52 weeks of the year. Requested INPEX get in contact to discuss their concerns.	Yes - Letter & Activity Fact Sheet	Stakeholder's concerns are in relation to the seismic survey, not exploration drilling.
	31/03/2022	Email/ Letter to Stakeholder from INPEX	INPEX thanked stakeholder for reaching out and highlighting concerns INPEX inquired if the stakeholder could set up a metting or phone call to discuss further.	N/A	N/A - Correspondence sent by INPEX
	31/03/2022	Email / letter from Stakeholder	Stakeholder requested to talk over the phone on Monday.	N/A	No relevant matters raised
	31/03/2022	Email/ Letter to Stakeholder from INPEX	INPEX confirmed phone call time, and requested a teams meeting to share more information.	N/A	N/A - Correspondence sent by INPEX

		4/04/2022	Email/ Letter to Stakeholder from INPEX	INPEX thanked stakeholder for phone call. Stated INPEX understands there are limitations with scientific data on the impacts of Seismic surveys on fish. INPEX noted the following from the phone call conversation based on INPEX's questions. INPEX requested if these are accurate, would the stakeholder acknowledge, or provide feedback/comment if INPEX has misinterpreted anything. Overview INPEX has provided an overview that explained INPEX are currently in a competitive bid for the permit area and have no guarantee the proposed project will proceed. The permit is for carbon capture and storage assessment only and at this stage INPEX is only looking at preliminary studies. These consist of Exploration Drilling and a 3D Seismic survey. INPEX is working to prepare Environment Plans, inclusive of engagement, with the intent to submit for assessment shortly after permit award (assumed to be around July -August 2022). Best case planning currently estimates INPEX might be ready to complete the 3D Seismic survey in the period Àpril-June 2023. How many vessels work the area? Australia Bay Seafoods has three main vessels that operate in the Fishery. Two of these are the larger trawlers (Ocean Harvest, NT Leader) and a smaller vessel the Australia Bay 2 (AB2). The Ocean Harvest and NT Leader tend to work in other areas that don't overlap the Proposed Operational area but the AB2 regularly fishes (i.e. 52 weeks per year doing 3 trips per month approx. 10 days each). To your knowledge there are no other licence holders using the area. Another company does lease a licence and have 4 other trawlers and a handful of trap fishing vessels but these usually fish to the North or East of the Proposed Operational area. There is some overlap of the Proposed Operational Area and the grounds targeted by the AB2. INPEX attached an image below indicating the overlap of the AB2 and the proposed area (Note INPEX would like to obtain further data from stakeholder to better understand this overlap given this image is only based on 4 months of vessel movement).	N/A	No relevant matters raised. Summary of meeting. Stakeholder's concerns are in relation to the seismic survey, not exploration drilling.
				What species do you target? The main species are Crimson Snapper and Saddletail snapper which make up Approx 85% of the annual catch. The areas targeted are based on bottom profile (as opposed to a certain depth profile). The AB2 does not use traps in the area. There are options to fish/trawl in alternative areas to avoid contact between vessels if they are on water at the same time. You have up to 5 years of data you can share that has breakdown of catch to 1km2 What communication is best? VSat is best for the Vessel masters when on water. Meetings/phone calls with yourself in the near term to discuss potential impacts, overlaps and a claim process for loss of catch, damaged equipment etc. INPEX attached a shapefile of proposed areas which may assist.		
		27/04/2022	Email/Letter from INPEX to Stakeholder	Follow up email sent to stakeholder. Notified stakeholder that INPEX personnel will be in Darwin during May and requested to meet to discuss INPEX's proposed controls and provide an update on INPEX's risk assessments within the EP being drafted.	N/A	N/A - Correspondence sent by INPEX

	Arrow Pearls	18/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requested the following information: - Does the organisation have any pearl oyster fishing, holding or farming activities in Joseph Bonaparte Gulf overlapping or in proximity to the GHG21-1 permit area; - Does the stakeholder have any feedback or concerns about either of the proposed activities. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on caron capture storage (CCS). INPEX requested feedback and enquiries to be provided by 15 April 2022.	Yes - Activity fact sheet & Letter	N/A - Correspondence sent by INPEX
	Chamber of Commerce NT (CCNT) (CEO)	22/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
	Clipper Pearls	18/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requested the following information: - Does the organisation have any pearl oyster fishing, holding or farming activities in Joseph Bonaparte Gulf overlapping or in proximity to the GHG21-1 permit area; - Does the stakeholder have any feedback or concerns about either of the proposed activities. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on caron capture storage (CCS). INPEX requested feedback and enquiries to be provided by 15 April 2022.	Yes - Activity fact sheet & Letter	N/A - Correspondence sent by INPEX

	Cygnet Bay Pearls	18/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requested the following information: - Does the organisation have any pearl oyster fishing, holding or farming activities in Joseph Bonaparte Gulf overlapping or in proximity to the GHG21-1 permit area; - Does the stakeholder have any feedback or concerns about either of the proposed activities. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS). INPEX requested feedback and enquiries to be provided by 15 April 2022.	Yes - Activity fact sheet & Letter	N/A - Correspondence sent by INPEX
	Willie Creek Pearls	18/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requested the following information: - Does the organisation have any pearl oyster fishing, holding or farming activities in Joseph Bonaparte Gulf overlapping or in proximity to the GHG21-1 permit area; - Does the stakeholder have any feedback or concerns about either of the proposed activities. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS). INPEX requested feedback and enquiries to be provided by 15 April 2022.	Yes - Activity fact sheet & Letter	N/A - Correspondence sent by INPEX

Maxima Pearls	18/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requested the following information: - Does the organisation have any pearl oyster fishing, holding or farming activities in Joseph Bonaparte Gulf overlapping or in proximity to the GHG21-1 permit area; - Does the stakeholder have any feedback or concerns about either of the proposed activities. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS). INPEX requested feedback and enquiries to be provided by 15 April 2022.	Yes - Activity fact sheet & Letter	N/A - Correspondence sent by INPEX
	18/03/2022	Email/ Letter from Stakeholder	Email from stakeholder stating for INPEX to go ahead with activities.	N/A	No relevent matters raised
Darwin Port Operations Pty Ltd (a Landbridge company)	14/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
	15/03/2022	Email/ Letter from Stakeholder	Stakeholder thanked INPEX for email. Stakeholder shared INPEX's email with leadership team and advised they will get back to INPEX with any questions.	N/A	No relevent matters raised
Neptune Energy	16/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX

	Paspaley	18/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requested the following information: - Does the organisation have any pearl oyster fishing, holding or farming activities in Joseph Bonaparte Gulf overlapping or in proximity to the GHG21-1 permit area; - Does the stakeholder have any feedback or concerns about either of the proposed activities. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS). INPEX requested feedback and enquiries to be provided by 15 April 2022.	Yes - Activity fact sheet & Letter	N/A - Correspondence sent by INPEX
	Pearl Producers Association of WA (PPAWA)	15/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities by 15th April 2022 and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
	Northern Prawn Fishery	8/03/2022	Email/Letter to Stakeholder from INPEX	Email sent to stakeholder advising INPEX will soon be preparing stakeholder engagement material for an area that may be of interest to the NPF. INPEX requested a phone call/ teams meeting with stakeholder during the week to understand any preferences NPF may have for meaningful consultation.	N/A	N/A - Correspondence sent by INPEX

14/03/2022	Email/Letter from INPEX to Stakeholder	Email sent to Stakeholder ahead of meeting. INPEX attaced fact sheet and map showing potential overlap with NPF and sent through the following background information prior to the meeting: Overlap between the INPEX West Peron 3D MSS Operational Area and NPF activities in the JBG The INPEX West Peron 3D MSS Operational Area is located in water depths of approximately 65 m – 106 m. The INPEX West Peron 3D MSS Operational Area overlaps the boundary of the closure area, but does extend north into waters where fishing is permitted (see attached map). The INPEX West Peron 3D MSS Operational Area does not overlap any waters where low – high fishing intensity has occurred between 2010 and 2020. The Operational Area only overlaps waters where <5 vessels have fished during any year. Most fishing effort in the JBG has historically occurred >50 km south west of the Operational Area. INPEX would like to understand: Is there likely to be any NPF fishing effort at all near the Operational Area during the 1 April – 15 June banana prawn fishing season (to the north of the closure area) or are vessel unlikely to bother travelling to the JBG now given the closure over the main fishing grounds? If there is likely to be any fishing effort may occur there during the tiger prawn fishing season. Is there a map and/or breakdown of fishing catch and effort in the JBG (banana prawn and tiger prawn separated)? 2021 season catch and effort data might provide an indication of what effort may take place in the Operational Area in the coming years (if any). This data isn't yet available from ABARES.	Yes - Fact sheet & Map showing potential overlap with the NPF	N/A - Correspondence sent by INPEX
15/03/2022	Email/Letter from Stakeholder	Email from stakeholder thanking INPEX for email and requesting to reschedule meeting.	N/A	No relevent matters raised
15/03/2022	Email/Letter from INPEX to Stakeholder	INPEX agreed and rescheduled meeting time.	N/A	N/A - Correspondence sent by INPEX
15/03/2022	Email/Letter from INPEX to Stakeholder	INPEX emailed stakeholder stating they have included the Seismic Shape file, permit area and Drilling Area.	Yes - seismic shapefile, permit area and Drilling area	N/A - Correspondence sent by INPEX
15/03/2022	Email/Letter from Stakeholder	Stakeholder thanked INPEX for providing information	N/A	No relevant matters raised
28/03/2022	Email/Letter from INPEX to Stakeholder	INPEX thanked stakeholder for phone call to discuss fact sheet and questions. Requested stakeholder let INPEX know if they need any further information. Stated that if the catch data is available and INPEX has a resource spare to provide they will arrange for payment ASAP.	N/A	N/A - Correspondence sent by INPEX

	5/04/2022	Email/ Letter from Stakeholder	Stakeholder provided response to INPEX's specific questions below: Is there likely to be any NPF fishing effort at all near the Operational Area during the 1 April – 15 June banana prawn fishing season (to the north of the closure area) or are vessel unlikely to bother travelling to the JBG now given the closure over the main fishing grounds? *There is now closure in place in the JBG sub-fishery for sustainability reasons from 1 December to 1 August the following year. This is the NPF's preferred time for any seismic activity in the JBG .* If there is likely to be any fishing effort may occur there during the tiger prawn fishing season. *Yes, given the above closure, there will be activity in the area during the tiger prawn fishery. Previous patterns of fishing activity in the proposed of activity area may well change/ expand during future tiger prawn seasons given the first season closure now in place.* Is there a map and/or breakdown of fishing catch and effort in the JBG (banana prawn and tiger prawn separated)? *I have attached the Shape files showing the shot data over 10 years. This is highly confidential and not for publication.* 2021 season catch and effort data might provide an indication of what effort may take place in the Operational Area in the coming years (if any). This data isn't yet available from ABARES. *The 2021 data is still being analysed by NPFI – this won't be available until toward the end of May.* Stakeholder reiterated the advice given in earlier conversation that NPFI does not support any activities by oil and gas companies being undertaken in the JBG during the period from 1 August and 1 December each year given this is the only time period in which NPF fishers can access the JBG fishery. Stakeholder stated they will be on leave and will arrange for invoice to be sent on return.	Yes – shapefiles showing shot data 2012-2021 for banana and tiger prawns	Relevant objection/claim raised - INPEX notes NPFI's request for activities to be undertaken in the JBG outside the period from 1 August and 1 December each year given this is the only time period in which NPF fishers can access the JBG fishery. However, based on historical fishing effort data and fishery publications, INPEX understands that exploration drilling will not be taking place in a location that is of particular significance for prawns (in terms of biology, recruitment) or for fishing activities. Fishing effort in this location has historically been very low or non-existent in some years. INPEX notes that there is a new closure in place for the banana prawn fishing season, but there is no apparent reason why this would affect tiger prawn fishing activities during the tiger prawn season. Given the limited potential for impact and low risk to the NPF, INPEX does not consider undertaking activities outside the period from 1 August and 1 December to be practicable.
	5/04/2022	Email/Letter from INPEX to Stakeholder	INPEX thanked stakeholder for response.	N/A	N/A - Correspondence sent by INPEX
	12/04/2022	Email/Letter from INPEX to Stakeholder	INPEX acknowledged that the data provided is confidential and informed stakeholder that it will not be included in the EP. However, the maps will be included with records of correspondence, which gets submitted to NOPSEMA with the EP in a 'Sensitive Information Report'. INPEX informed the staeholder that this is viewed only be NOPSEMA, not published, so the content remains confidential. INPEX also noted stakeholders comments about the closure in place in the JBG sub-fishery and the NPF's preferred timing for seismic activity. INPEX is currently reviewing timing of all receptors in the region with respect to the timing of the survey. Regarding the tiger prawn fishing season, INPEX understands that the new closure in the JBG applies only during the banana prawn fishing season. Therefore, INPEX requested the stakeholder help INPEX understand the stakeholders comment about how the closure could change patterns of fishing activity during future tiger prawn seasons?	N/A	N/A - Correspondence sent by INPEX
	3/06/2022	Email/Letter from INPEX to Stakeholder	INPEX followed up on previous emails as no response received from stakeholder. INPEX requested stakeholder provide a response to query in previous email. INPEX queried if there has been any progress on the 2021 season catch and effort data that was expected towards the end of May. INPEX acknowledged that the stakeholder does not support any activities by oil and gas companies being undertaken in the JGB during the period from 1 August and 1 December in any year. INPEX is endeavouring to meet this request in our pre-planning. INPEX's intention is to conduct activities from December (Drilling) and the Seismic survey in Q2 2023 (April/May) however INPEX may not be able to avoid the period in its entirety if there are unforeseen delays and are hesitant to do so given that: • INPEX understands the survey is not in an area were a significant amount of prawn trawling normally occurs (based on historical effort for both banana prawn and tiger prawn seasons) • INPEX understands that the water depths of the active source area are largely greater than that of banana prawns and that banana prawn spawning, nursery grounds and juvenile migration for recruitment to adult stock are further inshore from where the survey is located. • Although tiger prawns may occur in deeper water depths, historical fishing effort again indicates that the survey area is not an area where the species typically occurs in abundance or is of any unique significance for their spawning and recruitment. Potential impacts would be negligible in the context of the broader JBG stock and natural variation in recruitment. In order to address INPEX's inability to commit to avoidance INPEX is preparing a claim process that mimics the process developed by the NERA and the Collaborative Seismic EP project that INPEX was a member of.	N/A	N/A - Correspondence sent by INPEX

	Northern Territory Seafood Council (NTSC), represents: -NT Offshore Net and Line -NT Spanish Mackerel -NT Demersal (Pot and Trawl) -NT Aquarium Fishery	14/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX thanked Stakeholder for previous phone call and advised they appreciate any early communication NTSC can provide to the licence holders through NTSC's regular updates. INPEX advised they understand the potentially effected fisheries may be: -NT Offshore Net and Line -NT Spanish Mackerel -NT Demersal (Pot and Trawl) INPEX outline they are intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX provided the following key information to support generic fact sheet: -Water depth : 65m-106m -Duration of 3D Seismic Survey ~6-10 weeks -Streamers up 1.5km wide and ~8-11km behind the survey vessel -Acquisition lines approx. 375-675m apart -Vessel speed approx-4-5 knots	Yes - Fact Sheet & NTSC Engagement powerpoint	N/A - Correspondence sent by INPEX
				Seismic source in the order of 3050- 3090 cubic inch INPEX is part of the Collaborative Seismic EP (CSEP) group and is committed to offering a process to assess any potential claims in a similar manner to that developed as part of the CSEP group. INPEX also recently developed a claim process for a 2D Seismic survey in consultation with WAFIC. This process can be accessed directly via this link 2D Claim Process | INPEX. -There are two Operational Areas; -The Drilling Operational Area is entirely within NT waters however abuts the WA NT border (Provided coordinates and figure showing location - The 3D Seismic Operational Area extends very slightly into WA offshore waters, see point D The full-fold Acquisition Area is entirely on the NT side of the line, the corner of the Active Source Zone is right on the boundary (0.5 km2 overlap with the WA side). (Provided coordinates and figure showing location) INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).		
		15/03/2022	Email/Letter from Stakeholder	Stakeholder thanked INPEX for email. Stakeholder Advised the other NT Fishery in the area is the Aquarium Fishery.	N/A	Relevant matter raised - INPEX has included Aquarium Managed Fishery in consultation.
		16/03/2022	Email/ Letter from Stakeholder	Stakeholder requested INPEX include Development Fishery Licences, as there has been activity by a development licence holder in the activity area. Stakeholder advised it is not clear whether these licences are still active or if NT is looking to transition to a fishery. Stakeholder advised it is best to ask NT Fisheries for contact details for them as well.	N/A	Relevant matter raised - INPEX has included Development Fishery License holders in consultation.

		17/03/2022	Email/Letter from INPEX to Stakeholder	INPEX thanked Stakeholder for feedback. Advised INPEX have included the NT Aquaculture Fishery in the stakeholder mailout. Stated that INPEX has been in touch with NT Fisheries but are yet to recieve a response. INPEX advised they will follow up with NT Fisheries on the Development licence holder.	N/A	N/A - Correspondence sent by INPEX
		29/03/2022	Email/Letter from INPEX to Stakeholder	INPEX advised they have lodged a request with DITT to obtain data including the Development fishery licences but nothing has come back yet. Notified that INPEX have sent mailed copies of the fact sheet and letters to licence holders in mid March. INPEX noted that stakeholder previously mentioned that the Demersal fisheries were planning some meetings in April. INPEX have not had a response from letters yet, and advised stakeholder may provide them INPEX's contact details if appropriate and INPEX would attend /present if appropriate.	N/A	N/A - Correspondence sent by INPEX
		4/04/2022	Email/ Letter to Stakeholder from INPEX	INPEX notified stakeholder that they have heard back from Australia Bay Seafoods and they are having a meeting today.	N/A	N/A - Correspondence sent by INPEX
	Western Australian Fishing Industry Council (WAFIC) Represents stakeholders in: WA fisheries • Mackerel Managed Fishery • Northern Demersal Scalefish Fishery • West Coast Deep Sea Crustacean Managed Fishery • Northern Shark Fishery • Pearl Oyster Managed Fishery • Kimberley Prawn Managed Fishery Cwth fisheries • North West Slope Trawl Fishery • Western Tuna and Billfish Fisheries	11/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Carbon Capture Storage (CCS) Drilling and 3D Seismic survey activities within exploration title GHG-21. Drilling is proposed betwen 2023 and 2024. The 3D Seismic survey could commence as early as January 2023 and be completed as late as December 2023. Inpex provided the following additional information: -The Water depth in both proposed Operational Areas is approx. 75-100m. -The WA/NT Border sits immediately to the West of the Proposed INPEX Operational areas (Inpex provided figures showing location) -The Size of the Seismic source is expected to be either 3050 or 3090 cubic inch. -No Fishing is permitted from INPEX vessel or Drill rigs -The Drilling Operational Area does not extend into WA offshore waters. There is no possibility of interaction with WA fisheries. -The 3D Seismic Operational Area extends very slightly into WA offshore waters (~25 km2). The full-fold Acquisition Area is entirely on the NT side of the line, the corner of the Active Source Zone is right on the boundary (0.5 km2 overlap with the WA side). -The two WA fisheries active in the general area are the Mackerel Managed Fishery (MMF) and the Northern Demersal Scalefish Managed Fishery (NDSMF). -Nearest MMF fishing effort (2010-2020) is a block approximately 75 km south-west from the seismic Operational Area, where less than 3 vessels have fished during the entire 11 year period. -Nearest NDSMF fishing effort (2010-2020) is a block approximately 7.5 km north-west from the seismic Operational Area, where less than 10 days of fishing effort has occurred during the entire 11 year period. -The Santos survey is occurring in Feb/ March 2022 and the INPEX Survey at its earliest is not expected to occur until Q1 2023 which reduces the potential for cumulative impacts. -Overall, there is very limited / no potential for interaction between the drill rig or seismic vessel and towed equipment, and fishing vessel, pots, so INPEX proposed to not engage with MMF or NDSMF unless WAFIC advises otherwise. INPEX noted they consider WAFIC's feedback and appreciate the time for engagement.	Yes - Fact Sheet	N/A - Correspondence sent by INPEX

	18/03/2022	Email/ Letter from Stakeholder	Stakeholder thanked INPEX for information regarding proposed activities. Stakeholder advised that given the proposed activities are not occuring in WA waters, with the exception of a small proportion and the earest fishing effort was approximately 75 km and 7.5 km respectively from the seismic operational area and the full-fold aquisition area is entirely on the NT side of the line, INPEX's activities may not be relevant to WA stakeholders. WAFIC advised if consultation material is already prepared, it might be worth sending it out to the small number of commercial fishers in the MMF and NDSMF, to ensure that if any recent fishing effort has occured in the operational area, potentially relevant persons have been notified.	N/A	Relevant matter raised - INPEX has consulted with the MMF and NDSMF. Overlap with the WA MMF and NDSMF relates to the seismic survey only, not drilling.
	21/03/2022	Email/ Letter to Stakeholder from INPEX	INPEX thanked WAFIC for response. Advised that INPEX has posted letters to the commercial fishers in the MMF and NDSMF.	N/A	N/A - Correspondence sent by INPEX Overlap with the WA MMF and NDSMF relates to the seismic survey only, not drilling.
RPS Asia-Pacific Applied Science Associates (APASA)	14/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
Suncable Energy	16/03/2022	Email/ Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX

	Vocus Group	16/03/2022	Email/ Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
		16/03/2022	Email/ Letter from Stakeholder	Stakeholder thanked INPEX for sharing and advised they will review and report back	N/A	No relevent matters raised
		23/03/2022	Email/ Letter to Stakeholder from INPEX	INPEX thanked stakeholder for response.	N/A	N/A - Correspondence sent by INPEX
	Industry Capability Network NT (CEO/Director	22/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
	Amatuer Fisherman's Association of the Northern Territoy (AFANT)	22/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX

	Northern Territory Guided Fishing Association	22/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
	Energy Club NT	22/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
ASTI communities						
	Kimberley Land Council	17/03/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX

	Northern Land Council	1/04/2022	Email/Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities by 15th April 2022 and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
	Tiwi Land Council	1/04/2022	Email/ Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities by 15th April 2022 and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
		2/04/2022	Email/ Letter from Stakeholder	Stakeholder thanked INPEX for email. Provided CEO contact details (Email) for consultation to be sent to.	N/A	N/A - Correspondence sent by INPEX
		4/04/2022	Email/ Letter to Stakeholder from INPEX	INPEX thanked stakeholder for sending CEO's contact detailes and notified that INPEX will send consultation e-mail to the CEO e-mail address.	N/A	N/A - Correspondence sent by INPEX
		4/04/2022	Email/ Letter to Stakeholder from INPEX	Email and fact sheet sent to stakeholder CEO e-mail address with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. INPEX requests feedback on proposed activities by 15th April 2022 and notes a 30-day public comment period applies to all Environmental Plans submitted for seismic or exploratry drilling activities. INPEX advised that all communications will be logged, assessed and acknowledged with a response and provided a link to more information on carbon capture storage (CCS).	Yes - Activity fact sheet	N/A - Correspondence sent by INPEX
Commercial Fisheries						

	NT Offshore Net & Line Fishery licence holder	16/03/2022	Letter/Email from INPEX to stakeholder	Letter sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. Provided information on location of the Drilling Project Area and 3D Operational Area, and maps. Provided further details of 3D seismic Survey as may be of praticular interest to fishing stakeholder including: - Water depth : 65m-106m - Duration of 3D Seismic Survey ~6-10 weeks - Streamers up 1.5km wide and ~8-11 kilometres behind the seismic vessel - Acquisition lines approx. 375-675 metres apart - Vessel speed approx-4-5 knots - Seismic source in the order of 3050- 3090 cubic inch - INPEX is committed to offering a process to assess any potential claims for loss of catch, damage or displacement as a result of the 3D seismic activity. INPEX has previously developed a claim process for a 2D Seismic survey in consultation with WAFIC. Provided a link to access claim. INPEX provided a map overlaying recent fishing effort and the operational/project areas to assist in understanding potential impacts. INPEX requested feedback and outlines that a 30-day public cmment period apples to all Environmental Plans Outlined that all communications will be logged, assessed and acknowledged with a response.	N/A	N/A - Correspondence sent by INPEX
	Northern Prawn Fishery licence holders	16/03/2022	Letter/Email from INPEX to stakeholder	Letter sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. Provided information on location of the Drilling Project Area and 3D Operational Area, and maps. Provided further details of 3D seismic Survey as may be of praticular interest to fishing stakeholder including: - Water depth : 65m-106m - Duration of 3D Seismic Survey ~6-10 weeks - Streamers up 1.5km wide and ~8-11 kilometres behind the seismic vessel - Acquisition lines approx. 375-675 metres apart - Vessel speed approx-4-5 knots - Seismic source in the order of 3050- 3090 cubic inch - INPEX is committed to offering a process to assess any potential claims for loss of catch, damage or displacement as a result of the 3D seismic activity. INPEX has previously developed a claim process for a 2D Seismic survey in consultation with WAFIC. Provided a link to access claim. INPEX provided a map overlaying recent fishing effort and the operational/project areas to assist in understanding potential impacts. INPEX requested feedback and outlines that a 30-day public cmment period apples to all Environmental Plans Outlined that all communications will be logged, assessed and acknowledged with a response.	N/A	N/A - Correspondence sent by INPEX

	NT Demersal Fishery licence holders	16/03/2022	Letter/Email from INPEX to stakeholder	Letter sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. Provided information on location of the Drilling Project Area and 3D Operational Area, and maps. Provided further details of 3D seismic Survey as may be of praticular interest to fishing stakeholder including: - Water depth : 65m-106m - Duration of 3D Seismic Survey ~6-10 weeks - Streamers up 1.5km wide and ~8-11 kilometres behind the seismic vessel - Acquisition lines approx. 375-675 metres apart - Vessel speed approx-4-5 knots - Seismic source in the order of 3050- 3090 cubic inch - INPEX is committed to offering a process to assess any potential claims for loss of catch, damage or displacement as a result of the 3D seismic activity. INPEX has previously developed a claim process for a 2D Seismic survey in consultation with WAFIC. Provided a link to access claim. INPEX provided a map overlaying recent fishing effort and the operational/project areas to assist in understanding potential impacts. INPEX requested feedback and outlines that a 30-day public cmment period apples to all Environmental Plans Outlined that all communications will be logged, assessed and acknowledged with a response.	N/A	N/A - Correspondence sent by INPEX
	NT Spanish Mackerel Fishery licence holders	16/03/2022	Letter/Email from INPEX to stakeholder	Letter sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. Provided information on location of the Drilling Project Area and 3D Operational Area, and maps. Provided further details of 3D seismic Survey as may be of praticular interest to fishing stakeholder including: - Water depth : 65m-106m - Duration of 3D Seismic Survey ~6-10 weeks - Streamers up 1.5km wide and ~8-11 kilometres behind the seismic vessel - Acquisition lines approx. 375-675 metres apart - Vessel speed approx-4-5 knots - Seismic source in the order of 3050- 3090 cubic inch - INPEX is committed to offering a process to assess any potential claims for loss of catch, damage or displacement as a result of the 3D seismic activity. INPEX has previously developed a claim process for a 2D Seismic survey in consultation with WAFIC. Provided a link to access claim. INPEX provided a map overlaying recent fishing effort and the operational/project areas to assist in understanding potential impacts. INPEX requested feedback and outlines that a 30-day public cmment period apples to all Environmental Plans Outlined that all communications will be logged, assessed and acknowledged with a response.	N/A	N/A - Correspondence sent by INPEX

	WA Mackerel Managed Fishery	16/03/2022	Letter/Email from INPEX to stakeholder	Letter sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. Provided information on location of the Drilling Project Area and 3D Operational Area, and maps. Provided further details of 3D seismic Survey as may be of praticular interest to fishing stakeholder including: - Water depth : 65m-106m - Duration of 3D Seismic Survey ~6-10 weeks - Streamers up 1.5km wide and ~8-11 kilometres behind the seismic vessel - Acquisition lines approx. 375-675 metres apart - Vessel speed approx-4-5 knots - Seismic source in the order of 3050- 3090 cubic inch - INPEX is committed to offering a process to assess any potential claims for loss of catch, damage or displacement as a result of the 3D seismic activity. INPEX has previously developed a claim process for a 2D Seismic survey in consultation with WAFIC. Provided a link to access claim. INPEX provided a map overlaying recent fishing effort and the operational/project areas to assist in understanding potential impacts. INPEX requested feedback and outlines that a 30-day public cmment period apples to all Environmental Plans Outlined that all communications will be logged, assessed and acknowledged with a response.	N/A	N/A - Correspondence sent by INPEX
	WA Northern Demersal Scalefish Managed Fishery	16/03/2022	Letter/Email from INPEX to stakeholder	Letter sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. Provided information on location of the Drilling Project Area and 3D Operational Area, and maps. Provided further details of 3D seismic Survey as may be of praticular interest to fishing stakeholder including: - Water depth : 65m-106m - Duration of 3D Seismic Survey ~6-10 weeks - Streamers up 1.5km wide and ~8-11 kilometres behind the seismic vessel - Acquisition lines approx. 375-675 metres apart - Vessel speed approx-4-5 knots - Seismic source in the order of 3050- 3090 cubic inch - INPEX is committed to offering a process to assess any potential claims for loss of catch, damage or displacement as a result of the 3D seismic activity. INPEX has previously developed a claim process for a 2D Seismic survey in consultation with WAFIC. Provided a link to access claim. INPEX provided a map overlaying recent fishing effort and the operational/project areas to assist in understanding potential impacts. INPEX requested feedback and outlines that a 30-day public cmment period apples to all Environmental Plans Outlined that all communications will be logged, assessed and acknowledged with a response.	N/A	N/A - Correspondence sent by INPEX

	Other Fisheries licence holders	16/03/2022	Letter/Email from INPEX to stakeholder	Letter sent to stakeholder with details of proposed Offshore Greenhouse Gas Storage Exploration and Assessment Activities in the Bonaparte Basin, offshore Northern Australia. INPEX is intending to undertake the following activities: -Exploration drilling within GHG21-1 – including wells close to the notional proposed CO2 injection site and along the expected CO2 migration pathway -A three-dimensional (3D) seismic survey to further assess the storage complex to confirm suitability for injection and storage of CO2 The site survey required to support drilling activities may be undertaken as early as Quater 4, 2022. Provided information on location of the Drilling Project Area and 3D Operational Area, and maps. Provided further details of 3D seismic Survey as may be of praticular interest to fishing stakeholder including: - Water depth : 65m-106m - Duration of 3D Seismic Survey ~6-10 weeks - Streamers up 1.5km wide and ~8-11 kilometres behind the seismic vessel - Acquisition lines approx. 375-675 metres apart - Vessel speed approx-4-5 knots - Seismic source in the order of 3050- 3090 cubic inch - INPEX is committed to offering a process to assess any potential claims for loss of catch, damage or displacement as a result of the 3D seismic activity. INPEX has previously developed a claim process for a 2D Seismic survey in consultation with WAFIC. Provided a link to access claim. INPEX provided a map overlaying recent fishing effort and the operational/project areas to assist in understanding potential impacts. INPEX requested feedback and outlines that a 30-day public cmment period apples to all Environmental Plans Outlined that all communications will be logged, assessed and acknowledged with a response.	N/A	N/A - Correspondence sent by INPEX

Appendix C-
Source Control Capability & Arrangements

INPEX Australia Environment Plans - Source Control Capability and Arrangements

Report

Document No.: D021-AH-REP-70000
Security Classification: Unrestricted

REV	Date	Issue Reason	Prepared	Checked	Endorsed	Approved
2	29/04/2022	Issued for use	E Law	R Quaden	T Lee	S Zoller
3	10/08/2022	Issued for use	E Law	R Quaden	T Lee	S Zoller

RECORD OF AMENDMENT

Revision	Section	Amendment
1	4.6 (Table 4-5)	Environmental performance standards defining timelines for the capping stack mobilisation to the well location and deployment plan and relief well response model activities have been included as a result of the NOPSEMA assessment of the Offshore Facility (Operation) EP
2	Table 1-1; Table 3-1; 4.2 (Table 4-1); 4.6 (Table 4-4)	Tables revised to include Holonema (WA-285-P) and Bassett Deep (WA-343-P) wells. References provided for Exploration Drilling WA-285-P and WA-343-P EP and Browse Basin Common Relief Well Design and Response Time Models Technical Note
	4.5 (Table 4-2)	Capping stack mobilisation times revised to align with the INPEX Capping Stack Logistics Plan (D020-AD-PRC-10039)
3	4.2	Details of source control MODU and vessel availability monitoring and associated adaptive management implementation included
	Table 4-5	Include pre-spud risk review in EPS regarding the maintenance of MODU and vessel availability registers
	5.2; Table 5-2	Include a description of pre-spud risk reviews and adaptive management, to ensure adequate source control MODU and vessel availability. Include new EPS's for the verification of suitable source control MODU's and vessels prior to spudding well. Amend current EPS for MoC'ing changes made as a result of quarterly risk review.

Revision	Section	Amendment

DOCUMENT DISTRIBUTION

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00	Document Control
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1 INTRODUCTION

1.1 Purpose

The purpose of this document is to:

- Present a summary of INPEX Australia's exploration and production (E&P) drilling; and operations activities in the Browse Basin.
- Present a summary of the worst credible well blowout scenarios (WCWBS) which could occur from exploration/production drilling activities and from the operation of production wells.
- Provide a detailed source control capability analysis, for the selected WCWBS.
- Define environmental performance outcomes (EPO) and environmental performance standards (EPS) for the source control capabilities and arrangements (preparedness), and the risk assessment of the implementation of the source control capability.
- Provide an implementation strategy for this source control arrangements and risk assessment report, including management of change processes and compliance reporting requirements.
- Ensure INPEX's description of source control capability and arrangements as related to Environment Plans (EP) is appropriately described, in accordance with the requirements of Section 3.1 of the NOPSEMA *Source control planning and procedures* Information Paper (N-04750-IP1979).

1.2 Limitations/out of scope

Current in-force Ichthys Development Drilling Campaign WA-50-L EP (0000-AD-PLN-60003), from which the source control capability and evaluation content is derived.

This document does not include evaluation and response capability/arrangements associated with the following:

- Environmental risk assessment and spill prevention/control
  - The following elements are contained within each activity specific EP:
    - Detailed activity description
    - Activity specific oil spill hazard identification, including potential release rates, volumes, locations, hydrocarbon types etc.
    - Activity specific oil spill modelling, used to inform environmental risk assessment
    - Description and risk assessment of oil spills on environmental values and sensitivities
    - Evaluation of controls to prevent oil pollution from the described activity.
- Oil spill response
  - Oil spill response for all INPEX Australia EPs are managed under the Browse Regional Oil Pollution Emergency Plan (BROPEP) suite of documents

- Operational and scientific monitoring programs (OSMP)
  - The full OSMP capability requirement is addressed within the INPEX Australia Browse Regional Oil Pollution Emergency Plan (BROPEP) (X060-AH-PLN-70009 – Appendix A).

The inter-relationship of this document to other drilling and environmental documentation is presented in Table 1-1.

Table 1-1: Source Control Documentation Overview

Document title	Document number	Purpose
INPEX Australia Environment Plans - Source Control Capability and Arrangements Report (This document)	D021-AH-REP-70000	The EP Source Control Capability and Arrangements Report provides an evaluation of INPEX's source control capability and arrangements required to conduct a successful well-kill for exploration and production wells in the Browse Basin. This document also provides the environmental ALARP and acceptability statements and implementation strategy, to ensure the ongoing demonstration of source control capability and arrangements.
Loss of Well Integrity Response Plan (WIRP)	D021-AD-PLN-70023	The WIRP's objective is to prevent the escalation of any loss of well integrity and reinstate well integrity as soon as practicable. It: • provides an action plan to be taken in the case of a loss of well integrity from a production well; and • identifies and records the required readiness level for the preparation, equipment and services. It describes: – the requirements documented as checklists; and – checklists suitable for both planning and audit.
INPEX Well Operations Management Plans (WOMP): • INPEX Phase 2a WOMP • Holonema (WA-285-P) WOMP • Basset Deep (WA-343-P) WOMP	0000-AD-PLN-60004 D021-A7-PLN-70000 D021-A7-PLN-70001	The WOMP describes the well activities and associated management systems for drilling and completion; suspension; intervention; and inspection maintenance and repair of INPEX production and exploration wells within their respective permit and licence areas.
INPEX Blowout Contingency Plan (BOCP)	D020-AD-PLN-10040	The purpose of the BOCP is to provide a plan for regaining control of a blowout, not blowout prevention. The BOCP specifies how INPEX will respond to a well control event where primary well control has been lost with potential, or real, complications with secondary well control, extending to the worst case scenario of an uncontrolled blowout with significant hydrocarbon release to the environment and loss of assets.

Document title	Document number	Purpose
Source Control Emergency Response Plan (SCERP)	D020-AD-PRC-10036	The SCERP is designed as a subset of the BOCP, to support response preparations to well control emergencies and establish a process for responding to safely managing them using a standard uniform approach. It includes the equipment and procedures to address a range of well control scenarios necessitating immediate mobilisation of intervention equipment and personnel.
INPEX Capping Stack Logistics Plan	D020-AD-PRC-10039	The INPEX Logistics plan describes the mobilisation of the Wild Well Control international (WWCI) capping, debris clearance and dispersant equipment (Source Control Equipment) into Australia from point of origin (Singapore) through end delivery point in Australian waters.
INPEX Environment Plans • Offshore Facility Operations EP • Ichthys Development Drilling Campaign WA-50-L EP (future revision) • Exploration Drilling WA-285-P & WA-343-P EP	 X060-AH-REP-70007 0000-AD-PLN-60003 0021-AD-PLN-70000	All INPEX EPs contain a detailed activity description and activity-specific oil spill scenarios. Specifically, INPEX EPs include the following: • a description of the activity-specific spill scenarios (including the potential well blowout release rates, volumes, locations, hydrocarbon types, etc.) • activity-specific oil spill modelling (used to inform environmental risk assessments) • an assessment of oil spills risks/impacts on environmental values and sensitivities • evaluations of controls to prevent well blowouts.
INPEX Australia - Browse Regional Oil Pollution Emergency Plan (BROPEP) suite of documents, including; • Basis of Design and Field Capability Assessment Report (BROPEP BOD & FCA) • Browse Regional Oil Pollution Emergency Plan – Incident Management Team Capability Assessment Report (BROPEP IMTCA)	X060-AH-REP-70016 X060-AH-REP-70015 X060-AH-PLN-70009	The BROPEP BOD & FCA report evaluates the oil spill field response capability required for all INPEX Australia’s offshore petroleum exploration and production activities and associated oil spill risks. The BROPEP IMTCA report defines the required IMT capability needed to implement the field oil spill response. The BROPEP is the response document, used by the IMT, to activate and implement oil spill response capabilities during a spill scenario.

Document title	Document number	Purpose
• Browse Regional Oil Pollution Emergency Plan.		
Browse Basin Common Relief Well Design and Response Time Models Technical Note	0021-AD-TCN-70000	The purpose of the technical note is to document common relief well design including the supporting simulation work as well as the response time models for various INPEX drilling projects.

2 INPEX AUSTRALIA EXPLORATION AND PRODUCTION ACTIVITIES OVERVIEW

INPEX Ichthys Pty Ltd, on behalf of the Ichthys Upstream Unincorporated Joint Venture Participants, is developing the Ichthys Field in the Browse Basin off the north west coast of Western Australia to produce condensate offshore for export to markets in Japan and elsewhere, and export gas for further processing at the Ichthys liquefied natural gas (LNG) plant in Darwin.

Initial development wells were drilled and the Ichthys LNG offshore facilities were installed and commissioned from 2014 through to 2018. The assets commenced production in July 2018 and now routinely ship cargoes of condensate from the FPSO to international customers and send gas to the Darwin plant via the Gas Export Pipeline.

The existing facilities consist of a subsea production system (SPS) (E.g., xmas trees (XT), manifolds, subsea control systems and umbilicals, risers and flowlines (URF), and the gas export riser base (GERB), which connect the wells to the Central Processing Platform (CPF) Ichthys Explorer and Floating Production Storage Offtake – (FPSO) Ichthys Venturer

The CPF/FPSO, GEP and onshore Ichthys LNG plant are collectively referred to as the Ichthys Project.

INPEX Australia's offshore exploration activities are focused on identification of additional petroleum reserves to tie-back into the Ichthys Project, either at the CPF/FPSO, or onto any of the five hot-tap-tees along the length of the GEP, within the Canning, Browse and Bonaparte basins. Therefore, exploration activities, including exploration/appraisal drilling, are generally located within the same geographic area as the Ichthys Project in Commonwealth waters between Broome and Darwin.

3 WORST CREDIBLE WELL BLOWOUT SCENARIOS

To determine source control capability requirements, an evaluation of current INPEX production, and planned exploration wells has been undertaken. A summary of key well data is provided in Table 3-1.

As detailed in Table 3-1, the Plover reservoir has a higher gas flowrate potential than the Brewster reservoir and is therefore the worst-case scenario from a well kill perspective (Wild Well Control 2019).

Table 3-1: Comparison of well-blowout modelling data

Model	Brewster Production Phase 1	Plover Production Drilling Phase 2	Holonema (WA-285-P)	Bassett Deep (WA-343-P)
Release location (coordinates)	13° 52’ 46.2” S 123° 19’ 3.0” E Approximately 35 km north west of Browse Island.	13° 54' 17.14" S 123° 09' 53.93" E Approximately 47 km north west of Browse Island.	14° 05’ 35.4” S 123° 10’ 37.9” E * Approximately 19 km north west of Browse Island.	13° 22’ 52.4” S 123° 24’ 02.2” E Approximately 68 km north of Browse Island.
Oil type	Brewster condensate	Plover condensate	Primary: Brewster condensate	Plover condensate
Reservoir pressure (psia)	6020	6683	6020	7,572
Gas flowrate (MMscf/day)	577	735	577	400
Oil flowrate (m^3/day)	3193	1082	3193	867
Release duration (days)	80	108	80	115
Total release volume (m^3)	255,475	116,856	255,475	99,705
Well bore size - internal diameter (inches)	8.5”	8.5”	8.5”	8.5”
Well blow-out modelling report	C020-AD-TCN-00023	X080-AD-TCN-10084	C020-AD-TCN-00023	0000-AD-TCN-70006

*indicative

4 SOURCE CONTROL CAPABILITY AND ARRANGEMENTS EVALUATION

As described in INPEXs EPs, should a loss of well containment event occur during a drilling activity or from a producing well, a number of source control activities may be implemented depending on the specific circumstances of the loss of well containment.

For a production well, a range of loss of well integrity events are considered within the Loss of Well Integrity Response Plan (WIRP). Tier 1, Tier 2 and Tier 3 category events as described in API RP 754 / IOGP Report 456 are covered by the WIRP. The well intervention based response options covered by the WIRP include:

- relief well and / or capping stack.
- ROV intervention (light and heavy)
- well intervention – light well intervention (LWI) (DP vessel)
- well intervention – emergency disconnect package (EDP) /lower riser package (LRP) (MODU)

Source control activities for Tier 1 and 2 category events are presented in the following section.

4.1 Relief well and capping stack response options

A relief well plan for the INPEX Brewster and Plover wells has been finalised, utilising specific well kill modelling results to complete the relief well design. The modelling considers a number of factors including well geometry, reservoir pressure, temperature, permeability and reservoir fluid properties (as described in Table 3-1).

Depending on the loss of well containment scenario other source control activities may be required to assist in regaining control such as ROV based systems for seabed debris clearance, BOP intervention and/or well capping.

4.2 Source control MODU and vessel availability

INPEX monitors the availability of source control MODUs and vessels, maintaining monthly registers and shipbrokers reports, which are developed using defined criteria to ensure the most suitable MODUs and vessels are identified for respective source control activities.

4.2.1 Relief well MODU

INPEX maintains two registers for relief well MODUs, one which includes a global list of available MODUs and another, filtered to identify those relief well MODUs meeting minimum requirements, defined by the respective dynamic well kill study reports. Each report defines the minimum MODU and equipment criteria required for relief well planning purposes.

In addition, MODU safety case status is monitored in the register to ensure response time models described within Table 4-1 can be met.

Pre-spud and quarterly risk reviews, as described in Section 5.2 will be conducted. These reviews interrogate current MODU market reports and availability registers to verify the availability of capable relief well MODUs in advance of and during the activity.

In the event identified relief well MODUs are not available or are further afield than required for the respective response time model, adaptive management measures will be implemented which will assess alternative MODUs and arrangements to ensure the described response times detailed in Table 4-2 are met.

The MODU availability registers contain details of the following criteria:

- MODU name, type and contract status (24 month LAH)
- Current regional location
- MODU specifications (as required by current respective dynamic well kill reports) including:
  - water depth capability (1500+ ft)
  - BOP specifications (15K+ psi, 5+ Rams)
  - mud pump number/specifications (3+/1500+ HP)
  - drilling fluid storage capacity
  - variable deck load
- Jurisdictional safety case status (NOPSEMA/ UK/ AOC)

4.2.2 Capping stack deployment vessel

INPEX monitors availability of vessels through monthly shipbrokers reports, which include capping stack deployment and debris removal vessels that may be required in the event of source control activities.

Current reports identify suitable vessels, required to meet minimum criteria for each source control activity, as defined in the INPEX Capping Stack Logistics Plan, Capping Stack Landing study and described in Table 4-4. The shipbroker report is designed to include a range of vessel capabilities that suit each source control activity. The following criteria have been used:

- Capping stack deployment: minimum of 120T active heave compensated (AHC) crane onboard
- Debris removal: minimum of 150T AHC crane (or greater) onboard
- Asia / Pacific region (3,400 nm from northern Australia)
- deck area
- DP2 redundancy
- working class ROV

Pre-spud and quarterly risk reviews will be conducted which interrogate the ship brokers reports, to ensure the availability of identified vessels.

In the event suitable vessels are not available or are further afield than described in the respective response time model, adaptive management measures will be implemented which will assess alternative vessels and capabilities and the associated capping stack landing requirements to ensure the described response times detailed in Table 4-2 are met. That is, consideration may be given to suitable vessels that exceed (or fall below) optimal requirements for respective activities.

4.3 Summary of relief well analysis

INPEX engaged third-party specialist to undertake a relief well and dynamic well kill study for the Brewster and Plover production wells in WA-50-L (Add Energy 2019) and the exploration well in WA-343-P (Add Energy 2022). The dynamic well kill portion of this study models a blowout rate for given subsurface and well architecture parameters and then models the kill rate for a given kill fluid density required to kill the well.

NORSOK D-010 Rev 5 (Standards Norway, 2021) Section 5.8.1 gives clear guidance on the assumptions to be used during dynamic well kill modelling and these are outlined as follows:

- expected values for reservoir parameters (pore pressure, permeability, porosity, net gross pay, etc.)
- expected top of reservoir depth
- expected productivity index / transient productivity index
- expected fluid type parameters, if oil is expected, but gas cannot be disregarded both cases shall be simulated
- mechanical skin is zero
- no restrictions in the flow path
- planned well design (hole size, casing setting depth, etc.).

The modelling and subsequent analysis of logistical requirements presented in Browse Basin Common Relief Well Design and Response Time Models Technical Note (0021-AD-TCN-70000) has determined the design for and duration of, relief well drilling for a range of Ichthys and non-Ichthys wells in the Browse Basin. These include Ichthys Brewster and Plover wells; standard or normally pressured exploration wells (i.e Holonema); and high pressure and high temperature (HPHT) wells (i.e. Bassett Deep), all with a single well kill achievable in both reservoirs. These durations are summarised and presented in the form of a response time model in Table 4-1, developed in accordance with the Australian Offshore Titleholders Source Control Guideline (APPEA 2021).

Table 4-1: Summary of time response models for Brewster and Plover reservoirs (Browse Basin Common Relief Well Design and Response Time Models Technical Note)

Activity	**Brewster reservoir Ichthys (days)**	**Plover reservoir Ichthys (days)**	**Exploration standard - Holonema (days)**	**Exploration (HPHT) - Bassett Deep (days)**
Relief well MODU mobilisation	28	28	28	28
Relief well construction	35	63	35	70
Ranging and intercept (incl. kill)	17	17	17	17
Total duration	**80**	**108**	**80**	**115**

The MODU used to drill the relief well will need a NOPSEMA accepted Safety Case Revision (SCR). A total of 28 days has been scheduled for the development, submission and acceptance of the SCR by NOPSEMA. An indicative schedule for the SCR approval is as follows:

- Day 0-1 – MODU(s) identification
- Day 1-2 – SCR development schedule created. Engagement meeting with NOPSEMA held to advise of submission schedule and request all attempts be made to assess SCR as a matter of priority
- Day 2-16 – SCR developed including HAZID with contractor personnel. Partially populated SCR template used as a starting point
- Day 16 – SCR submitted to NOPSEMA
- Day 16-23 – SCR Request For Further Written Information (RFFWI) received
- Day 26 – SCR resubmitted to NOPSEMA
- Day 28 – SCR accepted by NOPSEMA.

INPEX have prepared Scope of Validation templates for both Capping Stack Installation and Relief Well Drilling campaigns.

INPEX tracks the availability of MODUs capable of drilling a relief well on a monthly basis. The register includes whether the vessel currently has a valid Australian safety case and is provided to key source control team members. In addition, on a quarterly basis the latest edition of the register will be reviewed as part of exploration and production drilling EP quarterly risk reviews.

4.4 Relief well supply base capabilities and mud requirements

If required, drilling a relief well will necessitate supporting a MODU and other source control operations. INPEX operates an existing supply base in Broome which has previously supported a two MODU operations during the Phase 1 Ichthys development drilling campaign and will have sufficient arrangements in place for the Phase 2 Ichthys development drilling. At times, INPEX will likely also be supporting other exploration drilling operations in the region at the same time. Broome is now established as a mature oilfield supply centre with at least one liquid mud plant and cement plant in place. If additional resources or lay down area was required, INPEX operates a supply base in Darwin for its production operations which could also be utilised in the event of a source control operation.

Modelling shows that the well is killed relatively quickly (within 45 minutes) and liquid requirements are easily accommodated by typical relief well candidate MODUs operating in the country. Mud/kill fluid will be supplied through the above-mentioned supply bases.

4.5 Summary of capping stack feasibility analysis

High energy gas wells located in relatively shallow water (as seen in the Browse Basin) can present challenges with safe vertical access due to the resulting surface boil and Lower Explosion Limit (LEL) hydrocarbons associated with a well blowout. This in turn can preclude the deployment of a capping stack. This being said, INPEX are a member of a capping stack consortium and have access to a primary 15,000 psi, 18 ¾” capping stack in Singapore and the equivalent as secondary in Aberdeen. Because of this, INPEX undertook a capping study with the provider of this stack (Wild Well Control 2019).

This study involved computational fluid dynamics modelling to show the behaviour of the stack as it is landed on a flowing well with expected Plover reservoir properties (Plover reservoir has higher gas pressure than Brewster reservoir and is therefore a worst-case scenario). The study found that "the capping stack is able to move through the discharge plume in a controlled manner and can potentially be landed on the wellhead" (Wild Well Control 2019).

The study (Wild Well Control 2019) then looked at the behaviour of the subsea plume as it rises in the water column and then the dispersion of any gas at the sea surface, in order to infer if vertical access is possible. It was determined that with assumed current and wind conditions, the plume would be displaced 50 m downstream of the well centre but the 10% LEL radius extends up to 60 m upwind. This means that, if limited to 10% LEL, the closest a construction vessel could get to the well centre is 10 m. Therefore, deployment of the capping stack could be possible subject to crane capacity on the selected construction vessel.

While direct vertical access has been determined as not possible for the modelled Plover discharge rate, there are influences that would likely reduce the discharge rate and thus enable vertical access. These are outlined as follows:

- The situation may be a drilled kick escalating to blowout meaning less net pay and possibly non-Plover reservoir (being of lower quality)
- There may be wellbore flow restrictions which are likely to occur from:
  - Drill-string remaining in the hole (drilled kick/dropped drill-string) partial closure of BOP due to activation during/after the event from MODU or vessel
  - flowing zone collapse/bridging.

4.6 Assessment of capping stack deployment duration

Opting for capping as the primary means of containment yields a reduction in the time to contain the well. An operational analysis of capping stack mobilisation by air and vessel (sea freight) has been conducted and the options detailed in the INPEX Capping Stack Logistics Plan (D020-AD-PRC-10039). Vessel mobilisation has been assessed as the quickest option and is summarised in Table 4-2 below.

Table 4-2: Deployment of capping stack – vessel freight option

Item	Maximum duration (days)	Comments
Mobilise personnel and equipment	4	Call out to arrival of crew in Singapore warehouse. Mobilise equipment including Fugro ROV skids to Kim Heng.
Source and mobilise construction vessel to Singapore (concurrent operation)	(3)	Typical response time based on market knowledge of suitably rated vessels with Australian Vessel Safety Cases. An appropriate vessel will be identified on INPEX register, updated monthly, tracking the location and availability of HLVs in the SE Asian region.
Stack up and test capping stack in Singapore and ready for load out (concurrent operation)	(3)	Based on capping stack mobilisation schedule stack-up and testing of capping stack in Singapore.

Load out capping stack on to construction vessel from Singapore	3	Based on logistics plan from provider
Transit capping stack directly to licence area	7	Typical sailing time from Singapore to well location with some minor allowance for weather on route.
Deployment of capping stack onto well and shut-in of well	7	Assumes vertical access is possible with an allowance for unfavourable metocean conditions during deployment
Total	**21**	INPEX Capping Stack Logistics Plan (D020-AD-PRC-10039)

Running in parallel with the above timeframe, a SCR for a capping stack deployment vessel would also be developed and submitted to NOPSEMA for acceptance. An indicative schedule for the SCR approval is as follows:

- Day 0-1 – vessel(s) identification
- Day 1-2 – SCR development schedule created. Engagement meeting with NOPSEMA held to advise of submission schedule and request all attempts be made to assess SCR as a matter of priority
- Day 2-12 – SCR developed including HAZID with contractor personnel
- Day 12 – SCR submitted to NOPSEMA
- Day 12-19 – SCR RFFWI received
- Day 21 – SCR resubmitted to NOPSEMA
- Day 22 – SCR accepted by NOPSEMA

INPEX tracks the availability of vessels capable of deploying a capping stack on a monthly basis. The register includes whether the vessel currently has a valid Australian safety case and is provided to key source control team members. In addition, on a quarterly basis the latest edition of the register will be reviewed as part of exploration and production Drilling EP quarterly risk reviews.

4.7 Evaluation of source control capability and arrangements

Table 4-3 presents an evaluation of the applicability of various source control options.

Table 4-4 presents further information regarding the environmental benefits and merit in improving the implementation of source control activities (i.e. implementing controls to a greater extent or within a faster timeframe and associated cost benefit considerations).

Table 4-5 presents the environmental performance outcomes, environmental performance standards and measurement criteria, related to the preparedness and implementation of source control activities.

Table 4-3: Evaluation of applicability of source control response options

Source control response technique	Likelihood of success	Considered for implementation
Site survey	Site survey involves the use a response vessel and ROV to conduct visual/sonar observations, to determine the condition of well and BOP and search for any debris, following the source control event. This information is required, to enable the source control team to conduct detailed planning for all source control activities. A detailed assessment of the logistical resources required to implement this response strategy are described in Table 4-4	Yes
Debris clearance	Debris clearance involves the use of response vessel(s) with cranes/lifting equipment and work-class ROVs, equipped with cutting tools, to cut and relocate/recover debris on the seabed, to enable other response strategies such as BOP intervention, capping stack deployment and mooring a relief well MODU to occur safety. A detailed assessment of the logistical resources required to implement this response strategy are described in Table 4-4	Yes
BOP intervention	BOP intervention involves the use of response vessels and work-class ROVs with tooling to enable an additional hydraulic power source to power some BOP functions. The BOP intervention tooling can be used to attempt to close the shear-rams of the BOP to stop the flow from the well and/or unlatch the Lower Marine Riser Package to allow its removal for the installation of the capping stack. A detailed assessment of the logistical resources required to implement this response strategy are described in Table 4-4	Yes
Capping stack	A capping stack response involves the use of a heavy lift vessel (HLV) to lower and latch the capping stack on the blowing well, to stop the flow from the well. A detailed assessment of the logistical resources required to implement this response strategy are described in Table 4-4	Yes
Capping stack – offset installation equipment	INPEX is aware of new technology developed by Saipem and marketed by Oil Spill Response Limited (OSRL) in the form of Offset Installation Equipment (OIE). The OIE is designed to deploy a capping stack on a blowing well where vertical access is not possible. It is essentially a mobile subsea crane which is used to perform debris clearance and then pick up a capping stack from a subsea parking stand and deploy it, though the discharge plume and on to a blowing well.	No

	INPEX do not believe that the proactive gaining of access to this equipment for the planned operations in WA-50-L is in line with ALARP principles for the following reasons: • Mobilisation: the equipment is stored in Trieste, Italy and is believed to include nearly 170 packages with a shipping weight of 300 t. The carrier itself is 14 m x 13 m x 10 m in dimension and as such, mobilisation can only be undertaken by sea, not by air. Further consideration has been made to assess the possibility of airfreighting the equipment. The equipment would require disassembly in order to be of an appropriate size to travel by aircraft. Disassembly of just the carrier is predicted to result in approximately 43 packages. These would then require to be transported in around 20 aircraft given the size of the packages. On this basis, the potential to airfreight the equipment in order to decrease the mobilisation time from Italy to Australia has been discounted given the time-saving gained by airfreighting is lost due to the additional time required for disassembly and reassembly. Whether by sea or air, the long mobilisation duration erodes the time saving realised by capping relative to a conventional relief well kill. • Deployment mass: the deployment mass is understood to be up to 300 t. This is roughly three times the mass of a 15,000 psi 18 ¾" BOP style capping stack. It is understood that a 400t crane is quoted as the minimum requirement for the installation vessel and it is stated that this is what was used during a field deployment trial. INPEX participated in an OIE workshop with other titleholders in May 2019, and at that time it was stated that the original equipment manufacturer of the OIE identified a minimum 600t crane vessel as being required. It was then noted from a marine advisor participating in the workshop that due to the overturning moment during the deployment of the OIE carrier, significant re-ballasting operations would be required, and this would likely necessitate a much larger vessel to maintain stability during the lift. The crane rating of such a vessel was stated at 900t. Nonetheless, despite the stated true minimum crane rating, it is noted that there are other minimum specifications, notably around the "active/passive anti roll system" and "ballasting capacity sufficient to minimise the installation and recover time of the OIS" which call for a specialised and likely large vessel. This vessel would be more specialised and larger, and thus less readily available than a vessel suitable for a standard capping stack deployment in the case of vertical access being possible. This greatly reduces the number of candidate vessels in the region, let alone those with current Australian Vessel safety cases. Less readily available means a longer response time and a further demonstration that OIE is not ALARP when compared to a relief well kill in the case were vertical access for capping is not possible. • Debris clearance capabilities: it is understood that that OIE can perform some debris clearance tasks, including lifting debris up to 160 t. While this may be sufficient to remove a LMRP from a BOP, it is unclear what capabilities exist for the clearance work prior to this operation including but not limited to the deployment of super shears to sever riser and the like, if required.	

	• Local fabrication: the OIE scope of supply excludes some significant equipment including but not limited to three gravity anchors and a subsea parking stand for the capping stack. It is understood that this fabrication would require up to 500t of steel and it is estimated that even a significant supply hub such as Darwin would struggle with the scale of this fabrication. This may drive the sourcing of this fabrication to a regional hub such as Singapore which could place this fabrication on the critical path and further erode the time saving realised by capping relative to a conventional relief well kill. • Exclusion zone: while theoretically vertical access is not required with OIE, access into 500 m is required for the initial deployment of the carrier and support operations with ROVs during capping operations. With unfavourable metocean conditions and a high energy blowout, even this may be difficult, particularly with at least 5 vessels being required (2 x anchor handers on either side of boil for initial deployment, 1 x survey, 1 x construction, 1 x air supply). Relief well planning performed for WA-50-L has spud locations 2,000 m away from the blowing well centre which is well beyond the downwind/down current extent of 10% LEL radius of 1,100 m. • Localised soil conditions: The unique carbonate shallow soils present in the Browse Basin have posed significant challenges to well structural design to date and it is understood they are out with the acceptable range verified by Saipem as part of the design validation for the OIE anchors. While this does not preclude the use of the OIE, a revised anchor design needs to be generated in order to achieve the required 50 t capacity of each of the three anchors if they are to be deployed in the Browse Basin. • Drag chain contact with seabed: For stability, the carrier requires a drag chain to be in contact with the seabed at all times. Ichthys drill centres are surrounded by a complex array of SPS infrastructure. The transit of the carrier, and its drag chain would need to be carefully evaluated, at the time of the blow-out, to determine if it was safe to attempt to run the drag chain through possible approach corridors without causing additional damage and possible gas/oil releases to the environment, through additional damage to existing subsea infrastructure. These corridors may be incompatible with the prevailing metocean conditions and the resulting surface boil location and geometry, thereby preventing the safe conduct of the activity. • Contractual arrangements: It is understood that OSRL have been unable to negotiate post event contractual terms with Saipem as the Original Equipment Manufacturer of the OIE. Existing contractual agreements only cover training and maintenance of the system however ultimately Saipem would need to operate the system. This is seen to be a significant issue as such contracts would need to be brokered during mobilisation.	

	The OIE is an extremely complex spread of equipment and as outlined above, comes with attendant risks, any of which if realised, may preclude its deployment. Fortunately, the system has not been used to respond to an actual source control event but that makes it, as yet, unproven. Comparing this with a well-established source control method of intersection with a relief well and dynamic well kill, it is seen that the proactive gaining of access to OIE is not ALARP for operations in WA-50-L or other near-by exploration drilling activities.	
Relief well	A relief well can be drilled to intercept the original wellbore close to the reservoir. Kill fluid is then pumped through the relief well into the original well-bore, to provide an overbalance pressure to the reservoir, and stop the flow of hydrocarbons from the well. To conduct the relief well, a MODU with support vessels is required. In addition, extra vessels with additional drilling fluid and pumping equipment may be required, for the well kill activity. Following the well kill, the MODU will use the relief well to isolate and abandon both wells. A detailed assessment of the logistical resources required to implement this response strategy are described in Table 4-4	Yes
Use of relief well injection spool	INPEX is aware of new technology developed by Trendsetter Engineering in the form of the Relief Well Injection Spool (RWIS). The RWIS is a spool piece with side outlets installed below the BOP of the relief well which facilitates the connection of more surface pumping resources. These additional resources can deliver greater kill fluid rates to the relief well. As all WA-50-L development wells can be killed with a single relief well using mud pumping resources available on standard MODUs, the use of the relief well injection spool would not be required.	No
Subsea dispersant injection	SSDI involves the use of an ROV, to inject dispersant directly into the hydrocarbon stream flowing from the damaged well. The outcome of SSDI is a significant increase of entrainment of oil in the water column. By increasing the proportion of hydrocarbons becoming entrained, there will be a reduction in hydrocarbons arriving on the ocean surface, and an associated reduction in hydrocarbons evaporating into the atmosphere. Modelling results (RPS 2019) indicates that under a worst-case blowout scenario, VOC concentrations (from oil evaporating into the atmosphere) are likely to exceed safe exposure thresholds within 1 km of the release location. The workforce onboard vessels conducting source control activities such as BOP intervention, debris clearance and capping stack installation could therefore be exposed to VOCs, and if gas monitoring indicated exposure had exceeded the VOC thresholds, the vessel would be required to cease the activity move out of the area. In effect, VOC exposure may impact the feasibility of debris clearance/capping stack installation and ultimately limit available source control options to drilling a relief well.	Yes

	Modelling results (RPS 2019) also concluded that SSDI would eliminate the risk of VOCs exceeding exposure thresholds. Therefore, the use of SSDI to significantly reduce the VOC risk to source control vessels/workers may contribute to the feasibility of capping stack, instead of a well kill via relief well, which would take several more months to achieve. A detailed assessment of the logistical resources required to implement this response strategy are described in Table 4-4.	

Table 4-4: Source control arrangements and capability evaluation

Source control element	Can a greater response effort be implemented?	Can the time to respond be improved?	Justification for increased response effort/reduced response time
A vessel with an observation or work-class ROV is required to undertake the site survey and record / report visual observations of the well location and surrounding area and will be in Broome within 7 days. The location and availability of support vessels with ROVs will be tracked on a register which is updated on a monthly basis.	Only a single vessel with a single ROV is required for site survey activities. Additional vessels and/or ROV's will not result in any better information being provided to the source control team, to facilitate ongoing source control planning. Therefore, a single vessel and ROV is appropriate.	A support vessel with ROV would be identified from within Australia and would be expected to arrive and commence mobilisation activities in Broome, within 7 days. INPEX's drilling support vessels and Ichthys Field support vessels are not required to be equipped with ROVs. The cost of maintaining a vessel with full ROV spread and ROV crew at all times on a support vessel is estimated to be ~$65,000 a day and not considered ALARP given the cost and many vessels with ROVs can be made available on short notice within the region. Typically, several support vessels with ROVs are located in the NW region, with additional vessels around Australia / SE Asian region capable of completing the site survey. To track and identify capable support vessels and ROVs, the most practicable option is to maintain an up to date register of suitable available support vessels.	No additional site survey response capability required.
A Construction Support Vessel (CSV) with lifting equipment of 150t lifting capacity and work-class ROVs will be utilised, if required, for debris clearance and will be in WA-50-L within 17 days.	Only a single CSV equipped with work class ROVs and lifting equipment rated for 150t is required for debris clearance.	A CSV with lifting equipment rated for approximately 150t with a work-class ROV would be identified and contracted from within Australia or the SE Asian region within 10 days and would arrive in the licence area within 17 days.	No additional debris clearance vessel response capability required.

Source control element	Can a greater response effort be implemented?	Can the time to respond be improved?	Justification for increased response effort/reduced response time
The location and availability of a CSV with suitable lifting equipment and work-class ROVs will be tracked on a register which is updated on a monthly basis. The status of vessel safety cases will also be maintained on the register.		A vessel with a reduced lifting capacity may be used for debris clearance if available and post debris clearance planning using the information presented by the site survey team. Identification and contracting/mobilisation will typically commence when initial source control planning begins. Response time could be improved by maintaining a CSV on stand-by. However, until site survey activities have been conducted and results evaluated by the source control team, it is unknown if debris clearance is even required. Therefore, the large costs of maintaining a CSV on stand-by (~$225,000 per day) are not considered ALARP, especially given CSVs with ROVs can be made available within the region. To ensure the availability, the most practicable option is to maintain an up to date register of suitable, available vessels and their safety case status.	
Debris clearance ROV tooling is required for debris clearance activities. The AMOSC subsea first response tool-kit (SFRT), is located in Perth and will be in Broome within 3 days. Wild Well Control Inc (WWCI) debris clearance equipment is available in	Debris clearance equipment such as drill pipe and riser cutting shears are specifically designed tools for specific tasks, which typically only need to be utilised once during the debris clearance activity. Primary and redundancy equipment is available through the AMOSC and WWCI contracts. There is no benefit to increasing the quantities or capabilities of debris clearance equipment.	Debris clearance equipment will be mobilised when the initial source control planning begins. The AMOSC SFRT can be mobilised, by road to Broome, within 3 days. The WWCI debris clearance equipment can be mobilised by air to Broome within 5 days.	No additional debris clearance tooling capability required.

Source control element	Can a greater response effort be implemented?	Can the time to respond be improved?	Justification for increased response effort/reduced response time
Singapore, with back-up equipment based in the United Kingdom. Primary equipment will be in Broome within 5 days.		The debris clearance tooling will likely arrive in Broome before the debris clearance vessel, and whilst site survey and initial source control planning is still occurring. If the debris clearance vessel is mobilising directly to the licence area, a small charter vessel can rapidly mobilise the debris clearance tooling from Broome to WA-50-L. Therefore, maintaining additional debris clearance equipment in Broome is not considered ALARP.	
Support vessel with work-class ROVs and BOP intervention tooling (hot stabs) are required for the BOP intervention activity. The location and availability of support vessels with work-class ROVs will be tracked on a register which is updated on a monthly basis and a support vessel with work-class ROVs and BOP intervention tooling will be in Broome within 10 days.	Only a single vessel equipped with a work-class ROV is required for BOP intervention. BOP intervention uses standard hot-stabs, routinely used on offshore facilities. This type of tooling is readily available and will be mobilised with the BOP intervention vessel and ROV spread. There is only a single BOP during well drilling, therefore additional vessels and ROVs will provide no benefit to the BOP intervention activity.	A support vessel with work-class ROV will mobilise from within Australia and commence mobilisation activities in Broome (including gas detection system), within 10 days. Depending on the outcome of site survey activities, debris clearance may be required prior to attempting BOP intervention. However, under some circumstances, BOP intervention could occur without debris clearance. Therefore, mobilisation within 10 days is appropriate. If the site survey vessel is using a work-class ROV instead of an observation class ROV, the site survey vessel with work-class ROV would be capable of attempting BOP intervention, eliminating the requirement to mobilise a second vessel. INPEX's drilling support vessels and Ichthys Field support vessels are not required to be equipped with ROVs.	No additional BOP intervention tooling response capability required.

Source control element	Can a greater response effort be implemented?	Can the time to respond be improved?	Justification for increased response effort/reduced response time
		The cost of maintaining a vessel with a work class ROV and ROV crew at all times is estimated to be ~$65,000 a day and is not considered ALARP (given the cost and the availability of vessels with ROVs can be made available on short notice within the region). Typically, several support vessels with work-class ROVs are located in the NW region, with additional vessels around Australia / SE Asian region with the capability of completing a BOP intervention. To ensure the availability, the most practicable option is to maintain an up to date register of suitable, available support vessels.	
Capping stack – primary located in Singapore and secondary in the United Kingdom will be mobilised from Singapore and be available on location within 21 days.	INPEX are a member of a capping stack consortium and have access to a primary 15,000 psi, 18 ¾” capping stack in Singapore and the equivalent as secondary in Aberdeen. INPEX and WWCI have reviewed the capping stack interface with the selected BOP, and have identified the required connections and its availability, and that anticipated pressures are within the operating parameters of the capping stack. INPEX are also conducting a landing study, to plan how to safely lower and latch the capping stack onto the BOP. As there is only a single BOP, only a single capping stack is required.	A breakdown of the individual steps and durations for capping stack mobilisation are provided in Table 4-2 and Table 4-4. An operational assessment and deployment planning study conducted by WWCI, determined a one (1) day difference between air and sea freight logistics options (longer by air). In addition, various uncertainties and risks to schedule were identified with the air freight option including handling restrictions at airports and wharfs. Another significant concern for stack up and testing of the capping stack in Australia is the reduced presence of original equipment manufacturer (OEM) and access to parts.	No additional capping stack response capability required.

Source control element	Can a greater response effort be implemented?	Can the time to respond be improved?	Justification for increased response effort/reduced response time
	As INPEX have access to primary and back-up capping stacks, sufficient redundancy is available, should any issues arise during stack up, testing, mobilisation, deployment and activation of the primary capping stack.	As a result, the capping stack will be stacked up and tested in Singapore due to the established infrastructure and Subject Matter Experts (SMEs) based in Singapore. WWCI conduct an annual stack up of the capping stack capturing lessons learned to improve the preparation time for mobilisation to field.	
A HLV with a work class ROV and minimum lifting capacity of 120t would be mobilised to Singapore, to receive the capping stack and ancillary equipment, then deploy to the licence area. The HLV will be used to land the capping stack on the blowing well and be on location within 21 days. INPEX will maintain a register, updated on a monthly basis, of the location and availability of all HLVs in the SE Asian region. The register will maintain status of safety cases.	As there is only a single BOP and single capping stack, only a single HLV is required.	A breakdown of the individual steps and durations for capping stack mobilisation including sourcing of an appropriate HLV vessel are provided in Table 4-4 Identification and contracting/mobilisation and planning will commence when initial source control planning begins. Response time could be improved by maintaining a HLV on stand-by. However, until site survey and other activities have been conducted and results evaluated by the source control team, it is unknown if capping stack deployment will be possible. Therefore, the large costs of maintaining a HLV on stand-by (~$225,000 per day) are not considered ALARP, especially given HLVs with ROVs can be made available within the region. To ensure the availability, the most practicable option is to maintain an up to date register of suitable, available HLVs and their safety case status.	No additional HLV response capability required.

Source control element	**Can a greater response effort be implemented?**	**Can the time to respond be improved?**	**Justification for increased response effort/reduced response time**
A single MODU would be required to drill a relief well in an absolute worst-case scenario. INPEX will maintain a register, updated on a monthly basis, of the location and availability of all MODUs internationally. The register will maintain status of safety cases. The register will include: • name, contractor, stacking status (cold/warm/on contract/yard) • operator (if on contract) • type • water depth capability • BOP pressure rating and # ram cavities • maximum personnel on board • mud pump, crane, helideck, variable deck load and top drive specifications	Approximate relief well locations have been identified around each drill centre in the WA-50-L licence area. Metocean and seasonal environmental conditions will be considered in final relief well location selection. Preliminary designs have been completed for optimal interception of a blowing well and completing a dynamic kill for the worst-case scenario.	The time to contain the well has been conservatively assessed as 80 days (Brewster); 108 days (Plover) and 115 days (Plover HTHP) based on an absolute worst-case discharge. The relief well design and plan will be optimized to intersect the blowing well and to complete a dynamic kill. The relief well cannot be drilled to a shallower depth (less drilling time), and intercept the original well at a shallower depth, as there would not be sufficient hydrostatic head pressure and drilling fluid weight in a shallower relief well to successfully kill the original well. Should the original MODU still be functional (however without BOP), a study would be conducted, and if practicable to implement, to have the MODU pre-drill the top-hole section of the relief well, prior to the arrival of the relief well drilling rig. INPEX has signed the APPEA MoU for mutual assistance between Titleholders. This MoU requires Titleholders to make ‘best endeavours’ to release and transfer drilling units and well-site services between operators in a source control event.	No additional relief well response capability required.

Source control element	**Can a greater response effort be implemented?**	**Can the time to respond be improved?**	**Justification for increased response effort/reduced response time**
• base oil, bulk and liquid mud storage capacities • vessel safety case status and jurisdiction. INPEX will also maintain its subscription to the APPEA MoU.			
Relief well long-lead items (LLIs) and equipment has been identified, e.g. casing and well-head. INPEX drilling logistics team maintain a register of all drilling equipment to ensure relief well stocks are available.	The required consumables are available and tracked, as part of routine Ichthys development drilling. Specifically, spares maintained include: • wellhead system • conductor • surface casing • intermediate casing • relief well conduit Miscellaneous equipment such as crossovers can be manufactured locally within Australia in relatively short timeframes. This would be undertaken using pre-existing arrangements that INPEX has in place for the manufacture of such consumables.	The response time to access the relief well equipment (including miscellaneous equipment items such as crossovers etc that may be required and can be fabricated locally), will not be a critical path activity during the relief well drilling, as a standard logistics supply chain for INPEX development drilling activities, involving the Drilling Supply Base in Broome (and back-up base in Darwin) and standard supply vessels, will continue to be utilised.	No additional relief well long lead equipment capability required.

Source control element	Can a greater response effort be implemented?	Can the time to respond be improved?	Justification for increased response effort/reduced response time
A single SSDI spread would be required to implement SSDI. This equipment includes the dispersant stockpile and injection wands. (Note – support vessels with work-class ROVs for SSDI are the same types of vessels as those required for BOP intervention).	There is no requirement for additional/duplicate SSDI spreads. A single SSDI spread will be able to successfully inject dispersant into the well stream at the optimal ratio of approximately 100:1, which has been demonstrated to reduce VOC concentrations below safe levels (RPS 2019). Injecting additional dispersant into the well-stream will not result in any greater/beneficial reduction in VOC concentrations in the atmosphere. Based on a worst-case oil release rate of 20,000 bbl/day (3193 m^3/day), at 100:1 treatment ratio, the dispersant requirement is 32 m^3/day. For a worst case (complex) activity, 30 days of SSDI could be required. Therefore, a worst-case total of ~1000 m3 dispersant could be required. SSDI would generally not be required to commence mobilisation onto a vessel in Broome until approximately day 10 of a response (aligning with BOP intervention/debris clearance mobilisation activities).	SSDI will only be activated when modelled and/or field measurements predict that VOC concentrations are likely to be exceeded during other source control activities such as BOP intervention, debris clearance or capping stack deployment and installation. The SFRT/SSDI spread is located in Western Australia and maintained by AMOSC. This equipment is rapidly able to be mobilised to Broome, the SFRT / SSDI spread is not anticipated to be on the critical path. As such, response time for SSDI spread readiness/mobilisation is determined to be appropriate/ALARP.	No additional SSDI capability required.

Source control element	Can a greater response effort be implemented?	Can the time to respond be improved?	Justification for increased response effort/reduced response time
	The SSDI spread maintained by AMOSC in WA includes 500 m3 of Slick-Gone-NS dispersant and can be mobilised to Broome within 10 days. Therefore, 50% of the total worst-case dispersant requirement for a worst credible SSDI response can be mobilised outside of critical path timeframes. Additional Australian and global dispersant stockpiles can be mobilised, should it be estimated that the AMOSC 500 m^3 will be used up. Additional dispersant would not be required until a minimum of ~day 25 of the response, and therefore any additional dispersant stocks could be easily mobilised by vessel or aircraft to Broome within the required timeframe. INPEX maintains access to the global dispersant stockpile through INPEX Corporations membership with OSRL. Therefore, INPEX has access to sufficient dispersant for a worst case (30 day) SSDI activity.		

Table 4-5: Environmental performance outcomes, standards and measurement criteria for source control preparedness arrangements

Environmental Performance Outcome	Environmental Performance Standard	Measurement Criteria
INPEX will be prepared and ready to respond to source control events.	INPEX will maintain and monitor registers as described in Table 4-4 and Section 4.2 updated on a monthly basis, of the location and availability of support vessels, CSVs, HLVs and MODUs, including their capabilities (ROVs/crane capacity etc) and safety case status and jurisdiction	Vessel and MODU registers.
	INPEX will maintain a register of relief well long lead items.	Relief well long lead items register.
	INPEX will maintain contracts for suitable debris clearance equipment. Debris clearance equipment will be able to be mobilised to Broome within 5 days.	Records of contracts for debris clearance equipment.
	INPEX will maintain a contract for a SSDI spread, which can be mobilised to Broome within 10 days. The SSDI spread will contain a minimum of 500 m^3 of dispersant.	Records of contract for SSDI spread.
	INPEX will maintain its OSRL membership, to ensure access to the global dispersant stockpile.	Records of INPEX OSRL membership.
	INPEX will maintain contracts for suitable capping stack equipment. The capping stack equipment will be: • identified as fit for purpose, capable of being lowered and latched onto the selected BOP, utilising a single HLV • rated to achieve a well-kill, based on the expected pressures of the reservoir • primary stack available to be mobilised onto a HLV within 5 days • primary and secondary capping stack maintained in a suitable state of readiness.	Records of contracts for capping stack equipment.

Environmental Performance Outcome	**Environmental Performance Standard**	**Measurement Criteria**
	INPEX will continue to subscribe to the APPEA MoU.	Record of APPEA MoU.
	INPEX will participate in the DISC steering committee for the development and submission of a SC template for a generic vessel including the activity of deploying a capping stack from this vessel.	Meeting minutes and records of attendance.
	Source control team will maintain preparedness through training and exercises to validate source control logistical arrangements and ensure the source control team: • understand the source control planning documents/procedures • understand their defined roles and responsibilities • validate communications with external source control service providers.	Records of training and exercises for the source control team.
	INPEX will maintain a contract with WWCI, for the provision of personnel to: • provide technical expertise to the INPEX source control team • provide in-field supervision of source control activities.	WWCI contract.
	Prior to spudding; source control documentation will be approved and in place in accordance with the WOMP, including: • Drilling Browse Basin Emergency Response Plan • Source Control Emergency Response Plan • Blowout Contingency Plan – Browse Basin Wells • Well Control Modelling Service Report	Records confirm source control planning documentation was approved prior to spudding.

Environmental Performance Outcome	Environmental Performance Standard	Measurement Criteria
	• Capping Stack Deployment and Installation Procedure.	
INPEX will re-gain control of a well within 80 days (Brewster)/108 days (Plover)/115 days (HPHT) of any source control event, through implementation of the environmental performance standards.	In the event of a loss of well control, conduct a site survey of well-head infrastructure, to inform source control planning activities. A vessel to undertake the site survey will be mobilised to Broome within 7 days.	Records of site survey.
	In the event conditions allow for the safe deployment and installation of the capping stack, INPEX will mobilise, deploy and install the capping stack in accordance with response time model detailed Table 4-2: Deployment of capping stack – vessel freight option	Records of capping stack feasibility report. Daily drilling report.
	INPEX will mobilise relief well MODU and drill, intercept and regain control of the well, in accordance with the time frames detailed in Table 4-1: Summary of time response models for Brewster and Plover reservoirs (Browse Basin Common Relief Well Design and Response Time Models Technical Note)	Daily drilling report.
	The source control team will utilise the source control planning documentation to develop and implement a source control plan. The source control plan will: • evaluate, define and schedule source control activities • utilise the asset registers to identify and safely mobilise suitable assets within the minimum timeframe possible • evaluate the potential to use the site survey vessel/ROV for BOP Intervention • evaluate the potential to use the original MODU to drill top-hole sections for any relief wells.	Source control plan documentation.

Environmental Performance Outcome	Environmental Performance Standard	Measurement Criteria
	The source control team will develop a SIMOPs plan, to support the source control plan. The SIMOPs plan will specify: • licence area entry requirements, including DP checks • exclusion zones • minimum vessel separations • communications requirements and frequencies SIMOPs planning meetings.	Records confirm SIMOPs plan developed and implemented.
No incidents of loss of hydrocarbons to the marine environment as a result of a vessel collision during source control activities.	If debris clearance and wet-storage is required, the source control team will use existing site survey data to identify temporary wet storage areas which are not sensitive benthic habitats.	Records confirm any identified wet-storage areas do not contain sensitive benthic habitats.
Impacts to the shallow water column through use of SSDI will be reduced to ALARP through the implementation of the Environmental Performance Standard.	SSDI will only be activated when: • Air quality monitoring and/or modelling determines there is a credible risk of atmospheric VOC concentrations exceeding safe exposure thresholds for source control activities; and • There is a requirement to conduct source control activities in the zone where atmospheric VOCs may present a hazard to the safety of workers, and • Air quality monitoring and/or modelling of gas levels and lower explosive limits determines source control activities including SSDI could be safety conducted.	Records of: • Air quality monitoring and/or modelling demonstrating a credible risk of atmospheric VOC concentrations exceeding safe exposure thresholds for source control activities • SSDI injection occurring concurrently with source control activities.
	SSDI injection concentration will initially be set at 100:1 (based on best estimate of well flow-rate at the time of the blow-out).	Records of SSDI injection ratio Records of atmospheric VOC concentration monitoring during source control activities.

Environmental Performance Outcome	Environmental Performance Standard	Measurement Criteria
	Effectiveness of SSDI will be monitored through ongoing measurement of VOC concentrations on the surface, by source control vessels. If VOC exposure thresholds are exceeded, SSDI ratio will be incrementally increased, until VOC concentrations are below safe exposure thresholds.	

5 IMPLEMENTATION

An implementation strategy is described within all INPEX EPs. The implementation strategy addresses the following:

- overview of the INPEX Business Management System, including HSE management systems/processes
- leadership and commitment including Environment Policy
- capability and competency including the organisational team and responsibilities associated with the implementation of the EP
- documentation, information and data management related to the EP
- risk management process used within the EP
- operate and maintain; specific processes/systems required for EP implementation
- management of change, including the specific change management process for the EP
- stakeholder engagement, including processes for ongoing engagement and consultation with stakeholders potentially affected by the EP
- contractors and suppliers, including selection and management processes
- security and emergency management
- incident investigation and lessons learned, which also includes monthly and annual performance reporting.
- monitor, review and audit; defining the processes to ensure ongoing compliance and continual improvement of the EP
- management review, including senior management review of the EP.

Within the implementation strategy of each EP, only some elements are relevant to this document. The following are considered necessary to include as stand-alone processes within this document:

- source control arrangements testing
- review of source control arrangements process
- management of change process
- annual performance reporting requirements
- management review process.

The details of these are provided in the following sections.

5.1 Source control arrangements testing

Environmental performance outcomes, standards and measurement criteria relating to testing of source control arrangements associated with INPEX exploration and production wells in the Browse Basin are presented in Table 5-1.

Table 5-1: Environmental performance outcome, standards and measurement criteria for testing response arrangements

Environmental performance outcome	Performance standards	Measurement criteria
INPEX will be prepared and ready to respond to source control events.	INPEX IMT and drilling source control team will conduct a well blow-out exercise in the Browse Basin biennially. The objectives of this exercise will include as a minimum: practice the interface between the source control team and IMT • source control team verification of availability of rigs, vessels and equipment • source control team verification of logistics plan • to verify source control response timelines as specified in Table 4-4.	Exercise records demonstrate that a Browse Basin well-kill exercise has been conducted biennially.
	INPEX source control team will conduct an annual source control logistics desktop validation exercise. The objectives of this exercise will include: • source control team verification of availability of rigs, vessels and other required source control equipment, specified in Table 4-4. • source control team verification of a logistics plan which meets the source control response timelines specified in Table 4-4.	Exercise reports demonstrate objectives have been tested annually.

5.2 Review of source control arrangements and risk assessment

An environmental risk register for each EP is maintained and will be reviewed and updated quarterly. The quarterly environmental risk review process will be implemented to assess internal and external changes that may affect the performance outcome and standards as associated with the activity. Changes could include availability of source control response MODUs/vessels or other source control relevant information.

Pre-spud risk reviews will be conducted to verify the availability of relief well MODUs and capping stack deployment vessels with respective capabilities as described in Section 4.2 Adaptive management measures will be implemented, should identified MODU's and vessels be unavailable or outside the limits required to meet the described response time models detailed in Tables 4-1 and Table 4-2.

This document will be reviewed following any events requiring its activation, in order to identify any lessons learned, or other relevant triggers for review.

Environmental performance outcomes, standards and measurement criteria relating to source control capability and arrangements reviews and updates to this document are presented in Table 5-2.

Table 5-2: Environmental performance outcome, standards and measurement criteria for updating this source control document

Environmental performance outcome	Performance standards	Measurement criteria
INPEX will be prepared and ready to respond to source control events.	This document will be reviewed and updated if necessary, following any INPEX source control team exercise or incident in which any source control capability used/activated.	Records demonstrate a review and update (if necessary) of this document.
	Verify availability of capable source control MODU and vessels required for the activity prior to, and during the drilling activity.	Records demonstrate pre-spud and quarterly risk review conducted.
	Implement adaptive management measures to identify a suitable alternative: • relief well MODU and/or • capping stack deployment vessel to ensure the described response time models in Tables 4-1 and Table 4-2 are met.	Records demonstrate pre-spud and quarterly risk review conducted.

	If new source control related information, which could affect source control capability and arrangements (such as MODU/vessel availability issues) is identified through the pre-spud and/or quarterly risk review process, the information will be assessed using New Information Risk Assessments and/or the Management of Change process. Depending on the outcome of the risk assessment and/or change assessment, this document will be updated as necessary.	Records demonstrate quarterly risk reviews consider source control risk elements.
	This document will be reviewed and updated if necessary, based on findings from the annual management review and annual performance report.	Records demonstrate a review and update (if necessary) of this document.

5.3 Management of Change

Changes to INPEX documents are managed in accordance with a business-wide standard, and related procedures and guidelines. Where a change to management of an activity is proposed, it will be logged. Internal notification will be communicated via a management of change (MoC) request. The request will identify the proposed change(s) along with the underlying reasons and highlight potential areas of risk or impact. In accordance with the INPEX business rules, it is mandatory to undertake an environmental risk assessment in every case for changes that could affect the environment, including source control risks and response arrangements.

The MoC request will be managed by an environmental adviser who will then determine the necessary approval/endorsement pathway, in consultation with the environmental approvals coordinator. Minor changes (such as updating a document or process) that do not invoke a revision trigger are made in document reviews from time to time.

In accordance with Regulation 17 of the OPGGS (E) Regulations 2009, a revision of an EP will be submitted to NOPSEMA where:

- a change is considered to represent a new activity
- a change is considered to represent a significant modification to, or a new stage of, an existing activity
- a change will create a significant new environmental impact or risk
- a change will result in a series of new (or increased) environmental impacts or risks that, together, will result in a significant new environmental impact or risk, or a significant increase in an existing environmental impact or risk.

The MoC request process will be periodically checked against NOPSEMA guidance to ensure ongoing compliance and will be undertaken as part of the management review process described in Section5.5.

As this document is an integrated element for EPs associated with exploration and production wells, the MoC process is also applicable to this documents. Therefore, where an MoC is required for changes to this document, the INPEX EP MoC template will be used to formally record/document the change.

When a new or revised EP is required to be re-submitted to NOPSEMA, and the new or revised EP also requires/results in changes to this document, the updated version of this document will be submitted, with the new/revised EP, to NOPSEMA.

5.4 Annual performance reporting

In accordance with Regulation 14(2) of the OPGGS (E) Regulations 2009, INPEX will undertake a review of its compliance with the environmental performance outcomes and standards set out in this document and will provide a written report of its findings to NOPSEMA on an annual basis.

The annual reporting period for this document will be from the 01 January to 31 December of each calendar year. The submission date for the environmental performance report will be 01 April each calendar year.

Any findings from the Annual Performance Report will be included on an INPEX action tracking register.

5.5 Management review

Management reviews of this document shall assess whether:

- control measures detailed in this document are effective in maintaining source control preparedness and response capability to an ALARP and acceptable level
- implementation of the MoC process has been applied consistently and appropriately, ensuring source control preparedness and response capability and arrangements remain ALARP and at acceptable levels, commensurate with INPEX’s activities and source control risks
- any changes in legislation, NOPSEMA guidance or other matters relating to source control preparedness and response have been taken into consideration in relation to this document.

Where the documented findings of the management reviews have implications for this document, it will be updated in accordance with Table 5-2.

6 REFERENCES

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