INPEX

Ichthys PROJECT

GAS EXPORT PIPELINE

Summary Environmental Plan

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INPEX

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ICHTHYS PROJECT - GAS EXPORT PIPELINE EPCI CONTRACT

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ACRONYMS AND ABBREVIATIONS

AFMA	Australian Fisheries Management Authority
AHT	anchor-handling tug
AIS	automatic identification system
ALARP	as low as reasonably practicable
AMSA	Australian Maritime Safety Authority
CEMP	Construction Environmental Management Plan
CHARM	chemical hazard and risk management
CMA	Commonwealth marine area
Cwlth	Commonwealth
DGPS	differential global positioning system
EP	environment plan
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
ERASS	equipment risk assessment score sheet
GEP	gas export pipeline
GT	gross tonnage
IFO	intermediate fuel oil
IMO	International Maritime Organisation
IMS	invasive marine species
IMSMP	Invasive Marine Species Management Plan
INPEX	INPEX Operations Australia Pty Ltd
KEF	key ecological feature
KP	kilometre point
LAT	lowest astronomical tide
LNG	liquefied natural gas
LPG	liquefied petroleum gas
MARPOL	International Convention for the Prevention of Pollution from Ships
MFE	mass flow excavator
MGO	marine gas oil
MGPS	marine growth prevention system
MoU	Memorandum of Understanding
MSDS	Material Safety Data Sheet
NAXA	Northern Australia Exercise Area
nm	nautical mile (approximately 21,850 m)
NOHSC	National Occupational Health and Safety Commission
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority

NT	Northern Territory
NWMR	north-west marine region
OCNS	offshore chemical notification scheme
ODS	ozone depleting substances
OPGGS (E) Regulations	Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2009
OPGGS Act	*Offshore Petroleum and Greenhouse Gas Storage Act 2006*
OSCP	oil spill contingency plan
OSMP	operational and scientific monitoring plans
PHV	pipe haul vessel
PLET	pipeline end termination
PLONOR	pose little or no risk to the environment
PSV	pipe supply vessel
QAQC	quality assurance and quality control
ROV	remotely operated underwater vehicle
ROW	right-of-way
Saipem	Saipem (Portugal) Comércio Maritimo (Australian Branch)
SOLAS	Safety of Life at Sea
SOPEP	Shipboard Oil Pollution Emergency Plan
VRASS	vessel risk assessment score sheet
WA	Western Australia

1 INTRODUCTION

The Ichthys Gas Field Development Project (the Ichthys project) is a joint venture between INPEX group companies (INPEX), major partner, Total group companies, and the Australian subsidiaries of Tokyo Gas, Osaka Gas, Chubu Electric Power Company and Toho Gas. INPEX intends to develop the Ichthys Field in the Browse Basin off the north-west coast of Western Australia to produce liquefied natural gas (LNG), liquefied petroleum gas (LPG) and condensate for export to markets in Japan and elsewhere.

The Ichthys gas field is located in the Browse Basin, approximately 210 km north-west of the coast of mainland Western Australia and 820 km west-south-west of Darwin, Northern Territory (NT), Australia (Figure 1-1). The Ichthys project will allow for the extraction and transmission of natural gas from the Ichthys gas field through the Gas Export Pipeline (GEP) to the onshore processing facilities at Blaydin Point in Darwin Harbour for processing into liquefied natural gas (LNG), liquefied petroleum gas (LPG) and condensate. Export of condensate for the international market will also occur directly from the offshore floating facilities via off-take tankers [Ref A1].

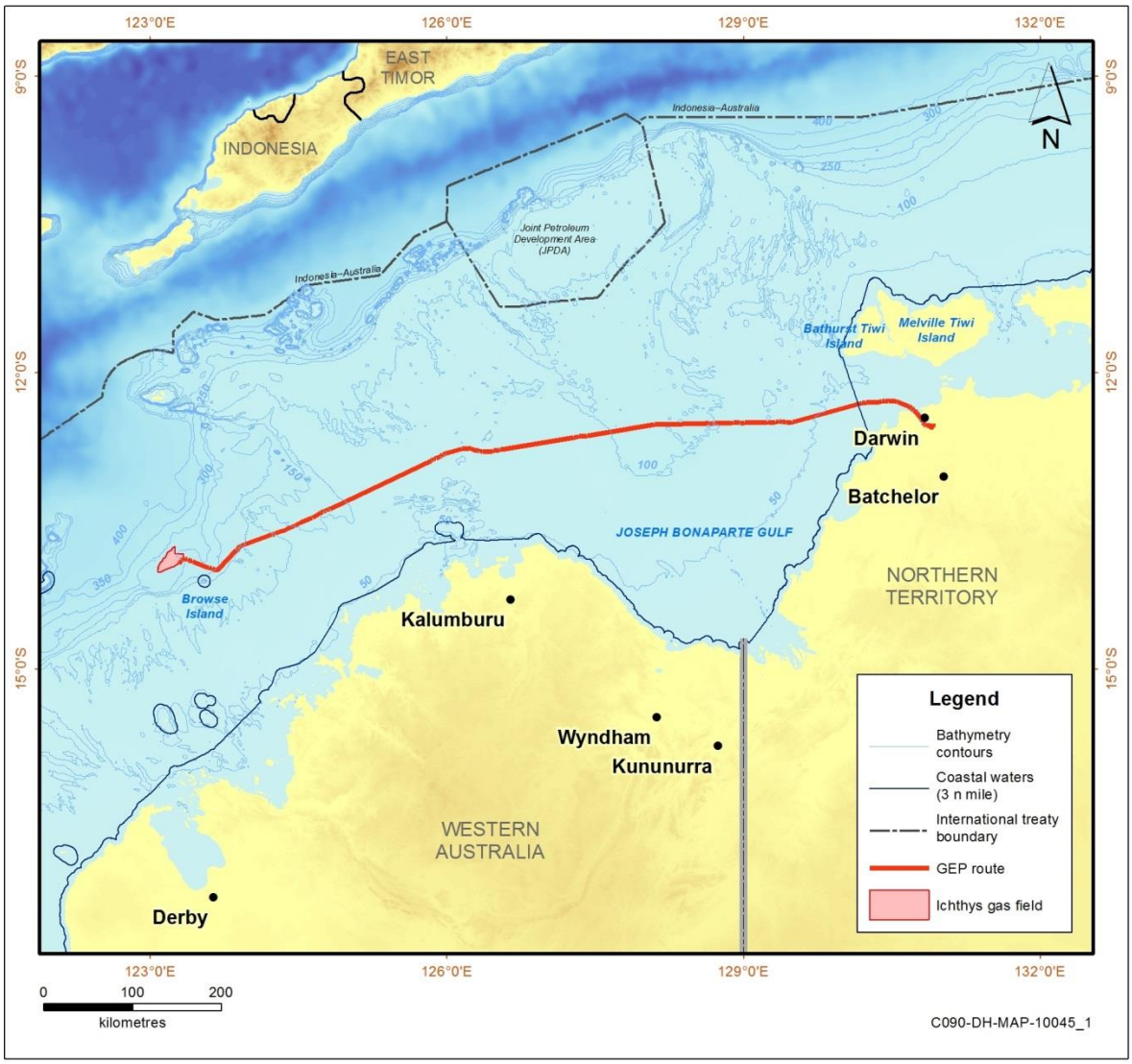

Figure 1-1 The Ichthys gas field and GEP route

Saipem (Portugal) Comércio Maritimo (Australian Branch) (Saipem) has been awarded the engineering and installation contract by INPEX for the GEP associated with the Ichthys project. The GEP Environment Plan (EP) has been developed to cover Saipem's scope of work in respect of the offshore GEP installation activities - from a pre-lay survey through to the completion of pipeline installation.

The GEP-EP covers the following:

- describes the GEP installation activities;
- describes the surrounding environment and activities occurring within the vicinity of the GEP route;
- identifies the applicable regulatory requirements pertaining to the environmental management of the offshore pipelay;
- describes environmental risks and impacts associated with the GEP installation activities for planned and unplanned events;
- describes the performance objectives, standards and measurement criteria to reduce impacts and risks to as low as reasonably practicable (ALARP) and acceptable levels; and
- provides an Oil Spill Contingency Plan (OSCP) containing the planning means to implement response arrangements to reduce impacts and risks of oil spills to ALARP and acceptable levels.

The GEP-EP has been structured to meet the requirements of the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) *Guidance Note N-04700-GN1074 Environment plan content requirements Revision 1, January 2013* for use by Operators in preparing EPs for submission from 1 January 2013, and to satisfy the requirements of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS (E) Regulations).

The GEP-EP was accepted by NOPSEMA in accordance with Regulation 11(1) of the OPGGS (E) Regulations and Amendment Regulations 2011. This document provides a summary of the INPEX Ichthys Project GEP-EP applicable to the GEP installation activities and this summary document has been prepared as per the requirements of Regulation 11(7–8) of the OPGGS (E) Regulations.

2 DESCRIPTION OF THE ACTIVITY

The GEP project scope of work comprises the installation of the pipeline from the shore crossing site in Darwin Harbour through to the Ichthys gas field. The scope of work for the GEP-EP includes offshore pipelay, from pre-lay survey through to installation of pipeline through to the pipeline end termination (PLET). The offshore installation area comprises the GEP route from the 3 nm Northern Territory coastal waters boundary to the Ichthys gas field, a distance of approximately 793 km.

A semi-submersible shallow water lay barge (*Semac-1*) and a deep water pipe-laying vessel (*Castorone*) will be used to install the GEP. Before and after pipe-laying, Saipem will undertake surveys along the GEP route to confirm the initial seabed characteristics and subsequent final pipeline position.

The GEP route has been selected by INPEX to minimise the seabed intervention disturbance to the marine environment. Seabed intervention works will be undertaken at three separate locations using methods such as a mass flow excavator (MFE) and/or clay cutter operated to reduce the final pipeline free-span distances where seabed undulations are significant.

Pipelay will commence in Darwin Harbour in mid-2014 using the *Semac-1* to lay pipe within Darwin Harbour and NT waters, which is outside the scope of this EP. The *Semac-1* will continue the pipelay from nearshore waters into Commonwealth waters, to a depth of approximately 65 m lowest astronomical tide (LAT), laying up to approximately 80-100 km. The *Semac-1* pipelay activities in Commonwealth waters are within the scope of this EP.

At completion of its scope of work, the *Semac-1* will lower the pipe to the seabed at approximately kilometre point (KP) 716. The pipeline end location will be recorded and a marker buoy attached. The dynamically positioned *Castorone* will arrive at the pipeline end location and continue pipelay to approximately KP –1.8. At approximately KP –1.8, the *Castorone* will lay down the pipeline into a pre-installed PLET, in a depth of approximately 250 m LAT. The GEP will be laid directly on the surface of the seabed in Commonwealth waters.

2.1 LOCATION OF THE ACTIVITY

The offshore installation area, which is addressed in this Summary EP, comprises the GEP route from the three nautical mile (nm) NT waters/Commonwealth waters boundary, to the Ichthys gas field, a distance of approximately 793 km [Ref A1].

The total length of the 42″ concrete-coated, steel pipeline will measure approximately 882 km, with the GEP distance measured from the offshore end in the Ichthys gas field kilometre point (KP) 0, to the onshore beach valve location at the shore crossing in Darwin Harbour (KP 885). Approximately 238 km of pipeline will be laid within the Northern Australia Exercise Area (NAXA) (Figure 2-1).

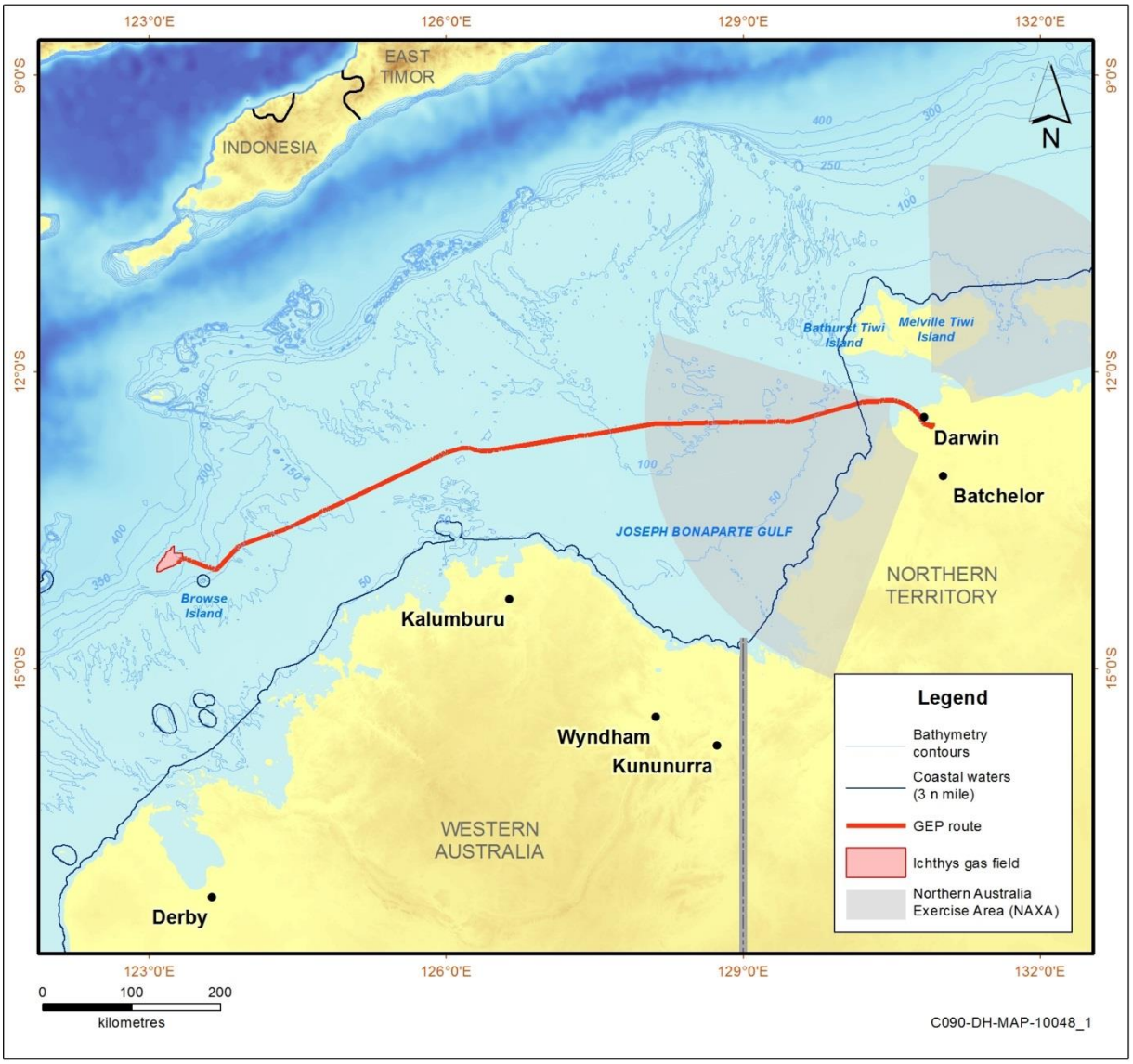

Figure 2-1 GEP route traversing the NAXA

Note that a separate plan, the Onshore and Nearshore Construction Environmental Management Plan (CEMP), has been developed to address the nearshore (NT waters) aspects of GEP installation activities [Ref B1], comprising pipeline pre-lay survey and installation within 3 nm of the coastline. The CEMP was approved by NT Environment Protection Authority on 20 December 2013.

Five pipeline licences have been granted for the GEP project. The NT Government has issued three licences under the former *Energy Pipelines Act and Petroleum (Submerged Lands) Act*. The other two pipeline licences have been issued under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGS Act).

2.2 TIMING OF THE ACTIVITY

GEP installation activities are scheduled to be undertaken from June 2014 to June 2015, a period of approximately 12 months. The schedule is indicative only and is subject to vessel availability, arrival time, weather and other potential constraints. For commercial reasons however, the intention is to follow the indicative schedule provided as closely as possible. Environmental performance objectives, standards and measurement criteria in the GEP-EP allow for potential changes in schedule and potential seasonal variations in environmental sensitivity.

The pipelay barge *Semac-1* will operate in Commonwealth waters for approximately one month. When the *Semac-1* is no longer able to work efficiently due to water depth, the pipelay vessel *Castorone* will continue with

the pipelay to the PLET at the Ichthys gas field. The *Castorone* is due to undertake pipelay for approximately nine months.

2.3 PIPELAY VESSEL SPREAD

The GEP vessel spread comprises:

- Pipelay vessels:
  - A semi-submersible shallow water lay barge (Semac-1) and a deep water pipe-laying vessel (Castorone) will be used to install the GEP. Before and after pipe-laying, Saipem will undertake surveys along the GEP route to confirm the initial seabed characteristics and subsequent final pipeline position.
- Surveys and survey vessel
  - A non-invasive pre-lay survey will be undertaken prior to pipelay using side-scan sonar, multibeam echo sounder. The survey will confirm the bathymetric profile along the GEP route and identify any seabed features or obstructions that may have any engineering significance.
  - The survey vessel will undertake the pre-lay survey of the entire GEP route. It will also conduct touchdown monitoring using a remotely operated underwater vehicle (ROV) for the entire Semac-1 activities and for the Castorone during its first week of operation and its final 100 km (approximate) of operations. The proposed survey vessel, the Go Explorer.
- Linepipe transportation
  - The linepipe will be transported from Indonesia to both the Semac-1 and Castorone. The linepipe sections (12.2 m) will be supplied to the Semac-1 using up to eight cargo barges, towed by shuttle tugs. Linepipe for the Castorone will be supplied using a combination of up to eight pipe supply vessels (PSVs) and up two pipehaul vessels (PHVs).
- Supply vessels
  - Up to three supply vessels will operate out of Darwin approximately every two days, transporting food and general supplies (including lubricating oils and hydraulic oils, if required) to the Semac-1 and Castorone. The supply vessels will be used to transport incinerator ash and any waste materials not incinerated back to Darwin for recycling or disposal.
  - Other vessels that form part of the marine operations for the GEP installation activities include:
    - an offshore support vessel;
    - a construction support vessel;
    - anchor-handing tugs (AHTs), cargo barges, shuttle tugs;
    - supply vessels and fuel tankers.

    Up to six vessels will be present within the GEP construction corridor at any one time. Helicopters will also be used to support the GEP installation activities. A 500 m safety zone will be enforced around the Semac-1 and Castorone while conducting GEP installation activities, to regulate vessel activities (including speed and vessel to vessel communication) for the safety of GEP project vessels and other marine users.
- Refuelling
  - The Semac-1 will be bunkered at sea by one of the AHTs or supply vessels that will obtain fuel supplies from Darwin. The other two AHTs will then be bunkered from the Semac-1. It is anticipated that refuelling of the Semac-1 will be required, on average, every 20 days.
  - The Castorone will be bunkered at sea by a fuel tanker originating from either in Singapore or Indonesia. It is anticipated that refuelling will be required approximately every 30 days. The fuel tanker will have a capacity of approximately 10 000 m^3.

The GEP-EP addresses the operational management of vessels present (either continuously or transiently) and those activities taking place within the 500 m safety zone which will be in force around the pipelay barge Semac-1, and subsequently the pipelay vessel Castorone, as they proceed along the GEP route.

The GEP-EP does not include any required movement of vessels outside of the 500 m safety zone (e.g. travel to and from Australian supply base or overseas ports). These activities will be undertaken in accordance with relevant maritime legislation, most notably, the Navigation Act 2012 and the Protection of the Sea (Prevention of Pollution from Ships) Act 1983 when vessels are within Australian waters, and the International Convention for the Prevention of Pollution from Ships 1973/1978 (MARPOL 73/78) when vessels are outside Australian waters.

Hydrotesting and depressurisation of the GEP, or mechanical completion, is not in the scope of this EP and will be detailed in a separate EP.

3 DESCRIPTION OF THE ENVIRONMENT

3.1 PHYSICAL ENVIRONMENT

The GEP route traverses 793 km of open ocean from the 3nm limit of NT waters to the Ichthys gas field (refer to Figure 2-1) and passes through two bioregions - the North Marine Region [Ref D1] and the North-West Marine Region (NWMR) [Ref D2]. The GEP route will also traverse the North West Shelf Transition provincial bioregion in the eastern (Darwin) area through to the Timor Province bioregion where the Ichthys gas field is located.

The climates for the bioregions are similar and are largely dominated by cyclonic weather patterns and monsoonal conditions (generally from November/December to March/April). It is expected that weather conditions along the GEP route will be similar in both regions, this can include high temperatures and heavy (though variable) rainfall with the potential for cyclones during the wet season, alternated by dry periods.

Four key ecological features (KEFs) are in close proximity or traversed by the GEP route including the pinnacles of the Bonaparte Basin, the ancient coastline at 125 m depth contour, carbonate bank and terrace system of the Sahul Shelf and the continental slope demersal fish communities.

3.2 BIOLOGICAL ENVIRONMENT

3.2.1 Habitats of the GEP route

Surveys of the seabed along the pipeline route [Ref D3] recorded featureless, unconsolidated clay-silt sands along the greater part of the pipeline route (>98%), with the most dominant seabed features being areas of pockmarks and sand waves. Rock subcrop occurred in some areas and exposed outcrop were very rare.

Benthic communities of ecological interest along the GEP route are sparsely distributed and are mainly associated with hard substrates; species in the communities surveyed are common throughout north-west Australian offshore waters and are not considered to be of particular significance in the context of the GEP installation activities. Feather stars were the most commonly seen species on the rocky outcrops surveyed. Sea pens, sea fans, sea whips, soft corals of the genus Dendronephthya, bryozoans, hydroids, and sponges were recorded in the soft substrates along the GEP route [Ref A1].

3.2.2 Habitats of mainland coastline, islands, reefs and shoals

A number of habitats along the mainland coastline have been identified due to their proximity to the GEP route and potential for contact by an oil spill event resulting from a vessel collision. No impacts on these habitats are anticipated as a result of normal GEP installation activities.

The WA-NT coastal intertidal and sub-tidal habitats provide foraging habitat and/or nesting sites for EPBC-listed dugongs, turtles, sea snakes, crocodiles, sharks, seabirds and shorebirds. Tidal wetlands, mangroves and salt marshes are common along the mainland shoreline.

Various islands reefs and shoals are within the vicinity of the GEP route and potential exposure zone[1], and are depicted in Figure 3-1 and Figure 3-2. A summary of islands, reefs and shoals and their approximate distance to the closest section of the GEP route are presented below:

Islands

- The Vernon Islands (located approximately 99 km from the GEP route) are a Conservation Reserve. Large numbers of dugongs forage around the islands. Hard corals have been recorded on the slopes of reef pavements on the South West Vernon Island. Large intertidal reef flats occur around all three of the Vernon Islands. The intertidal rocky reefs support sponges and algae [Ref A1].
- The Tiwi Island group (located approximately 66 km from the GEP route) consists of two large inhabited islands (Melville and Bathurst), and nine smaller uninhabited islands. The islands' shorelines feature numerous mangrove-lined bays and inlets. Habitat supports crocodiles, dolphins, sea turtles (nesting beaches) and dugongs, as well as bird life (breeding colonies) [Ref A1]. The Tiwi Islands are culturally significant, are inhabited by the Tiwi people and was proclaimed an Aboriginal reserve in 1912.

[1] Exposure zone refers to all key sensitive receptors and features that are within the area potentially contacted by the maximum credible spill scenario predicted to result in the most widespread contact, as predicted from the stochastic trajectory modelling along the GEP route.

- Browse Island (located approximately 14 km from the GEP route) is an isolated sandy cay surrounded by an intertidal reef platform and shallow fringing reef. The reef crest and seaward ramp habitats around the edge of the reef support moderately rich assemblages of molluscs, while the shallow narrow sub-tidal zone supports relatively small areas of well-developed coral assemblages. Browse Island supports feeding and/or nesting habitat for EPBC-listed turtle, sea snake, whale and dolphin species [Ref A1]. It is also located within the Indonesian traditional fishing memorandum of understanding (MoU) 74 area (Figure 4-3). It is a Class C Nature Reserve.
- Cartier Island (located approximately 139 km from the GEP route) and surrounding waters are characterised by an unvegetated sandy cay surrounded by reef platform. Cartier Island forms part of the Cartier Island Commonwealth Marine Reserve and the Ashmore Reef and Cartier Island and surrounding waters KEFs. The island supports significant populations of feeding and nesting marine turtles, seabird rookeries (mainly migratory) and breeding sites [Ref D1 and D4]. It is also located within the Indonesian traditional fishing MoU 74 area (Figure 4-3).
- Adele Island (located approximately 187 km from the GEP route) is characterised by sand banks atop a shallow-water limestone platform surrounded by an extensive reef. The island is an A Class Nature Reserve and provides feeding and breeding habitat for seabirds [Ref D2].
- Cape Londonderry (located approximately 100 km from the GEP route) is characterised by bays and inlets lined with mangroves. Submerged and fringing reefs, and coral communities occur along the coast [Ref D5]. Islands off the coast include Lesueur, Troughton and Long Islands. More than 20 bird species live and feed in mangroves. EPBC-listed cetaceans forage, feed, breed and calve in the area [Ref D6]. Lesueur Island is a Nature Conservation Reserve.
- Bonaparte Archipelago (located approximately 110 km from the GEP route) consists of approximately 2000 islands. The islands range from grassed sand cays to larger islands of stony plateaus with mangrove fringes or sand dunes [Ref D5]. Large islands include Cassini, Bigge and Coronation Islands. The islands fall within the proposed North Kimberley Marine Park and the West Kimberley National Heritage Site. Islands of the archipelago support manta ray, dugongs, six species of marine turtles, extensive mangrove forests, coral reefs and sponge gardens.
- Buccaneer Archipelago (located approximately 221 km) consists of approximately 1000 islands which are sparsely vegetated and rocky with patches of rainforest, white sandy beaches, small embayments and fringing mangroves. Islands include Koolan Island, Cockatoo Island and the Montgomery Islands. The islands are rich in bird species, estuarine crocodiles, sea snakes, sharks, swordfish and other fish species [Ref D7]. It falls within the Camden Sound Marine Park and the West Kimberly National Heritage site.

<u>Reefs</u>

- Hibernia Reef (located approximately 200 km from the GEP route) is characterised by a deep central lagoon and drying sand flats. Hibernia Reef is regionally important for its high diversity, endemic species and it supports important sea snake populations [Ref A1 and Ref D1].
- Ashmore Reef (located approximately 175 km from the GEP route) is an atoll-like structure with vegetated islands, sand banks, lagoon areas and surrounding reef. It forms part of the Ashmore Reef Commonwealth Marine Reserve and is a declared Ramsar wetland. It supports feeding habitat for EPBC-listed turtle, sea snake, dugongs and seabird species [Ref D1]. It is also located within the Indonesian traditional fishing MoU 74 area (Figure 3-3).
- Seringapatam Reef (located approximately 134 km from the GEP route) is a regionally important scleractinian coral reef which has high diversity, endemic species and represents the limit of the geographic range of numerous fish species. It also encloses a lagoon which is connected to the ocean. Scott Reef is a declared Commonwealth Heritage place. It provides feeding and/or nesting habitat for EPBC-listed turtle and seabird species [Ref A1]. It is also located within the Indonesian traditional fishing MoU 74 area (Figure 3-3).
- Scott Reef (located approximately 144 km from the GEP route) is a regionally important scleractinian coral reef which has high diversity, endemic species and represents the limit of the geographic range of numerous fish species. Scott Reef consists of two reefs, North Scott Reef and South Scott Reef, which are separated by a deep channel. Both reefs enclose lagoons which are connected to the ocean. Scott Reef is a declared Commonwealth Heritage Place and is a Nature Reserve (portions of South Scott Reef are Class C). It provides feeding and/or nesting habitat for EPBC-listed turtle, sea snake, whale

and seabird species [Ref A1]. It is also located within the Indonesian traditional fishing MoU 74 area (Figure 3-3).

- Other reefs of the WA and NT coastline (locations ranging from 37 km to 354 km from the GEP route) also support feeding and/or nesting habitat for EPBC-listed turtle, whale and seabird species.

Shoals

Shoals and banks within the Timor Sea are characterised by abrupt bathymetry, rising steeply from the surrounding shelf to horizontal plateau areas typically 20 m to 30 m deep [Ref D8]. Shoals support a diverse biota, including algae, reef-building corals, hard corals and filter-feeders and provide feeding habitat for EPBC-listed turtle and shark species.

- Flat Top Bank (located approximately 3 km from the GEP route) is a submerged shoal with similar biological habitats to other shallow shoals in the bioregion. Flat Top Bank is used for recreational fishing, and lies within commercial fishing zones (demersal, offshore net and line, mackerel and trepang fisheries).
- Shoals and banks north of the Joseph Bonaparte Gulf (locations ranging from 57 – 177 km from the GEP route) consist of submerged platforms typically supporting a diverse biota, including algae, reef-building corals, hard corals and filter-feeders.
- Van Cloon Shoals (located approximately 12 km from the GEP route) consist of a submerged platform typically supporting a diverse biota, including algae, reef-building corals, hard corals and filter-feeders.
- Gale Bank (located approximately 18 km) is characterised by a submerged platform typically supporting a diverse biota, including algae, reef-building corals, hard corals and filter-feeders.
- Shoals and banks of the Sahul Shelf Complex (locations ranging from approximately 235 – 305 km from the GEP route) consist of submerged platforms typically supporting a diverse biota, including algae, reef-building corals, hard corals and filter-feeders.
- Heywood Shoal (located approximately 22 km from the GEP route) consists of a reef platform comprising hard corals, feather stars, sea whips, soft corals, sponges and occasional echinoderms.
- Echuca Shoal (located approximately 9 km from the GEP route) is one of many limestone pinnacles and shoals which occur on the Sahul Shelf. The benthic community comprised a sparse assemblage, dominated by occasional hard corals and soft corals, sponges, crinoids, hydroids and turfing algae.
- Shoals associated with the Ashmore/Cartier Reef complex (locations vary from approximately 38 – 214 km from the GEP route) consist of submerged platforms typically supporting a diverse biota, including algae, reef-building corals, hard corals and filter-feeders.

3.2.3 Benthic primary producers

Mangroves are a distinctive vegetation type occupying the intertidal areas and lower reaches of many rivers of the NT and northern WA coastline. Shoreline ecological aerial and ground surveys were conducted from Darwin (NT) to Broome (WA) in response to the Montara oil spill [Ref D9]. Approximately 5102 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 saltmarshes occurred over 23.8% of the shoreline. Mangroves are generally areas of high biodiversity and drive primary production. They provide habitat for species such as sawfish, Indo-Pacific humpback dolphins, seabirds (e.g. brown booby), and can provide nursery areas for fish.

Seagrass meadows occur along the mainland coastline of NT and WA and within coastal areas of islands. The largest seagrass meadows within the NWMR occur in the Buccaneer Archipelago on the Kimberley coast [Ref D10]. Seagrass habitat in Darwin Harbour is variable and patchy [Ref A1] and seagrass has been reported along the north coast of the Tiwi Islands [Ref D11]. Seagrasses are a significant component of the marine ecosystem and the main diet of dugongs and green turtles.

Coral communities can be found along the NT and WA mainland coastline, islands and shoals. Coral communities occur where the substrate is rocky in the lower intertidal and shallow sub-tidal zones. Approximately 250 species of coral have been recorded along the NT coastline. However, these species rarely form large reef systems, due to the lack of clear water [Ref D12]. Corals in WA reef habitats have adapted to survive in harsh conditions, and are known to be diverse [Ref D13]. Spawning of corals in NT has been

recorded around the full moon period in October and November, however has not been observed in Darwin Harbour [Ref A1]. Mass coral spawning has been observed to occur at Scott Reef and Rowley Shoals during autumn (March or April). A secondary spawning event was also observed in spring, usually October [Ref D14].

3.2.4 Protected species

An *Environmental Protection and Biodiversity and Conservation Act 1999* (EPBC Act) Protected Matters Database Search [Ref D15] for protected species within 10 km of the GEP route was undertaken. Table 3-1 lists threatened and migratory marine species that may be present within 10 km of the GEP route and are listed as "critically endangered", "endangered" or "vulnerable" under the EPBC Act and international conventions. It should be noted that other marine species that fall under less critical conservation categories (such as listed "cetacean" or "near threatened" species) may also occur within the vicinity of the GEP route.

Table 3-1 Key listed EPBC Act Species

Species name	Common name	Conservation Status	
		Threatened status	Migratory status
Mammals			
Balaenoptera musculus	Blue whale	Endangered	Migratory
Megaptera novaeangliae	Humpback whale	Vulnerable	Migratory
Balaenoptera bonaerensis	Antarctic minke whale, dark-shouldered minke whale	-	Migratory
Balaenoptera edeni	Bryde's whale	-	Migratory
Orcinus orca	Killer whale, orca	-	Migratory
Physeter macrocephalus	Sperm whale	-	Migratory
Dugong dugon	Dugong	-	Migratory
Orcaella brevirostris	Irrawaddy dolphin (currently known as Australian snubfin dolphin)	-	Migratory
Sousa chinensis	Indo-Pacific humpback dolphin	-	Migratory
Tursiops aduncus (Arafura/Timor seas populations)	Spotted bottlenose dolphin (also referred to as Indo--Pacific bottlenose dolphin)	-	Migratory
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	Salt-water crocodile, estuarine crocodile	-	Migratory
Cartilaginous sharks			
Glyphis garricki	Northern river shark, New Guinea river shark	Endangered	-
Pristis zijsron	Green sawfish	Vulnerable	-
Rhincodon typus	Whale shark	Vulnerable	Migratory

Species name	Common name	Conservation Status	
		Threatened status	Migratory status
Isurus oxyrinchus	Shortfin mako, mako shark	-	Migratory
Isurus paucus	Longfin mako	-	Migratory
Birds			
Anous tenuirostris melanops	Australian lesser noddy	Vulnerable	-
Calonectris leucomelas or *Puffinus leucomelas*	Streaked shearwater	-	Migratory
Fregata ariel	Lesser frigate bird, least frigate bird	-	Migratory

Sources: Ref D15, Ref D16, Ref D17 and Ref D18.

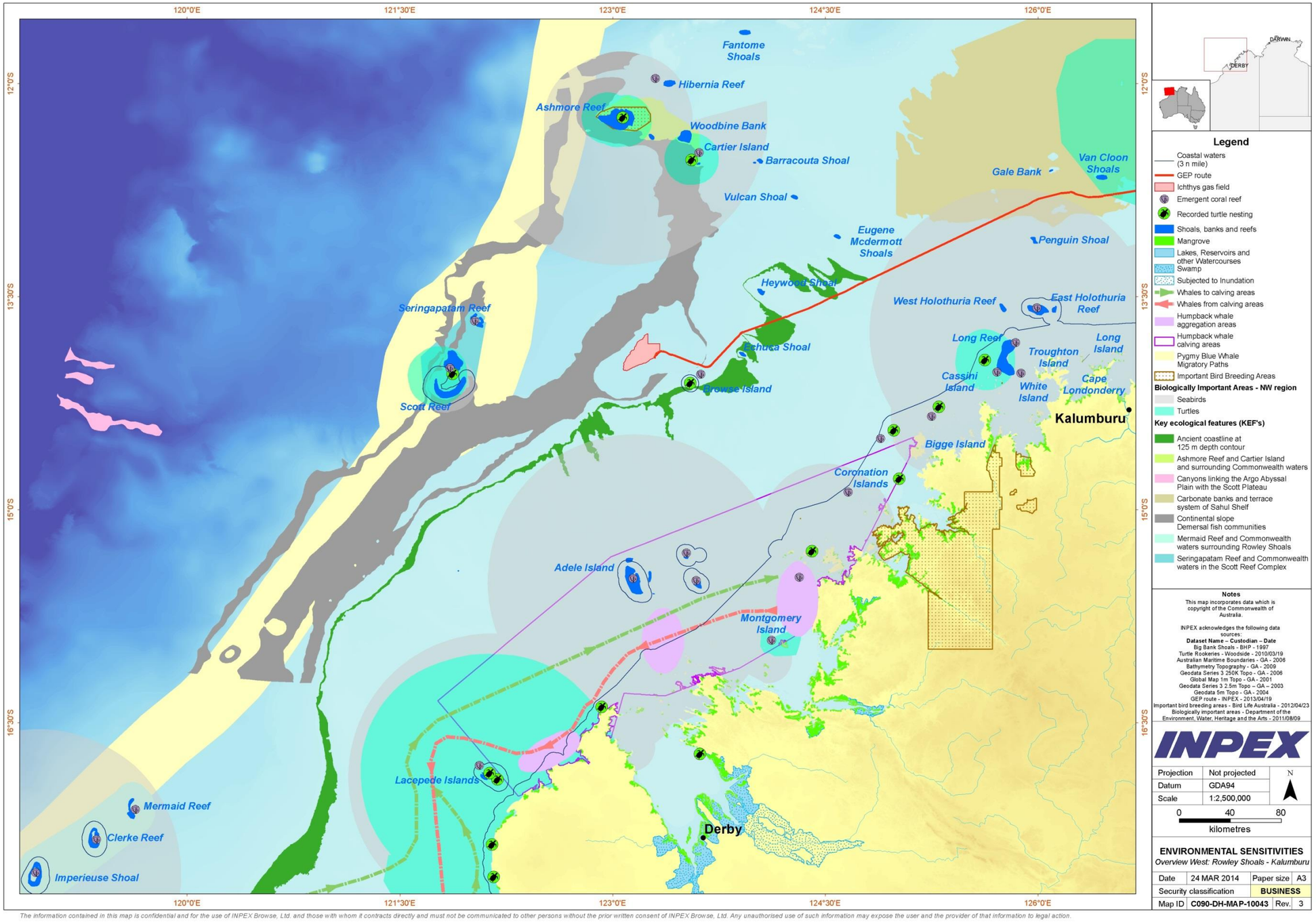

Figure 3-1 Key ecological features (KEFs) and protected/sensitive fauna in the vicinity of the GEP route off the Kimberley Coast, Western Australia

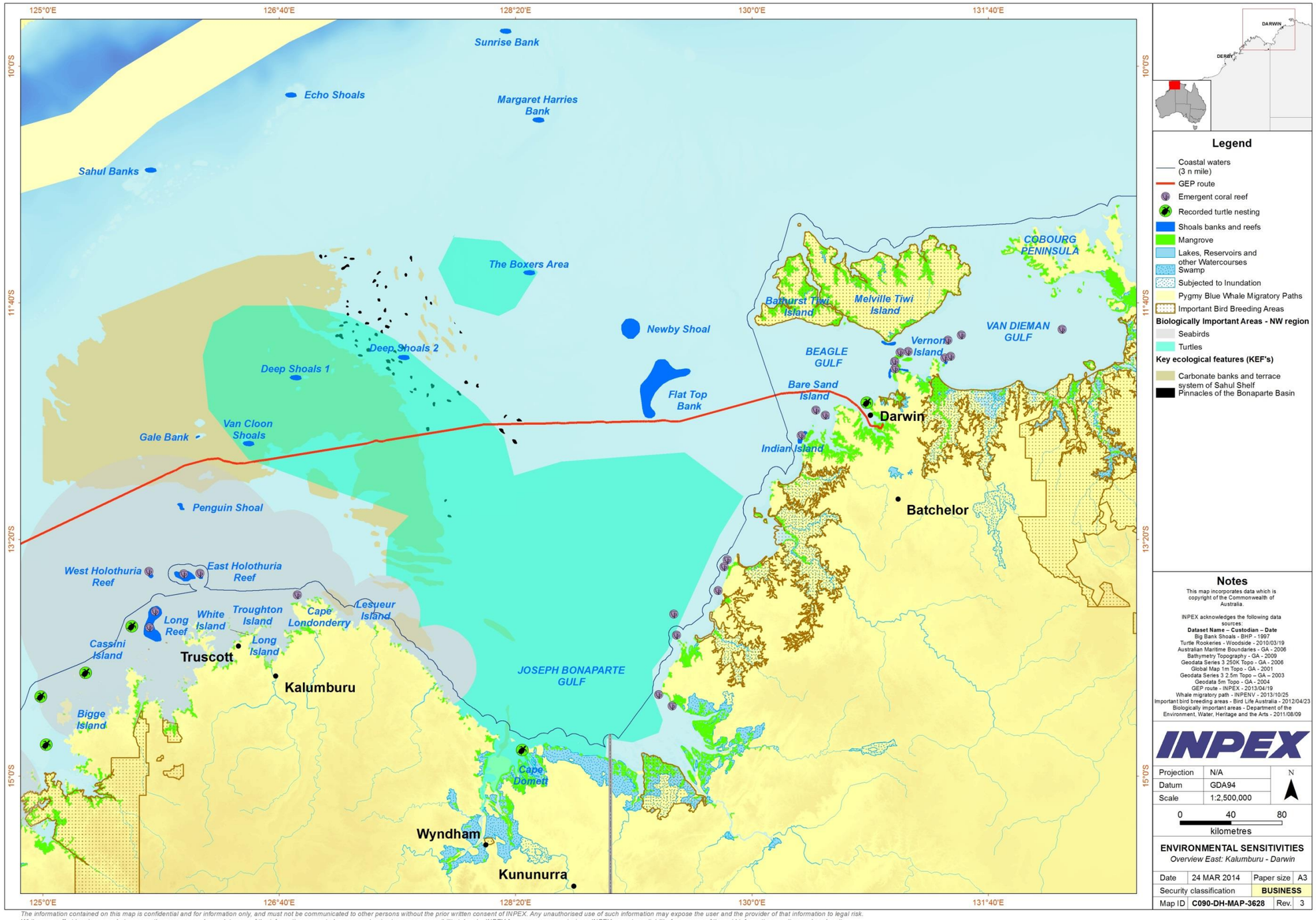

Figure 3-2 Key ecological features (KEFs) and protected/sensitive fauna in the vicinity of the GEP route, north of Western Australia and in the Northern Territory

3.3 SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

The GEP route is situated within the Commonwealth marine area (CMA). The CMA is defined as 'any part of the sea, including the waters, seabed and airspace, within Australia's Exclusive Economic Zone and/or over the continental shelf of Australia, that is not state or NT waters. The Commonwealth marine area stretches 3 to 200 nm from the coast' [Ref D19].

Three Commonwealth marine reserves within the North Commonwealth Marine Reserves Network (the North Network) [Ref D20] are applicable to the GEP-EP. These are the Oceanic Shoals Commonwealth Marine Reserve (which is traversed by the GEP route), the Joseph Bonaparte Gulf and the Arafura Commonwealth marine reserves (which occur within the potential exposure zone) (Figure 3-3).

Five Commonwealth marine reserves within the North-west Commonwealth Marine Reserves Network (the North-west Network) [Ref D20] occur within the potential exposure zone of the GEP installation activities. These include the Kimberley, Cartier Island, Ashmore Reef, Argo-Rowley Terrace and Mermaid Reef Commonwealth marine reserves (Figure 3-3). The North-west Network lies off the coast of WA from Cape Londonderry to Shark Bay and consists of 13 reserves.

No current state-managed marine parks are located within the GEP route. Two WA marine parks and one NT marine park are within the potential exposure zone, including the Cobourg Marine Park (now part of Garig Gunak Barlu National Park) which is used by the Cobourg Aboriginal people for its marine resources and to carry out customary management practices. One proposed WA state marine park (the North Kimberley Marine Park) is also in the potential exposure zone. Nine nature reserves are in the broad vicinity of the GEP route (Figure 3-3). Two wetlands of international significance (Ramsar) are located within the potential exposure zone.

The coast of the West Kimberley National Heritage area is approximately 112 km from the GEP route and occurs within the potential exposure zone. There are no World Heritage sites in, or adjacent to, the GEP route or the potential exposure zone. The GEP route is not located in, or immediately adjacent to, any Commonwealth Heritage places.

There are no operating oil or gas production facilities close to the GEP route, however the pipeline route does traverse a number of petroleum title areas. The closest gas field to the GEP route is the Prometheus/Rubicon gas field, approximately 1 km to the nearest point (partially owned by Tap Oil) and the closest oil field is the Cornea oil field, approximately 20 km from the nearest point (owned by Cornea Joint Venture).

A wide range of recreational activities occurs within the NWMR and the NMR. Recreational fishing activities peak in winter and are concentrated in coastal waters along the Kimberley and NT coastlines. There is little recreational fishing that occurs in the offshore GEP project area because of its distance from land, lack of features of interest and the deep waters. It is considered unlikely that recreational fishing vessels will transit the GEP route.

The GEP route traverses a number of commercial fisheries managed by the Commonwealth, NT and WA. The Northern Prawn Fishery and the North West Slope Trawl Fishery were the only fisheries identified as using areas traversed by the GEP route [Ref A2].

The traditional Indonesian fishing area covered by the MoU signed between the governments of Australia and Indonesia permits traditional Indonesian fishing practices in the region. This includes Scott Reef and associated reefs, including Seringapatam Reef, Browse Island, Ashmore Reef, Cartier Island and various banks. As the GEP route is located within the MoU traditional fishing area, it is possible that some Indonesian traditional fishing vessels will transit the GEP route when travelling between Scott Reef and Browse Island (although their presence in the area is expected to be low).

The Port of Darwin contains well-established trading and recreational facilities that receive a wide variety of vessels ranging from small pleasure boats to commercial tankers. The port is managed by the Darwin Port Corporation, it is Australia's second largest LNG exporting facility and has facilities for live cattle export, cargo and bulk commodities. Tourism activities such as charter fishing, scuba diving, sailing and general boating occur throughout Darwin Harbour.

Iron ore mining operations occur on two islands in the Buccaneer Archipelago (Koolan Island and Cockatoo Island), which are within the potential exposure zone. Both islands have facilities for loading ore directly onto ships, however main shipping routes associated with these islands do not traverse the GEP route.

In the eastern third of the route the pipeline will cross the NAXA, a maritime military zone administered by the Australian Defence Force. A Deed of Cooperation for the NAXA [Ref C2] was signed between the Commonwealth of Australia and INPEX on 4 August 2011, defining an ordinance no impact zone as that area of the seabed within 1nm either side of the GEP route through the NAXA.

Based on 2010 and 2013 data, very low shipping activity is expected along the majority of the GEP route, with shipping activity concentrated in NT waters around Darwin. Registered shipwrecks, identified by the EPBC Protected Matters Database search, occur within the potential exposure zone.

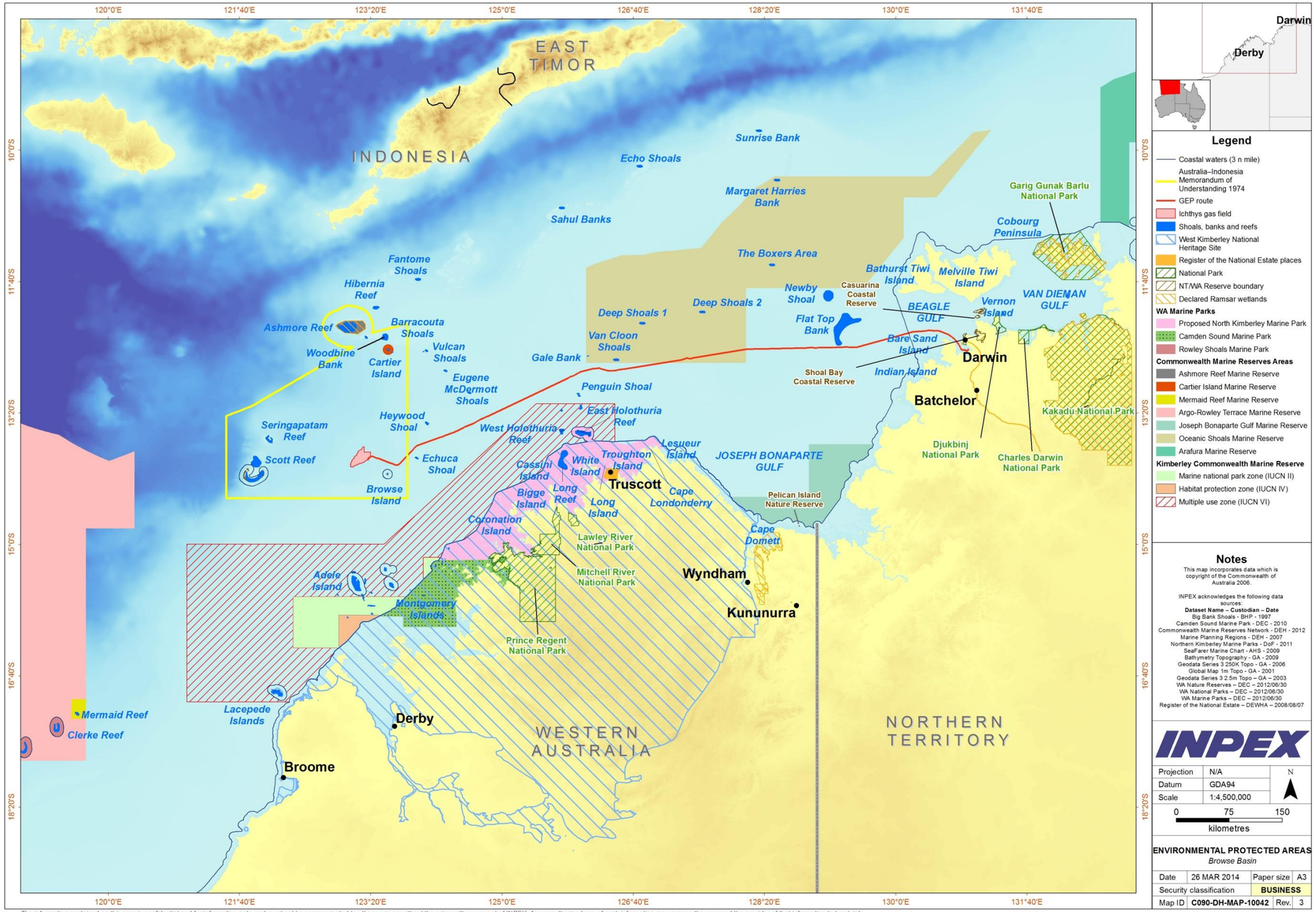

Figure 3-3 Commonwealth-protected and state-protected areas in the vicinity of the GEP route and potential exposure zone

4 CONSULTATION

INPEX applied the stakeholder engagement processes, procedures and guidelines referenced in the INPEX Stakeholder Engagement (Offshore EPs) Guideline [Ref A3] to the Ichthys project, as outlined in Figure 4-1. This stakeholder engagement process was followed by INPEX to ensure that engagement carried out with all stakeholders whose functions, interests or activities may affect or be affected by the GEP installation activities was adequate and to ensure that a consistent approach was applied.

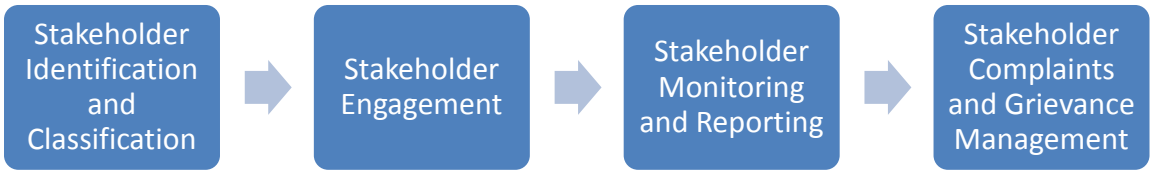

Figure 4-1 Stakeholder management process

In addition to the INPEX stakeholder engagement and monitoring and reporting processes referred to in Figure 4-1, INPEX developed the GEP Construction Stakeholder Engagement Plan [Ref A4]. The GEP Construction Stakeholder Engagement Plan outlines how the GEP Project will manage potential marine impacts from the GEP installation activities in order to maximise safety outcomes for the community and the GEP project and minimise risk.

The INPEX stakeholder engagement process is summarised into the following stages:

- Stakeholder identification and classification – Workshop participants undertook a stakeholder identification process and recorded a basis for selection to explain why each stakeholder was deemed relevant for engagement. Workshop participants collaboratively assessed the levels of interest and influence that each stakeholder would specifically or potentially have in relation to the GEP installation activities.
- Stakeholder engagement – A stakeholder engagement register was developed to identify stakeholders, establish their classification and identify the proposed manner of engagement, adhering to the INPEX stakeholder engagement guideline. To facilitate the engagement process, consultation fact sheets were produced that included a general overview of all offshore construction activities that INPEX will conduct for the Ichthys project, and an activity-specific fact sheet which included key information about the GEP installation activities.
- Stakeholder monitoring and reporting – Stakeholder engagement has been, and will continue to be, monitored, including responding to any queries or feedback raised by stakeholders, during the GEP installation activities.
- Stakeholder complaints and grievance management – Any concerns or complaints received in response to the proposed GEP installation activities have been treated as issues and dealt with in the course of developing the GEP-EP and the OSCP. INPEX has documented any change to the proposed management of an activity, where management or resolution of an issue has required such change. Grievances raised during the implementation of the GEP installation activities will be dealt with in accordance with the GEP Construction Stakeholder Engagement Plan.

Stakeholder groups that were identified as relevant during this consultation process include:

- Commonwealth, state, territory and local government departments and agencies;
- ministers of relevant portfolios;
- National Native Title Tribunal and relevant Aboriginal and Torres Strait Islander land councils and prescribed bodies corporate in areas potentially impacted by the GEP installation activities;
- commercial fishing industry associations and individual operators (permit or licence holders/lessees) in fisheries potentially impacted by the GEP installation activities;
- recreational fishing associations;

- environmental, heritage and marine research groups;
- Aboriginal and Torres Strait Islander communities (Traditional Owners) in areas potentially impacted by the GEP installation activities;
- oil and gas industry peers;
- business groups.

5 ENVIRONMENTAL HAZARDS AND CONTROLS

INPEX and Saipem have committed to a systematic risk assessment process as a means of achieving sound environmental management for the GEP project and to ensure that risks and impacts are managed to ALARP levels.

A risk assessment has been undertaken for all GEP installation activities in accordance with INPEX procedures as well as the procedures outlined in the Australian and New Zealand Standards *AS/NZS ISO 31000:2009, Risk management – Principles and guidelines*.

The key environmental hazards and control measures which will be applied during the GEP installation activities are provided in Table 5-1. These are consistent with INPEX, Saipem corporate and project-specific environmental performance objectives, standards and measurement criteria. The control measures associated with the hazards will be implemented to reduce environmental risks to ALARP and to an acceptable level.

Table 5-1 Key environmental hazards and control measures

Source of risk (hazard)	Potential environmental impact	Management and mitigation measures
Underwater Noise		
Generation of underwater noise from vessels/helicopters, surveys and subsea installation.	• Barotrauma, whereby physical damage is caused to an animal's body tissues as a result of differential pressures between an animal's internal air cavities and the surrounding fluid • Hearing loss which may be caused by a temporary threshold shift or a permanent threshold shift • Behavioral disturbance to sensitive marine fauna • Masking or interference with other biologically important sounds such as communication or echolocation	• Vessel and helicopter operations will be in compliance with the EPBC Act Regulations (2000) – Part 8 *Interacting with Cetaceans* for avoiding marine megafauna (cetaceans and dolphins) and the *INPEX Marine Megafauna Interaction and Observation Procedure* [Ref A5]. Furthermore, controls will be extended to include whale sharks. • All vessels within the 500 m safety zone will be regulated as per specific vessel operation procedures including monitoring of approach speeds. • Awareness and training on protected species management will be included in Vessel Masters and vessel crew inductions. • Vessel Masters or delegate will maintain watch for marine megafauna at all times during transit within the GEP construction corridor. • All personnel are required to monitor and report injured or deceased marine fauna, specifically EPBC Act matters of national environmental significance. • Vessels and helicopters will comply with engine and machinery maintenance schedules to reduce excessive noise and vibration. • Noise emitting equipment and machinery will be regularly maintained in accordance with manufacturers' recommendations.
Light emissions		
Light emitted from marine operations interacting with marine fauna such as fish, seabirds and reptiles	• Disorientation or mis-orientation of turtle hatchlings on Browse Island • Localised attraction of marine fauna	• Vessel lighting will comply with the *Navigation Act 2012* and managed in accordance with the need for safe navigation. • The *Castorone* and associated support vessels will not approach closer than 14 km from Browse Island.
Routine vessel discharges		
Routine discharge of vessel liquid wastes to the marine environment	• Toxic effects on marine biota • Reduction in water quality • Increase in nutrients that may result in phytoplankton blooms • Increase in biochemical oxygen demand • Microbial pollution	<u>Sewage</u> All vessels will comply with *Marine Orders – Part 96: Marine Pollution Prevention – Sewage* (as appropriate to vessel class) which prescribes regulatory requirements for sewage discharge. <u>Putrescible waste</u> All vessels will comply with M*arine Orders – Part 95: Marine Pollution Prevention – Garbage* which prescribes regulatory requirements for the discharge of food waste. <u>Cooling water</u> Vessels will minimise the temperature of cooling water discharges by maintaining all engines and machinery cooled by seawater intake in accordance with the vessels' planned

Source of risk (hazard)	Potential environmental impact	Management and mitigation measures
		maintenance system. <u>Oily water (Bilge water and deck drainage)</u> • All vessels will comply with *Marine Orders – Part 91: Marine Pollution Prevention – Oil* which addresses the disposal of bilge water and deck drainage within Commonwealth waters. • All vessels will comply with *Marine Orders – Part 95: Marine Pollution Prevention – Garbage* which addresses the discharge of deck and external surfaces washdown water in Commonwealth waters. • All chemicals will be packaged, marked, labelled and stowed in accordance with MARPOL 73/98, annexes I, II and III Regulations. • As required by the National Occupational Health and Safety Commission (NOHSC): Approved Criteria for Classifying Hazardous Substances (NOHSC: 1008; 2004), specifically hazardous substances will have material safety data sheets (MSDS) on board. • Deck drainage will be managed in accordance with the EPBC approval conditions (Liquid Discharge Management Plan - Offshore [Ref B2] prepared in accordance with EPBC approval condition 6) to protect marine water quality • A *GEP Chemical Management (Environment) Procedure* [Ref B3], which takes into account the specific use and frequency of use, quantities involved and environmental toxicity of chemicals, will be developed and implemented.
Atmospheric emissions		
• Atmospheric emissions from combustion of fuel or incineration of waste interacting with air quality. • Release of ozone depleting substances (ODS) from vessels	• Localised reduction in air quality leading to environmental impact, exceeding MARPOL requirements • Minor addition to total volume of the Australian contribution to global greenhouse gas emissions	• All vessels will comply with *Marine Orders – Part 97: Marine Pollution Prevention – Air Pollution* (appropriate to vessel class) for emissions from combustion of fuel. • Operation of vessel engines, generators and deck equipment in accordance with manufacturer's instructions and ongoing maintenance to ensure efficient operation • All helicopters used to support the marine operations will operate engines in accordance with manufacturer's instructions and ongoing maintenance to ensure efficient operation. • All vessels with ODS will comply with *Marine Orders – Part 97: Marine Pollution Prevention – Air Pollution* and MARPOL 73/78 Annex VI Regulation 12 (as appropriate for vessel class). • ODS only handled by a qualified or experienced tradesperson • All vessels with on board incinerators will comply *with Marine Orders – Part 97: Marine Pollution Prevention – Air Pollution* and MARPOL 73/78 Annex VI Regulation 16 (as appropriate to vessel class).

Source of risk (hazard)	Potential environmental impact	Management and mitigation measures
Seabed disturbance		
• Disturbance to surrounding seabed and benthic fauna from seabed intervention work. • Disturbance to benthic habitat from laying the GEP and PLET. • Disturbance to benthic habitat from *Semac-1* anchoring	• Temporary increase in suspended sediment and sedimentation • Smothering of marine benthic habitat and benthic fauna • Temporary and permanent loss of benthic habitat and associated infauna and epifauna	<u>Seabed intervention work</u> • Quality assurance and quality control (QAQC) checks will be undertaken. • A pre-lay survey will be conducted. • Vessel operations will be subject to continuous real time survey by Differential Global Positioning System (DGPS). • Post-lay intervention survey will be conducted. <u>GEP and subsea installation</u> • QAQC checks will be undertaken. • A pre-lay survey will be undertaken. • If the pre-lay survey identifies any areas whereby the GEP route needs to be locally adjusted, a Management of Change process will be implemented. • Accurate positioning of vessels will be maintained using DGPS. • The GEP installation will be subject to continuous real time survey by DGPS. • Any forecast or actual critical weather events during GEP installation activities will be managed in accordance with the Project Critical Weather Event Plan [Ref B4]. • A post-lay survey will be conducted. • The GEP will be laid on the seabed and not trenched. • An underwater positioning system will be used to identify the target area to position the PLET. A ROV will be used to confirm the PLET position. <u>Anchoring</u> • QAQC checks will be undertaken of anchor pattern drawings. • The AHT crews will be trained in anchor deployment and experienced in anchor handling. • Pre-lay survey will be undertaken. • A Tug Management System will be used for positioning of *Semac-1* anchor spread. • Anchor wire tension will be continuously monitored during anchor movement to ensure anchor wire does contact the seabed. The *Castorone* will be dynamically positioned in water depths of at least 65 m LAT and therefore no impact to the seabed will occur.
Physical presence		
Physical presence of vessels conducting the GEP installation activities and the	Potential disruption to: • Commercial, recreational and traditional	• An ongoing and continuous stakeholder engagement program will be implemented to verify that all contactable stakeholders are aware of the GEP installation activities. • GEP installation activities will be coordinated and synchronised with the Department of

Source of risk (hazard)	Potential environmental impact	Management and mitigation measures
presence of the pipeline.	fisheries • Defence vessels, customs vessels and air craft • Commercial shipping activities and other marine users	Defence as per the Deed of Cooperation for the NAXA [Ref C1] and Protocol for the Coordination of Project activities and Department of Defence activities in the NAXA [Ref C1]. • Over trawl covers will be installed on the five hot-tap-tees and tie-in-spool to prevent snagging by commercial trawling fisheries. • Notifications (notice to Mariners) will be issued to commercial and recreational fishermen, Australian Fisheries Manage Authority (AFMA), Customs vessels and any other relevant stakeholders, at least 30 days prior to predicted arrival at location and at the time of the demobilisation. • All vessels will comply the *Navigation Act 2012 – Marine Orders – Part 30: Prevention of Collisions* (as appropriate to vessel class). • A 500m safety zone will be in place around the *Semac-1* and *Castorone* during GEP installation activities.
Hydrocarbon spill scenario 1 – vessel to vessel collision involving a PHV (170m^3 intermediate fuel oil (IFO)-180)		
Accidental loss of 170 m^3 IFO-180 as a result of a vessel-to-vessel collision involving a PHV	• Temporary and localised reduction in water quality leading to toxic effects on marine biota • Potential oiling of marine wildlife • Socio-economic impacts on commercial resources due to potential closure or reduction in fishery productivity	• PHVs will be double hulled. • PHVs to be equipped with appropriate navigational systems, depth sounders and aids (including radar, signal and lights on facility structures and, where appropriate) that meet national and international requirements for the prevention of collisions. • PHVs used will have functioning dynamic positioning equipment. • Implement a stakeholder engagement procedure to verify all stakeholders are aware of the GEP installation activities and operational areas and potential risks • Enter into a MoU with Australian Maritime Safety Authority (AMSA) regarding proposed roles during a spill event • Provide AMSA with a copy of the accepted *GEP OSCP – Offshore* [Ref A2]. • GEP installation activities involving two or more vessels working in close proximity will be coordinated using a series of controls focused on communications, speed, approaches and distances. • Vessels will comply with the training requirements of the *Navigation Act 2012 – Marine Orders – Part 3: Seagoing Qualifications* and *Marine Orders – Part 6: Marine Radio Qualifications*. • All vessels will comply with the communication and navigation equipment requirements of the *Navigation Act 2012 – Marine Orders – Part 6: Marine Radio Qualifications* and *Marine Orders – Part 27: Radio Equipment* (as appropriate to vessel class). • All vessels will comply with the *Navigation Act 2012 – Marine Orders – Part 21: Safety of Navigation and Emergency Procedures* (as appropriate to vessel class). • All vessels will comply the *Navigation Act 2012 – Marine Orders – Part 30: Prevention of Collisions* (as appropriate to vessel class). • All vessels 300 gross tonnage (GT) and above will have an automatic identification system (AIS) transponder as required by the International Convention for the Safety of

Source of risk (hazard)	Potential environmental impact	Management and mitigation measures
		Life at Sea (SOLAS) (Chapter 5) Regulation 19 *Carriage requirements for shipborne navigational systems and equipment*. • Vessels will initiate the *GEP OSCP – Offshore* [Ref A2], including spill response as appropriate to the nature and scale of the spill. • INPEX will initiate operational and scientific monitoring plans (OSMPs) as appropriate to the nature and scale of the spill
Hydrocarbon spill scenario 2 – vessel to vessel collision involving a PSV or supply vessel (250 m^3 marine gas oil (MGO)		
Accidental loss of 250 m^3 MGO as a result of a vessel-to-vessel collision involving a PSV or supply vessel	• Temporary and localised reduction in water quality leading to toxic effects on marine biota • Potential oiling of marine wildlife • Socio-economic impacts on commercial resources due to potential closure, restriction or reduction in fishery productivity, oil and gas activity and commercial shipping movements	• PSVs, supply vessels etc. to be equipped with appropriate navigational systems, depth sounders and aids (including radar, signal and lights on facility structures and, where appropriate) that meet national and international requirements for the prevention of collisions. • PSVs, supply vessels etc. used will have functioning dynamic positioning equipment. • Implement a stakeholder engagement procedure to verify all stakeholders are aware of the GEP installation activities and operational areas and potential risks. • Enter into a MoU with AMSA regarding proposed roles during a spill event. • Provide AMSA with a copy of the accepted *GEP OSCP – Offshore* [Ref A2]. • GEP installation activities involving two or more vessels working in close proximity will be coordinated using a series of controls focused on communications, speed, approaches and distances. • Vessels will comply with the training requirements of the *Navigation Act 2012* – Marine Orders – Part 3: Seagoing Qualifications and Marine Orders – Part 6: Marine Radio Qualifications. • All vessels will comply with the communication and navigation equipment requirements of the *Navigation Act 2012 – Marine Orders – Part 6: Marine Radio Qualifications* and *Marine Orders – Part 27 Radio Equipment* (as appropriate to vessel class). • All vessels will comply with the *Navigation Act 2012 – Marine Orders – Part 21: Safety of Navigation and Emergency Procedures* (as appropriate to vessel class). • All vessels will comply the *Navigation Act 2012 – Marine Orders – Part 30*: *Prevention of Collisions* (as appropriate to vessel class). • All vessels 300 GT and above will have and AIS transponder as required by SOLAS (Chapter 5) Regulation 19 Carriage requirements for shipborne navigational systems and equipment. • Vessels will initiate the *GEP OSCP – Offshore* [Ref A2], including spill response as appropriate to the nature and scale of the spill. • INPEX will initiate operational and scientific monitoring plans (OSMPs) as appropriate to the nature and scale of the spill

Source of risk (hazard)	Potential environmental impact	Management and mitigation measures
Hydrocarbon spill scenario 3 – at sea fuel bunkering (2.5 m^3 IFO-180)		
Accidental loss of 2.5 m^3 IFO-180 as a result of a during bunkering or transfer operations	• Temporary and localised reduction in water quality leading to toxic effects on marine biota • Potential oiling of marine wildlife	• Designated bunkering hoses to have dry-break couplings and be equipped with floatation collars. • All vessels bunkering in Commonwealth waters will have a Saipem approved bunkering procedure in place prior to commencement of GEP installation activities. • All vessels will comply with *Marine Orders – Part 91: Marine Pollution Prevention – Oil* and MARPOL 73/78, Annex I (as appropriate to vessel class). • Vessels will implement the *GEP OSCP – Offshore* [Ref A2] and Shipboard Oil Pollution Emergency Plan (SOPEP) • The *Castorone* will only require bunkering approximately once every 30 days. This reduces the likelihood of an occurrence of a bunkering incident. • The *Castorone* will be the only vessel that is bunkered with IFO-180 within the 500 m safety zone • Fenders will be deployed between the *Castorone* and the bunker vessel • The *Castorone* will bunker 1FO 180 in the 500 m exclusion zone, all other vessels requiring IFO 180 will bunker outside of the 500 m exclusion zone. • Bunkering of the *Castorone* will comply with the *Navigation Act 2012 – Marine Orders – Part 91: Maine Pollution Prevention – Oil.*
Hydrocarbon spill scenario 4 – at sea fuel bunkering (2.5 m^3 MGO)		
Accidental loss of 2.5 m^3 MGO as a result of a during bunkering or transfer operations	• Temporary and localised reduction in water quality leading to toxic effects on marine biota • Potential oiling of marine wildlife	• Designated bunkering hoses to have dry-break couplings and be equipped with floatation collars. • All vessels bunkering in Commonwealth waters will have a Saipem approved bunkering procedure in place prior to commencement of GEP installation activities. • All vessels will comply with *Marine Orders – Part 91: Marine Pollution Prevention – Oil* and MARPOL 73/78, Annex I (as appropriate to vessel class). • Vessels will implement the *GEP OSCP – Offshore* [Ref A2] and SOPEP. • Fenders will be deployed between the *Castorone* and the bunker vessel • No bunkering of the *Semac-1* during helicopter operations involving that vessel.
Hydrocarbon spill scenario 5 – vessel to vessel collision involving the Castorone (1,000 m^3 IFO-180)		
Accidental loss of 1,000 m^3 IFO-180 as a result of a vessel to vessel collision involving the *Castorone*	• Temporary and localised reduction in water quality leading to toxic effects on marine biota • Potential oiling of marine wildlife • Socio-economic impacts on commercial resources due to potential closure or reduction in fishery productivity	• The *Castorone* is to be equipped with appropriate navigational systems, depth sounders and aids (including radar, signal and lights on facility structures and, where appropriate) that meet national and international requirements for the prevention of collisions. • The *Castorone* will have dynamic positioning equipment. • All fuel tanks on the *Castorone* are double skin, i.e. the hull and the tank wall must both be compromised for a spill to marine environment to occur. • The *Castorone* is an ice-strengthened vessel (American Bureau of Shipping Class A1. • Implement a stakeholder engagement procedure to verify all stakeholders are aware of

Source of risk (hazard)	Potential environmental impact	Management and mitigation measures
		the GEP installation activities. • Enter into a MoU with AMSA regarding proposed roles during a spill event. • Provide AMSA with a copy of the accepted *GEP OSCP – Offshore* [Ref A2]. • The 1,700 m^3 largest fuel tank on the *Castorone* will remain locked for GEP installation activities. • GEP installation activities involving two or more vessels working in close proximity will be coordinated using a series of controls focused on communications, speed, approaches and distances. • Vessels will comply with the training requirements of the *Navigation Act 2012 – Marine Orders – Part 3: Seagoing Qualifications* and *Marine Orders – Part 6: Marine Radio Qualifications*. • All vessels will comply with the communication and navigation equipment requirements of the *Navigation Act 2012 – Marine Orders – Part 6: Marine Radio Qualifications* and *Marine Orders – Part 27 Radio Equipment* (as appropriate to vessel class). • All vessels will comply with the *Navigation Act 2012 – Marine Orders – Part 21*: *Safety of Navigation and Emergency Procedures* (as appropriate to vessel class). • All vessels will comply the *Navigation Act 2012 – Marine Orders – Part 30: Prevention of Collisions* (as appropriate to vessel class). • Vessels will comply with the *Convention on the International Regulations for Preventing Collisions at Sea 1972* (COLREGS), Part B – Steering and Sailing (Rules 4–19), as appropriate to vessel class. • Vessels will comply with the *Navigation Act 2012* including standard maritime safety and navigation procedures. • Saipem and INPEX will comply with the OPGGS Act 2006 including the establishment of a 500 m safety zone around pipelay vessels. • Vessel monitoring will be undertaken in accordance a dedicated procedure. • All vessels 300 GT and above will have and AIS transponder as required by SOLAS (Chapter 5) Regulation 19 Carriage requirements for shipborne navigational systems and equipment. • Vessels will initiate the *GEP OSCP – Offshore* [Ref A2], including spill response as appropriate to the nature and scale of the spill. • SOPEP and *GEP OSCP – Offshore* [A2] will be tested in line with the spill exercises and audit schedule in the *GEP OSCP – Offshore.* • INPEX will initiate operational and scientific monitoring plans (OSMPs) as appropriate to the nature and scale of the spill.
Introduction of invasive marine species to Australian waters		
Introduction and establishment of invasive marine species	• Loss of species biodiversity of surrounding marine environment • Reduction in or loss (displacement) of	• The *Castorone* will use a marine growth prevention system to prevent biofouling in the seawater intake system. • All vessels being mobilised from outside Australia will comply with the Invasive Marine

Source of risk (hazard)	Potential environmental impact	Management and mitigation measures
	native marine species • Socio-economic impacts on commercial resources due to potential reduction in fishery productivity	Species Management Plan (IMSMP) [Ref B5], which includes specific requirements of the *National Biofouling Management Guidance for the Petroleum Production and Exploration Industry* (Commonwealth of Australia 2009). • Anti-fouling system will comply with the *Protection of the Sea (Harmful Anti-fouling Systems) Act 2006.* • All vessels being mobilised from outside Australia will comply with the *International Convention on the Control of Harmful Anti-fouling Systems on Ships* (IMO 2001). • All vessels being mobilised from outside Australia to the GEP construction corridor will comply with specific requirements of the Commonwealth *Quarantine Act 1908* and Australian Ballast Water Management Requirements – Version 5. o all vessels will undergo a vessel risk assessment (equivalent to a vessel risk assessment score sheet (VRASS)) conducted by an invasive marine species inspector. • An invasive marine species (IMS) risk assessment (Equipment Risk Assessment Score Sheet (ERASS)) will be completed for equipment used underwater during GEP installation activities. Based on the outcomes of the IMS risk assessment, management measures will be developed commensurate with the potential IMS risk such as cleaning equipment. • The *Castorone* and associated support vessels will not approach closer than 14 km from Browse Island.
Vessel collision with protected marine fauna		
Vessel collision with marine fauna.	Physical harm or death of an individual of a protected marine fauna species	• All vessels will comply with EPBC Regulations 2000 - Part 8 Division 1 *Interacting with Cetaceans* and the aligned INPEX Marine Megafauna Interaction and Observation Procedure [Ref A5]. • All vessel speeds within the 500 m safety zone will be managed in accordance with *Semac-1* and *Castorone* vessel operating procedures including regulation of vessel speeds in the 500 m safety zone. • The *Castorone* and associated support vessels will not approach closer than 14 km from Browse Island.
Non-routine liquid discharge – wet buckle contingency		
Chemically treated water released into the marine environment.	Reduction in local water quality and toxicity to marine fauna	• Low toxicity wet buckle chemicals have been selected which meet the technical specifications for pipeline protection, which includes: o Corrosion inhibitor selected will be on the pose little or no risk to the environment (PLONOR) list o Biocide selected will have a minimum rating of 'silver' under the United Kingdom's offshore chemical notification scheme (OCNS) chemical hazard and risk management (CHARM) hazard assessment model.

Source of risk (hazard)	Potential environmental impact	Management and mitigation measures
		• Dosing of freshwater (used to passivate the GEP during pipeline dewatering) is conducted in accordance with Wet Buckle Contingency Method Statement [Ref B7] and the lowest functional concentration of chemicals is used. • Dosage will be calculated in accordance with a specific procedure and will be based on the location of the buckle to ensure the corrosion inhibitor is consumed and minimal residual chemicals are discharged to the marine environment.
Accidental discharge of hazardous and non-hazardous materials		

• Accidental release of non-hazardous solid waste such as general garbage, plastic packaging, plastic containers, wooden crates, metal scrap offcuts (swarf), documents and packaging materials.
• Accidental release of hazardous solid or liquid waste such as medical waste, cooking oil/ grease, paint, solvents, chemicals, lube oil and hydraulic oil.
	Reduction in water quality and potential impact on marine biota if disposed overboard	• All vessels will comply with the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* – Parts IIIA and IIIC (as appropriate to vessel class).
		• All vessels will comply with *Marine Orders – Part 91: Marine Pollution Prevention – Oil* and MARPOL 73/78, Annex I (as appropriate to vessel class).
		• All vessels will comply with *Marine Orders – Part 94: Marine Pollution Prevention – Packaged Harmful Substances* (as appropriate to vessel class).
		• All vessels will comply with *the Protection of the Sea (Prevention of Pollution from Ships)* Act *1983* and *Marine Orders – Part 95: Marine Pollution Prevention –Garbage* (as appropriate to vessel class).
		• All vessels will comply with MARPOL 73/78, Annex III, Regulation 4 and Marine Orders Part 41 (as applicable) which require the completion of a multimodal dangerous goods form for the transportation of hazardous waste.
		• Key waste management practices and requirements will be detailed in the HSES induction which will be given to all project vessel crew members.
		• Accidental release of waste to the marine environment is reported and investigated and corrective actions are implemented.
		• All vessels have suitable secured storage facilities.
		• Bunding to be provided on deck areas where hydrocarbons and chemicals are stored and inspected weekly.
		• Lube oil on the Castorone and Semac-1 shall be managed in accordance with the Pollution Control and Waste Management Procedure [Ref B8].
		• Biodegradable oils (Panolin) will be used on the *Castorone* and *Semac-1,* including for the stinger system.
		• Ongoing inspection and maintenance of all hydrocarbon and chemical containing equipment and facilities via the maintenance management system, including:
		  ○ Hydraulic oil systems, hoses and couplings;
		  ○ Stinger systems;
		  ○ Cranes and winches
		• MSDS' will be available on all vessels.
		• INPEX and Saipem will implement any additional management which relate to waste generation and handling within the scope of the EP and which are agreed with DoE through the approval of the Waste Management Plan - Offshore [Ref B6].

Source of risk (hazard)	Potential environmental impact	Management and mitigation measures
		• Any forecast or actual critical weather events during GEP installation activities will be managed in accordance with the Project Critical Weather Event Plan [Ref B4] which includes the controls to prevent accidental loss of hazardous and non-hazardous materials and waste.
Accidental seabed disturbance		
Accidental loss of equipment or materials overboard	Damage or disturbance to sensitive habitats and/or benthic habitat	• Lifts of equipment and infrastructure will be undertaken in accordance with *Offshore Lifting Equipment and Operations procedure (STD-COR-HSEC-004-E*). • Cranes will be tested in accordance with certification requirements. • Lifting/winching equipment – slings, chains, shackles etc. will be tested for safe operation. • Certification of acceptability of containers used to transfer supplies or waste between vessels. • All items secured on deck or stored inside compartments or below decks. • Supply and waste container covers fastened down so as to prevent loss of contents due to wind. • Any object lost overboard will be subject to a risk assessment to decide what and when items will be recovered e.g. based on sensitivity of location, size of object, potential hazard posed to the marine environment and other users, and cost of recovery. • Saipem will develop and implement weather-tracking procedures to reduce the potential for equipment laydown due to cyclones or otherwise unsuitable weather.

6 MANAGEMENT APPROACH

The GEP project activity will be managed in accordance with the GEP-EP as accepted by NOPSEMA under the OPGGS (E) Regulations, other relevant environmental legislation and the INPEX and Saipem Environment Policies.

The GEP-EP contains an implementation strategy in accordance with Regulation 14 of the OPGGS (E) Regulations 2009. The key components of the implementation strategy are:

1. Plan - Details legal and other standards and guidelines applicable to the GEP activities. Describes how GEP activities will be risks managed to ALARP and outlines the process of risk identification and management.
2. Do - Details organisation and resources, roles and responsibilities, communication processes and training and competency measures. The 'do' component also details the INPEX and Saipem emergency response framework and event management process, including the NOPSEMA-approved GEP OSCP, cyclone response and emergency response training, and provides details of document control procedures.
3. Check - Details how compliance with the requirements of the GEP-EP will be monitored by the implementation of pre-mobilisation checks, ongoing audits, and weekly health, safety, environment and security inspections. In addition, the 'check' component details the monitoring of emissions and discharges and the management of non-conformance.
4. Act - Provides for a management review of the Project's environmental performance and details the process of updating the GEP-EP.

The implementation of the GEP-EP will be in accordance with, and supported by, the INPEX and Saipem health, safety and environment management systems.

6.1 REPORTING

Different levels of environmental performance reporting will be undertake by INPEX and Saipem to meet the requirements of the OPGGS (E) Regulations; in particular, Regulations 15, 16, 26, 26A, 26AA and 26B.

A daily progress report during GEP installation will be prepared by Saipem and issued to INPEX. Monthly and quarterly performance reports will also be developed by Saipem for review by INPEX.

Reporting to NOPSEMA will be undertaken as per the OPGGS (E) Regulations, including reportable and recordable events or incidents.

7 CONTACT DETAILS

INPEX Operations Australia Pty Ltd (INPEX), as the agent for and on behalf of the Ichthys Upstream Unincorporated Joint Venture Participants under the Ichthys Joint Operating Agreement, is the nominated Operator for the purposes of this EP. INPEX will be responsible for ensuring the GEP installation activities are carried out in accordance with the OPGGS (E) Regulations, this EP and other applicable Australian legislation.

The main point of contact for further information regarding this INPEX Ichthys Project GEP Summary EP is:

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8 REFERENCES

8.1 INPEX DOCUMENTS

No.	Document No.	Document Title	Rev
A1.	C075-AH-REP-0006	Ichthys Gas Field Development Project: Draft Environmental Impact Statement	0
A2.	F281-AH-PLN-10050	GEP Oil Spill Contingency Plan – Offshore	A
A3.	PER- 00391389	INPEX Stakeholder Engagement (Offshore Environment Plans) Guideline	0
A4.	L025-AG-PLN-00003	GEP Construction Stakeholder Engagement Plan	0
A5.	CO75-AH-PRC-0029	Marine Megafauna Interaction and Observation Procedure	0

8.2 SAIPEM DOCUMENTS

No.	Document No.	Document Title	Rev
B1.	F281-AH-PLN-10013	Construction Environmental Management Plan	2
B2.	F281-AH-PLN-10019	Liquid Discharge Management Plan - Offshore	0
B3.	800168-AH-PRC-0005	GEP Chemical Management (Environment) Procedure	-
B4.	F281-AH-PLN-0015	Project Critical Weather Event Plan	1
B5.	F281-AH-PLN-0017	Invasive Marine Species Management Plan	B
B6.	F281-AH-PLN-10017	Waste Management Plan - Offshore	0
B7.	F281-AV-MST-10000	Wet Buckle Contingency Method Statement	0
B8.	STD-COR-HSEC-019-E	E&C Construction Vessels Pollution Control and Waste Management Procedure	1

8.3 APPROVAL DOCUMENTS

No.	Authority	Document Title
C1.	Commonwealth of Australia	Protocol for the Coordination of Project activities and Department of Defence activities in the NAXA
C2.	Commonwealth of Australia	Deed of Cooperation – Northern Australia Exercise Area – Schedule 5

8.4 BIBLIOGRAPHY

No. **Document Title**

D1. Department of Environment, Water, Heritage and the Arts (DEWHA). (2008). *North-west Marine Bioregional Plan: Bioregional Profile - A Description of the Ecosystems, Conservation Values and Uses of the North-west Marine Region*. Australian Government Department of the Environment, Water, Heritage and the Arts.

D2. Department of Environment, Water, Heritage and the Arts (DEWHA). 2008*. North Marine Bioregional Plan: Bioregional Profile - A Description of the Ecosystems, Conservation Values and Uses of the North Marine Region*. Australian Government Department of the Environment, Water, Heritage and the Arts.

D3. Neptune Geomatics. 2009. *Ichthys Gas Field Development: Plan C Offshore Pipeline Geophysical and Geotechnical Survey Results Report.* Report prepared by Neptune Geomatics, Perth, for INPEX Browse, Ltd., Perth, WA.

D4. Maughan R., Ewers G., Glenn K. 2009. *Shoreline Assessment Ground Survey: An operational component of the Monitoring Plan for the Montara Well Release Timor Sea. October 2009 Post Survey Report*. Viewed online on 24 February 2014 at: <http://www.environment.gov.au/system/files/pages/1a63b46f-0a2a-4b4a-818c-319ea8d7cd23/files/shoreline-assessment.pdf>.

D5. Laurie, V. 2010. *The Kimberley: Australia's last great wilderness*. UWA Publishing, Crawley, WA.

D6. Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC). 2012. *Species group report card – cetaceans: Supporting the marine bioregional plan for the North-west Marine region*. Viewed online on 24 February 2014 at: < http://www.environment.gov.au/archive/coasts/mbp/north-west/publications/pubs/northwest-report-card-cetaceans.pdf>.

D7. Derby Visitor Centre. 2013. *Derby Visitor Centre: Buccaneer Archipelago, Derby*. Viewed online on 9 April 2014 at: <http://www.derbytourism.com.au/about-the-area/buccaneer-archipelago>.

D8. Heyward, A., Moore, C., Radford, B. and Colquhoun, J. 2010. *Monitoring Program for the Montara Well Release Timor Sea: Final Report on the Nature of Barracouta and Vulcan Shoals*. Report prepared by the Australian Institute of Marine Science for PTTEP AA, Perth, WA.

D9. UniQuest Pty Ltd (Duke, N., Wood, A., Hunnam, K., Mackenzie, J., Haller, A., Christiansen, N., Zahmel, K. and Green, T. 2010. *Shoreline Ecological Assessment Aerial and Ground Surveys 7-19 November 2009*. As part of the Scientific Monitoring Study of the Montara Monitoring Plan. A report commissioned by PTTEP Australasia (Ashmore Cartier) PL for the Department of the Environment, Water, Heritage and the Arts.

D10. Wells, F.E., Hanley, J.R., Walker, D.I. 1995 *Marine Biological Survey of the Southern Kimberley, Western Australia.* Perth, WA.

D11. Roelofs, A. Coles, R. and Smit, N. 2005. *A survey of intertidal seagrass from Van Diemen Gulf to Castlereagh Bay, Northern Territory, and from Gove to Horn Island, Queensland.* Report to the National Oceans Office Department of Primary Industries and Fisheries 1, CRC Reef Research Centre Biodiversity and Conservation, NT Department of Infrastructure, Planning and Environment.

D12. Northern Territory Government, Department of Natural Resources, Environment and Arts. 2014. *Fact Sheet: Corals In The Northern Territory 2007*. Viewed online on 9 April 2014 at: <http://lrm.nt.gov.au/__data/assets/pdf_file/0018/11079/coralreefs.pdf>.

D13. Richards, Z. 2009. *Western Australian Museum: Marine life of the Kimberley Regions, Researchers Diaries*. Zoe Richards, Marine and Tropical Biology, James Cook University, QLD.

D14. Gilmour JP, Smith LD, Brinkman RM. 2009. *Biannual spawning, rapid larval development and evidence of self-seeding for scleractinian corals at an isolated system of reefs*. Marine Biology 156:1297-1309.

D15. Department of Environment. 2014. *EPBC Act Protected Matters Report*. Created online at: <http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf>.

D16. International Union for Conservation of Nature and Natural Resources. 2013. *The IUCN Red List of Threatened Species*. Viewed online on 24 February 2014 at: <http://www.iucnredlist.org/>.

D17. Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention). 2013. *Species*. Viewed online on 24 February 2014 at: <http://www.cms.int/en/species>.

D18. Convention on International Trade in Endangered Species Of Wild Fauna and Flora. 2013. *Appendices I, II and III*. Viewed online on 24 February 2014 at: <http://www.cites.org/eng/app/ appendices.php>.

D19. Department of Environment, Water, Heritage and the Arts (DEWHA). (2008). *North-west Marine Bioregional Plan: Bioregional Profile - A Description of the Ecosystems, Conservation Values and Uses of the North-west Marine Region*. Australian Government Department of the Environment, Water, Heritage and the Arts.

D20. Director of National Parks 2013, *North-west Commonwealth Marine Reserves Network Management Plan 2014-24*, Director of National Parks, Canberra.