Wheatstone Project

Summary Environment Plan – Subsea Equipment Installation

1	25 Mar 2015	Issued for Use	EWKL	DTMD	AXPA
0	5 Mar 2015	Issued for Use	EWKL	DTMD	AXPA
REV	**DATE**	**DESCRIPTION**	**ORIG**	**CHK**	**APPR**

IP Security	☐ Company Confidential	**Total number of Pages (including Cover sheet):** 30

For Contractor Documents	**Contract No**	**Contractor Document No**	**Contractor Rev.**

Company Document Control No.	**Project**	**Area**	**Discipline**	**Type**	**Originator**	**Package**	**Sequence-Sht**	**Revision**
	WS2	3200	HES	PLN	CVX	000	00005	1

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1.0 INTRODUCTION

The Summary Environment Plan – Subsea Equipment Installation (Subsea) (this Summary) summarises the Wheatstone Project Installation Environment Plan – Subsea Equipment Installation (the EP) (Document Number WS2-3200-HES-PLN-CVX-000-00001-000). The EP was accepted by the National Offshore Petroleum Safety Environment Management Authority (NOPSEMA) on 25 February 2015. This Summary has been prepared in accordance with Regulation 11(3) of the Offshore Petroleum Greenhouse Gas and Storage (Environment) Regulations 2009 (OPGGS(E)R).

1.1 Location

Subsea Equipment Installation activities will be performed around the location of the Wheatstone Platform (WP) and a 500m radius around KP 148 on the Wheatstone Trunkline, as represented in Figure 1-1. The WP is located at Easting 330 860.000 m and Northing 7 795 520.000 m (UTM Zone 50). These coordinates are based on the Geodetic Datum of Australia (GDA94). The EP considers activities in Commonwealth waters only.

1.2 Nominated Titleholder Details

Chevron Australia Pty Ltd (Chevron) is the nominated titleholder to undertake eligible voluntary actions pursuant to the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGSA) for the Wheatstone Liquefied Natural Gas (LNG) Project (hereafter referred to as the Project). The titleholders of the Project are Australian subsidiaries of Chevron (64.14%), Apache Julimar Pty Ltd (13%), Kuwait Foreign Petroleum Exploration Company Australia (Julimar) Pty Ltd (KUFPEC, 7%), KUFPEC Australia (Wheatstone Iago) Pty Ltd (6.4%), Kyushu Electric Power Company (1.46%) and PE Wheatstone Pty Ltd (part owned by TEPCO, 8%).

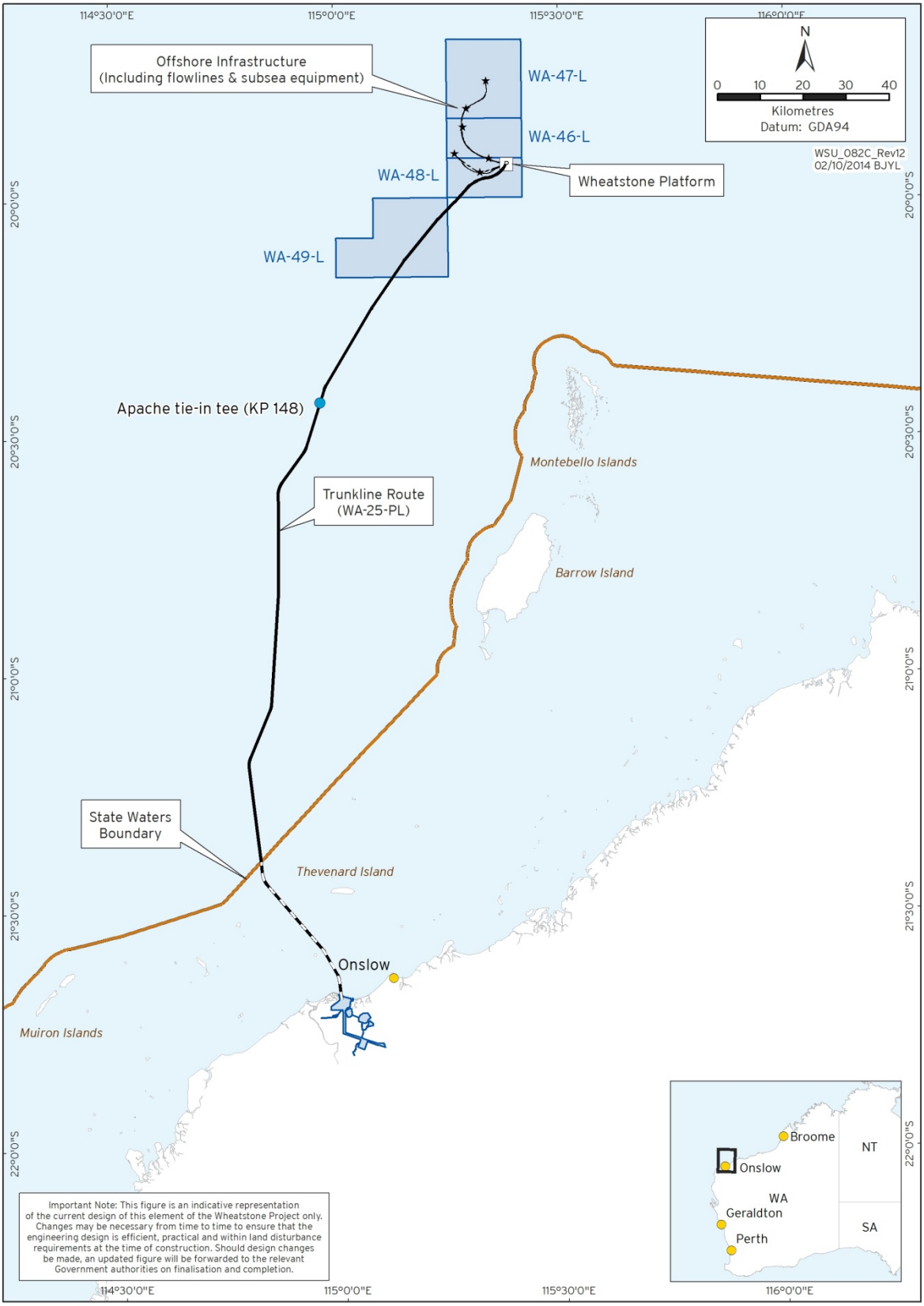

Figure 1-1: Planned Location of Project Infrastructure

2.0 ACTIVITY DESCRIPTION

2.1 Timeframes

The activities described in the EP are planned to commence in Quarter 2 2015 and are likely to be completed over a 10 month period. The timing of activities is indicative, and subject to potential delays caused by weather events, vessel availability and other unforeseen factors.

2.2 Planned Activity Summary

The activities addressed in the EP include the installation of subsea structures and tie in of subsea equipment to new and existing infrastructure required for the Project in Commonwealth waters. The introduction of well fluids to subsea systems and infrastructure are detailed in separate Environment Plans. The activities associated with Subsea Equipment Installation are broadly categorised as follows:

- Subsea Equipment Pre-Installation Activities
- Subsea Equipment Installation
- Post Subsea Installation Activities
- Supporting Activities

2.2.1 Subsea Equipment Pre-Installation Activities

A seabed survey of the flowline route may be undertaken by a survey vessel prior to the commencement of installation. Multi beam echo sounding (MBES) will be used together with visual aids to confirm the integrity of the sea bed foundation prior to commencement of the activity.

2.2.2 Subsea Equipment Installation

A variety of subsea infrastructure is required to supply reservoir hydrocarbon production fluids from subsea well to the WP for processing in operations. The installation of subsea equipment will occur in the vicinity of previously disturbed areas where the flowlines and the trunkline have been laid and includes the installation of subsea equipment such as subsea isolation valve structures, inline tee structures, manifold structures, pipeline termination structures, umbilicals, spool pieces, MEG jumpers and flying leads.

Internal surfaces of structures to be installed that are susceptible to corrosion during tie in operations (ie spool pieces and connections to manifolds) will be filled with flooding fluid to ensure the integrity of those structures is maintained prior to the introduction of reservoir hydrocarbon production fluids. The introduction of reservoir hydrocarbon production fluids are detailed in separate Environment Plans.

2.2.3 Post Subsea Equipment Installation Activities

Once the subsea infrastructure is installed at the WP and in-field at KP 148 (Figure 1-1), post installation activities will include, scour protection systems to avoid scouring of the seabed and potential undermining of the installed structures over the life of operations, umbilical protection and secondary stabilisation (including mattress installation and span correction where required), umbilical and MEG Jumper crossing stabilisation, system leak testing and umbilical and control system testing.

2.2.4 Supporting Activities

Various vessels are required during subsea installation activities, including survey, heavy lift and installation support vessels. Bunkering of the installation vessels will be conducted in the

operational area with locations dependent upon timing/location of the bunkering requirement. Supply vessels will support the activities, transport dry and wet provisions, ship spares and equipment from shore support bases to the vessels as required. The frequency of helicopter crew changes will be approximately three times a week during subsea installation activities

3.0 DESCRIPTION OF THE ENVIRONMENT

This section describes the environmental that may be affected (EMBA) by the activity (including in the event of an emergency).

3.1 Physical Environment

The region is largely characterised by an arid, subtropical climate. Daily temperatures range from 20°C to 34°C between the months of October and March in summer, and 15°C to 26°C between May and August in winter. The transitional season occurs in April and September. During summer, prevailing winds are from the north-west and south-west, typically varying between 10–13 ms^{-1}. During winter months, north-easterly to south-easterly winds average between 6–8 ms^{-1} (Chevron, 2010d). The cyclone season runs from Mid-December to April, peaking in February and March (Bureau of Meteorology 2012).

Waters in the region show temporal and spatial variation in water temperature, with a mean sea surface temperature in open shelf waters around 29.3°C in March dropping to 24°C in August. Nearshore temperatures in semi-enclosed waters of the North West Shelf may fluctuate through a higher range from 19-30.4°C (Chevron, 2010). Tides in the region are semi-diurnal with a spring tide range of 1.9 m.

The large-scale currents predominantly flow southwest through the region influenced by the Indonesian Throughflow and Leeuwin Current (Buchan 1998). Below the surface currents, there are a number of subsurface currents, the most important of which are the Leeuwin Undercurrent and the West Australian Current. Surface currents on the North West Shelf are largely dominated by moderate to strong east-west surface current patterns from tidal variations.

Offshore waters are characterised by a relatively clear water column. In shallower, nearshore waters turbid conditions are usually the result of tidal, wave action or current- induced re-suspension of sediments and from episodic runoff of adjoining rivers. Turbidity levels >80 NTU have been recorded during cyclonic activity.

The cyclone season runs from Mid-December to April, peaking in February and March (Bureau of Meteorology 2012). Cyclonic events can deliver up to 300 mm of rainfall. On average about five tropical cyclones pass through the warm ocean waters off the north-west coast annually (Bureau of Meteorology 2012).

3.2 Ecological Environment

The values associated with the World, Commonwealth and National heritage places located within the EMBA, including *Environment Protection and Biodiversity Conservation Act 1999* listed ‘threatened’ and ‘migratory’ species that are known to occur within the EMBA are summarised in Table 3.1.

Table 3.1: Areas of conservation significance and key ecological features which occur within the EMBA

Zone	Recognised Conservation Areas within EMBA	Key Ecological Features, Values & Sensitivities
Gascoyne	Commonwealth: ♦ Gascoyne Commonwealth Marine Reserve ▪ Marine National Park Zone (International Union for Conservation of Nature [IUCN] II) ▪ Habitat Protection Zone (IUCN IV) ▪ Multiple Use Zone (IUCN VI) ♦ Carnarvon Canyon Commonwealth Marine Reserve ♦ Habitat Protection Zone (IUCN IV)	♦ Canyons on the slope between the Cuvier Abyssal Plain and the Cape Range Peninsula (enhanced productivity, aggregations of marine life and unique sea floor feature) ♦ Exmouth Plateau (unique sea-floor feature associated with internal wave generation) ♦ Continental slope demersal fish communities (high species diversity and endemism - the most diverse slope bioregion in Australia with over 500 species found with over 64 of those species occurring nowhere else) ♦ Zone provides important migratory habitat for both the northern and southern migratory routes of the humpback whale. Usage level is seasonally high (Listed species) ♦ Loggerhead and Hawksbill turtle geographic distributions marginally overlap this zone ♦ The zone provides important foraging and breeding grounds that are highly utilised by a diverse number of marine and migratory bird species
Ningaloo	International: ♦ Ningaloo Coast World Heritage Area Commonwealth: ♦ Ningaloo Marine Park (Commonwealth Waters) ▪ Marine National Park Zone (IUCN II) ▪ Recreational Zone (IUCN IV) State: ♦ Ningaloo Marine Park ♦ Muiron Islands Marine Management Area ♦ Cape Range National Park ♦ Jurabi and Bundegi Coastal Parks	♦ Commonwealth waters adjacent to Ningaloo Reef (Unique seafloor feature, high biodiversity, feeding and breeding aggregations of marine life) ♦ Ningaloo Reef is the largest fringing barrier coral reef, and the second largest coral reef system in Australia. The Ningaloo Coast and Muiron Islands encompass a series of interconnected habitats, from the continental shelf and slope communities of the Commonwealth Waters to the reef and onshore ecosystems of Ningaloo Reef ♦ Limited mangrove communities occur in the northern half of the Ningaloo Marine Park with three species of mangroves identified within the Park ♦ Turtle nesting habitat with high utilization of beaches with high dune height with major turtle rookeries along the Ningaloo and Jurabi coast ♦ Zone provides foraging, breeding, calving and nursing habitat in the shallow protected lagoonal environments fringing the coast and the offshore islands, though not sighted in the comparatively large or dense concentrations seen in the Exmouth Gulf or Shark Bay Areas ♦ Zone provides important migratory habitat for both the northern and southern migratory routes of the humpback whale. Usage level is seasonally high. (Listed species) ♦ Loggerhead, Green, Hawksbill, Flatback, Leatherback and Olive Ridley turtles may all be present in this zone ♦ Whale sharks aggregate in the waters of the Ningaloo Marine Park, frequently close to the

Zone	Recognised Conservation Areas within EMBA	Key Ecological Features, Values & Sensitivities
		Ningaloo Reef front, both in the lagoon and outside it (Listed species) ♦ The Muiron Islands are significant feeding areas for many species of seabirds and shorebirds, and are important nesting sites for the Wedge-tailed Shearwater. Migratory species that are most abundant in summer and autumn include the Wedge-tailed Shearwater and nine other migratory bird species that are protected under the China–Australia Migratory Bird Agreement (CAMBA) and Japan–Australia Migratory Bird Agreement (JAMBA) ♦ Tourism and recreation is a major component of the local economy with Ningaloo Marine Park being a key tourist destination of local, state, national and international significance
Pilbara Coast	State: ♦ Part of the Robe Marine Management Area (indicative) ♦ Part of the Great Sandy Islands Nature Reserves ♦ Thevenard, Bessier, Serrurier, Airlie Islands Nature Reserves ♦ Regionally Significant listed mangrove habitats of Ashburton Delta & Coolgra Point by Environmental Protection Authority	♦ This zone possesses regionally significant mangroves both inside and outside industrial areas and associated port areas ♦ There are extensive areas of salt marsh along the Pilbara coastline from Exmouth Gulf northward where they typically occupy the upper intertidal zone, often mixed with scattered mangroves and also terrestrial vegetation on supratidal 'islets'. There are no areas of salt marsh listed as significant components of the Pilbara shoreline other than a general recognition of these habitats as benthic primary producer habitat ♦ Turtle nesting, internesting and foraging habitat with high utilization of beaches with high dune height ♦ Area provides important migratory habitat for both the northern and southern migratory routes of the humpback whale. Usage level is seasonally high. (Listed species) ♦ Loggerhead, Green, Hawksbill, Flatback and Leatherback turtles may all be present in this zone ♦ The zone provides important foraging and breeding grounds that are highly utilised by a small number of marine and migratory bird species ♦ The North West Coast, including Onslow, the Mackerel Islands, Dampier and the Dampier Archipelago, Karratha, and the Burrup Peninsula, are key coastal tourism areas
Barrow and Montebello Islands	Commonwealth: ♦ Montebello Commonwealth Marine Reserve (proposed) ▪ Multiple Use Zone (IUCN VI) State: ♦ Montebello Islands Marine Park	♦ Ancient Coastline at 125 m depth contour (Unique seafloor feature, enhanced biological productivity) ♦ Macroalgae meadows are a dominant feature of the sub-tidal habitats in this area and are most commonly found on shallow limestone pavement in depths of 5 to 10m. It is estimated that macroalgae meadows make up 40% of the benthic habitats of the Montebello/Barrow Islands Marine Conservation Reserve and make the major contribution to primary production ♦ This zone possesses regionally significant mangroves. Six species of mangrove are found in the reserves, with the Montebello Islands' mangrove communities considered globally unique

Zone	Recognised Conservation Areas within EMBA	Key Ecological Features, Values & Sensitivities
	♦ Barrow Island Marine Park ♦ Barrow Island Marine Management Area ♦ Barrow Island Nature Reserve ♦ Barrow Group Nature Reserves ♦ Lowendal Islands Nature Reserves ♦ Montebello Islands Marine Nature Reserves	as they occur in lagoons of offshore islands ♦ Significant turtle nesting habitat particularly at sandy beaches on Varanus Island, Lowendal Island Group and Barrow Island ♦ Dugongs are frequently recorded in the shallow, warm waters in the vicinity of the Montebello Islands, Lowendal Islands and Barrow Shoals, where they feed on seagrass meadows and algae, though not in the comparatively large or dense concentrations seen further south in the Exmouth Gulf and Shark Bay Areas ♦ This zone provides important migratory habitat for both the northern and southern migratory routes of the humpback whale. Usage level is seasonally high. Female humpback whales and their calves use the sheltered water to the west of Trimouille Island in the Montebello group as a resting area during their southerly migration to feeding grounds in Antarctica (Listed species) ♦ Several dolphin species have resident populations within the Barrow Island area including bottlenose and Indo-pacific humpbacked dolphin (Listed species) ♦ Loggerhead, Green, Hawksbill and Flatback turtles may all be present in this zone ♦ Whale sharks have been recorded foraging seasonally in the zone, however not at significant densities. (Listed species) ♦ The Montebello/Lowendal/Barrow Island region has significant rookeries for 15 seabird species, including the largest breeding colony of Roseate Terns in WA, located on the Montebello Islands
Dampier Archipelago	Commonwealth: ♦ Dampier Commonwealth Marine Reserve ▪ Marine National Park Zone (IUCN II) ▪ Special Purpose Zone (IUCN VI) State: ♦ Dampier Archipelago Marine Park (proposed) ♦ Dampier Archipelago Island Reserves Part of the Greater Sandy Islands Nature Reserve	♦ Extensive macroalgal and seagrass communities occur within the proposed reserves in this zone. Macroalgae dominate submerged limestone reefs and also grow on stable rubble and boulder surfaces in the Dampier Archipelago/Cape Preston region ♦ This zone possesses regionally significant mangroves both inside and outside industrial areas and associated port areas. There are six species of mangrove found in the proposed reserves and extensive mangrove communities line over 50% of the mainland shore. Many of these communities are considered to be of international significance ♦ The intertidal sand and mudflat communities of the proposed reserves are primary producers and have an abundance of invertebrate life, which provides a valuable food source for shorebirds ♦ Low level numbers of dugongs have been recorded in the Dampier Archipelago / Cape Preston region. Particularly in the shallow, warm waters in bays and between islands, including at East Lewis Island, Cape Preston, Regnard Bay, Nickol Bay and west of Keast

Zone	Recognised Conservation Areas within EMBA	Key Ecological Features, Values & Sensitivities
		Island ♦ The zone provides important migratory habitat for both the northern and southern migratory routes of the humpback whale. Usage level is seasonally high. Females occasionally give birth in the waters of the Dampier Archipelago, although the main calving area is further north. Adult humpback whales and their young also frequent the Archipelago on their southern migrations in early spring, and Mermaid Sound is a significant resting area for females with their calves (Listed species) ♦ Loggerhead, Green, Hawksbill, Flatback and Leatherback turtles may all be present in this zone. Turtle nesting on beaches of the Dampier Archipelago, with particularly high nesting activities on Legendre and Huay Islands ♦ The zone provides very important foraging and breeding habitat for a high diversity of birds, including a significant abundance of migratory and breeding seabirds. The small islands and islets such as Goodwyn Island, Keast Island and Nelson Rocks provide important undisturbed nesting and refuge sites and Keast Island provides one of the few nesting sites for pelicans in Western Australia
Offshore	Not applicable - No marine or coastal conservation areas occur within this zone.	♦ Glomar Shoals (Unique seafloor feature, high biodiversity) ♦ Ancient coastline at 125 m depth contour (Unique seafloor feature, enhanced biological productivity) ♦ Continental slope demersal fish communities (Communities with high species diversity and endemism) ♦ Canyons on the slope between the Cuvier Abyssal Plain and the Cape Range Peninsula (Unique sea floor feature, enhanced biological productivity, aggregations of marine life). ♦ Exmouth Plateau (Unique sea-floor feature) ♦ Zone provides important migratory habitat for both the northern and southern migratory routes of the humpback whale. Usage level is seasonally high (Listed species) ♦ Loggerhead, Green, Hawksbill and Flatback turtles may all be present in this zone ♦ This zone overlaps a Biologically Important Area for Whaleshark foraging in deeper waters ♦ The zone provides important foraging and breeding habitat that is highly utilised by various marine and migratory seabirds. Of particular note is the White-Tailed Tropic Bird which is only recorded in two locations in Western Australia
Argo-	Commonwealth:	♦ Canyons linking the Argo Abyssal Plain with the Scott Plateau (Unique seafloor, enhanced

Zone	Recognised Conservation Areas within EMBA	Key Ecological Features, Values & Sensitivities
Rowley Terrace	♦ Argo-Rowley Terrace Marine Reserve (proposed) ▪ Marine National Park Zone (IUCN II) ▪ Multiple Use Zone (IUCN VI) ♦ Mermaid Reef Commonwealth Marine Reserve ▪ IUCN 1a Strict Nature Reserve State: Rowley Shoals Marine Park	biological productivity, aggregations of marine life). ♦ Mermaid Reef and the Commonwealth waters surrounding Rowley Shoals (enhanced productivity, aggregations of marine life, high biodiversity) ♦ Continental slope demersal fish communities (Communities with high species diversity and endemism) ♦ Intertidal coral reef communities are a major feature of the Rowley Shoals within this zone ♦ Seagrasses and macroalgae are identified as key ecological values of the Rowley Shoals ♦ Clerke and Imperieuse Reefs of the Rowley Shoals contain small calcareous sandy cays sourced from broken down coralline material and shell fragments, Bedwell Island and Cunningham Island, respectively. These islands are an important nesting site for the red-tailed tropic bird. ♦ Zone provides migratory habitat for Pygmy Blue Whales. Usage level is seasonally high ♦ Seasnakes are likely to be fairly common in the Rowley Shoals, particularly the olive seasnake ♦ Loggerhead, Green and Hawksbill turtles may be present in this zone ♦ Area provides important habitat for sharks, which are found in abundance around the Rowley Shoals relative to other areas in the region ♦ A wide range of seabirds have been observed at the Rowley Shoals. Bedwell and Cunningham Islands are recognised as important resting places for northern migrants enroute to and from Australia as large flocks of unidentified waders have been seen at the Rowley Shoals

3.1 Socio-Economic Environment

Subsea oil and gas infrastructure and wells exist within the EMBA, however there is no infrastructure such as ports or harbors within the operational area, with the exception of three pipeline crossings occurring within the 500 m buffer either side of the petroleum pipeline licence WA-25-PL.

There are numerous petroleum activities and associated infrastructure offshore in the north-west shelf and also a number of coastal harbours utilised by industry and marine tourism operators and boats ramps throughout the EMBA, primarily used for recreational activities. Vessel traffic in the area is predominantly associated with movements between Indonesia and central-to-southern Western Australian waters.

A number of commercial fisheries operate in the North-west Marine Region. The waters off the Pilbara coast support a number of State managed commercial fisheries including prawn, demersal scalefish, demersal finfish, crab, mackerel, pearl and marine aquarium fish, as well as the Commonwealth managed North West Slope and Western Deepwater Trawl Fisheries and Western Tuna and Billfish Fishery.

The range of recreational fishing opportunities includes estuarine fishing, beach fishing and boat fishing either in embayment's or offshore for demersal and pelagic/game species often around islands and out to the edge of the continental shelf (DoF, 2012a). Most recreational fishing occurs in State Waters with very few recreational fishers visiting the offshore region where the installation activities will occur due largely to remoteness from land and lack of shallow features.

There is little marine-based tourism within the operational area, due to the remote location. The north west of WA provides marine-based tourism and recreational opportunities benefiting the Western Australian community. Recreational boating, diving, snorkelling, surfing, and wildlife observation (e.g. whales, dolphins, dugongs, turtles, and birds) occur predominantly throughout the coastal areas of the EMBA.

There are no identified areas of cultural heritage or shipwrecks within the operational area. Within the EMBA the types of cultural heritage sites that may be found along shorelines include middens, rock engravings and artefact scatters.

4.0 ENVIRONMENTAL IMPACTS AND RISKS

All aspects of the activity have been subjected to an impact and risk assessment to understand the potential environmental risks associated with the activity and ensure risks are reduced to as low as reasonably practicable (ALARP) and are of an acceptable level.

Environmental Risk Assessment Workshops were undertaken for Subsea Equipment Installation activities at which the environmental impacts and risks were considered for planned activities or unplanned events including unplanned events related to hydrocarbon spills and spill response activities. The environmental impact identification and risk assessment process comprised the following components:

- Identification of activities and events (including planned activities, unplanned events and spill response activities), and associated aspects with the potential to impact identified physical, biological, and socioeconomic receptors
- Identification of physical, biological, and socioeconomic receptors within the EMBA by the activities and aspects, and identification of particular environmental values and sensitivities
- Evaluation of the potential consequences to the identified receptors without safeguards
- Identification of safeguards (controls) to reduce the potential likelihood of the consequence occurring
- Evaluation of the likelihood of the consequence occurring with planned and confirmed safeguards in place
- Quantification of the risk ranking with safeguards in place
- Determination of whether the potential environmental impacts and risks are ALARP after considering the effectiveness of the identified safeguards
- Determination of whether the potential environmental impacts and risks are acceptable

Safeguards were identified during the Environmental Risk Workshops to ensure all identified risks were reduced to ALARP and of an acceptable level. Safeguards were considered in terms of both preventing the impact occurring, and mitigating the severity of the consequence, drawing on the hierarchy of controls, identified as Elimination, Substitution, Isolation, Engineering, and Administration and Procedures.

The risk assessment was undertaken in alignment with the processes outlined in Australian Standard/New Zealand Standard (AS/NZS) ISO 31000:2009 Risk Management and HB 203:2012 Managing Environment-Related Risk, using the Chevron Integrated Risk Prioritization Matrix. The matrix uses consequence and likelihood of the consequence (with safeguards in place) rankings of 1 to 6, which when combined, provide a risk level of between 1 (highest risk) and 10 (lowest risk). The risk levels have been grouped into three broader levels; high (1 to 4), medium (5 and 6), and low (7 to 10) which are relevant to the assessment as to whether potential risks and impacts have been reduced to ALARP and an acceptable level.

4.1 Determination of ALARP

Where it can be demonstrated that the ‘cost’ of further risk reduction is disproportionate to the benefit gained, the risk is considered ALARP. For this criterion, ‘cost’ is considered to include financial cost, time or duration, effort, occupational health and safety risks, or environmental impacts associated with alternatives.

ALARP is considered to be achieved when the following criteria are met:

- There are no reasonably practicable alternatives to the activity, or
- There are no additional reasonably practicable measures available to further reduce the risk, or
- The cost of implementing further measures is disproportionate to the reduction in risk.

4.2 Determination of Acceptable

The determination that impacts and risks associated with the activity are of an acceptable level are based on potential consequence and risk ratings. Impacts and risks are only deemed acceptable once all reasonably practicable alternatives and additional measures have been taken to reduce the potential consequence and likelihood to ALARP.

The environmental impacts and risks associated with implementing the activities described in this Plan were determined to be acceptable if:

- The level of environmental risk is assessed to be between 6 and 10 on the risk matrix; or
- The level of environmental risk is assessed to be ALARP; and
- The activities that generate the assessed aspect (and associated potential impacts and risks) are compliant with relevant legislation, industry standards/guidelines, and corporate policies, standards, and procedures specific to the operational environment.

In all instances for the planned activities and potential unplanned events assessed during the Environmental Risk Workshops, the risk levels with safeguards in place was determined to be low (between 7 and 10) and potential risks and impacts have been determined to be reduced to ALARP and an acceptable level.

A summary of the environmental risks and impacts and controls in place to manage the activity are detailed in Table 4.1.

Table 4.1: Hazards, Potential Environmental Impacts and Control Measures

Sources of Risk (Hazards)	Potential Environmental Impacts (Consequences)	Control Measures	Residual Risk
Physical presence of subsea infrastructure	♦ Impact to commercial and recreational fishing and shipping	♦ Notification to enable a Notice to Mariners (or similar instrument) to be issued ♦ Stakeholder engagement for the EP ♦ Australian Hydrographic Service (AHS) informed of location of installed subsea equipment	Low (9)
Vessel and ROV movements in the operational area	♦ Collision with marine fauna (including cetaceans, whale sharks, turtles) resulting in injury or death. ♦ Potential disruption / disturbance to commercial fishing operators or commercial shipping vessels.	♦ Wheatstone Project Conservation Significant Marine Fauna Interaction Management Plan ♦ Notification to enable a notice to Mariners (or similar instrument) to be issued. ♦ Stakeholder engagement for the EP ♦ Standard marine operations (communications) ♦ Navigational equipment/ radar to aid navigation of commercial shipping and commercial/ recreational fishing vessels ♦ AHS informed of location of activities	Low (8)
Physical presence of subsea infrastructure, anti-scour, span correction and protection/stabilisation on the seabed	♦ Smothering of widespread ecologically important benthic habitat from suspended sediments.	♦ Subsea infrastructure will be installed as per engineering drawings ♦ Construction drawings to be on survey screens for operators to follow. ♦ ROV inspection during placement to ensure correct infrastructure installation ♦ Installation procedures followed	Low (10)

Sources of Risk (Hazards)	Potential Environmental Impacts (Consequences)	Control Measures	Residual Risk
Unplanned infrastructure placement on the seabed outside the designated infrastructure placement area	♦ Direct disturbance to locally or regionally significant habitat and indirect disturbance to habitat through sediment dispersion and smothering of the benthic habitat.	♦ Construction drawings to be on survey screens for operators to follow. ♦ Vessel Dynamic Positioning capability.	Low (9)
Vessel lighting during night activities.	♦ Disruption to behaviour patterns of marine fauna resulting in changes at population levels.	♦ Wheatstone Project Conservation Significant Marine Fauna Interaction Management Plan	Low (9)
Vessel thrusters/ engine operation / helicopter transfer during subsea installation resulting in noise.	♦ Physiological damage to marine fauna (physical and perceptual). ♦ Disruption to behaviour patterns of marine fauna (including indirect impacts such as displacement or injury of prey species).	♦ Maintenance of vessel engines ♦ Wheatstone Project Conservation Significant Marine Fauna Interaction Management Plan Trained crew member on active duty during daylight hours ♦ Helicopters will operate in accordance with EPBC Regulations 2000 Division 8.1.	Low (8)
Vessel and helicopter operations generating air emissions.	♦ Temporary and localised reduction in air quality. ♦ Increased greenhouse gas emissions to the atmosphere.	♦ Vessel engines and plant will be managed in accordance with the vessel PMS. ♦ Where appropriate vessels will have valid International Air Pollution Prevention (IAPP) Certificate and an International Energy Efficiency Certificate (IEEC), certifying that a ship-specific Ship Energy Efficiency Management Plan (SEEMP) is onboard. ♦ Low sulphur fuel will be used where possible.	Low (10)
Incineration of solid wastes.	♦ Temporary and localised reduction in air quality. ♦ Increased greenhouse gas emissions to the atmosphere.	♦ All incinerators will be maintained in accordance with manufacturer specifications and MARPOL certified, if installed after January 2000.	Low (10)
Non-routine release of Ozone Depleting	♦ Depletion of stratospheric ozone.	♦ No deliberate release of ODS	Low (10)

Sources of Risk (Hazards)	Potential Environmental Impacts (Consequences)	Control Measures	Residual Risk
Substances (ODS).			
Ballast water exchange potentially harbouring IMP in the operational area Vessels with biofouling potentially harbouring IMP in the operational area.	♦ Introduction of IMP to the operational area, which have the potential to compete with native fauna and flora, introduce diseases and pathogens and alteration of natural habitats.	♦ All required vessels will have Department of Agriculture clearance and will undertake ballast water exchange in accordance with Australian Ballast Water Requirements. ♦ All vessels will have current anti-fouling certification. ♦ Wheatstone Introduced Marine Pest Risk Assessment Procedure (IMPRAP) for Non-Trading Vessels entering state waters	Low (7)
Routine discharge of putrescible wastes.	♦ Temporary and localised reduction in water quality associated with increase in nutrients.	♦ Food waste will be discharged in accordance with MARPOL, Annex V.	Low (9)
Accidental loss to the marine environment of generated solid hazardous and non - hazardous wastes	♦ Temporary and localised reduction in water quality associated with accidental release of hazardous and non-hazardous waste causing pollution or contamination. ♦ Ingestion by or entanglement of marine fauna.	♦ Appropriate segregation and containment of wastes, induction training in accordance with waste management plan. ♦ All non-putrescible solid wastes are incinerated or appropriately disposed of at a licensed onshore facility if disposed of in Australia	Low (10)
Routine discharge of grey water and sewage.	♦ Temporary and localised reduction in water quality resulting in acute and chronic effects on marine flora and fauna associated with an increase in nutrients.	♦ Sewage discharged in accordance with MARPOL	Low (9)
Routine discharge of deck drainage water and bilge water, waste oil and chemicals (including hydraulic fluids).	♦ Temporary and localised reduction in water quality causing physical and behavioural changes to marine fauna and/or damage to habitats	♦ Induction training includes appropriate segregation and containment of wastes ♦ Appropriate containment i.e. bunding/secondary containment and drainage system management ♦ Use of Oily Water Separator (OWS) to meet MARPOL requirements	Low (9)

Sources of Risk (Hazards)	Potential Environmental Impacts (Consequences)	Control Measures	Residual Risk
		♦ Waste management and housekeeping ♦ Biodegradable hydraulic fluid where practicable and technically feasible	
Planned release of MEG,UV treated gels, flooding fluids and control fluids	♦ Temporary and localised reduction in water quality causing physical and behavioural changes to marine fauna and/or damage to habitats.	♦ Chemical selection process ♦ Pressure tested items prior to deployment to ensure no leaks ♦ Density matching of MEG to that of ambient seawater ♦ Detailed procedures to control dosing of flooding fluids	Low (9)
Unplanned release of flooding fluid	♦ Temporary and localised reduction in water quality causing physical and behavioural changes to marine fauna and/or damage to habitats.	♦ Chemical selection process ♦ Use of Chevron lifting procedures	Low (9)
Single point failure Hydraulic oil and chemical spill spill – on or over board (< 1 m^3)	♦ Cumulative impacts to environmental values and sensitivities within the Offshore zone EMBA.	♦ Activities will be halted on alarm signal or evidence of leakage ♦ Camera on ROV to check for leakage ♦ PMS for ROVs ♦ Appropriate bunding and storage of hazardous material ♦ Spill kits ♦ Vessel Shipboard Oil Pollution Emergency Plan (SOPEP) ♦ Use bio-degradable hydraulic oils where practicable and only for systems in/over water	Low (10)
Refuelling – HFO spill during vessel refuelling (1 m^3 to 50m^3)	♦ Cumulative impacts to environmental values and sensitivities within the Offshore EMBA from a temporary and localised reduction in water quality.	♦ Use of dry break couplings on fuel transfer hoses ♦ Emergency stop activated on transfer pumps when there is loss of fuel hose pressure. ♦ Operational control procedures including visual monitoring, Dynamic Positioning/Global Positioning System (GPS), maintenance of radio communications, adhering to environmental and weather limitations, and sufficient lighting, will be followed during bunkering. ♦ Implementation of the Oil Spill Operational Response Plan.	Low (10)

Sources of Risk (Hazards)	Potential Environmental Impacts (Consequences)	Control Measures	Residual Risk
Vessel Collision – MDO spill from vessel (400 m3)	♦ Cumulative impacts to environmental values and sensitivities from potentially low levels of surface and entrained hydrocarbons.	♦ Vessel meets specifications including Dynamic Positioning systems and fenders will be deployed during vessel to vessel activities ♦ Notice to mariners ♦ 24-hour visual, radio and radar watch maintained for all vessels ♦ Simultaneous operations (SIMOPS) plan when installation vessels are working within 500 m of each other in the operational area ♦ Implementation of the Oil Spill Operational Response Plan	Low (9)
Vessel Collision – HFO spill from construction/ installation vessel (950 m3)	♦ Cumulative impacts to environmental values and sensitivities from potentially moderate to high levels of surface hydrocarbons	♦ Vessel meets specifications including Dynamic Positioning systems and fenders will be deployed during vessel to vessel activities ♦ Notice to mariners ♦ 24-hour visual, radio and radar watch maintained for all vessels ♦ Simultaneous operations (SIMOPS) plan when installation vessels are working within 500 m of each other in the operational area ♦ Implementation of the Oil Spill Operational Response Plan	Low (8)
Implementation of response strategies (source control, monitor and evaluate and containment and recovery) in the event of a spill.	♦ No additional environmental impacts identified to those relating to vessel and aircraft movements etc. described above, and therefore no known potential impacts	♦ N/A	N/A
Implementation of Assisted Natural Dispersion (AND) in the event of a spill (excluding standard vessel operations)	♦ Increased concentrations of aromatics in water column causing measurable localised impact.	♦ AND not conducted on HFO spill ♦ AND conducted in accordance with Oil Spill Operational Response Plan	Low (9)

Sources of Risk (Hazards)	Potential Environmental Impacts (Consequences)	Control Measures	Residual Risk
Application of dispersants in the event of a spill (excluding standard vessel operations)	♦ Application of dispersants resulting in significant toxicity impacts to marine fauna and habitats.	♦ Dispersant application in accordance with Oil Spill Operational Response Plan ♦ Dispersant approved under National Plan ♦ Training for vessel-base dispersant application ♦ AMSA conducts aerially applied dispersant ♦ Use of spotters ♦ Monitoring of dispersant efficacy	Low (8)
Implementation of shoreline protection and deflection in the event of a spill	♦ Impacts to nearshore benthic habitats from deployment of booms.	♦ Protection and deflection response option in accordance with Oil Spill Operational Response Plan ♦ Minimise damage to coral reefs and fragile benthic habitats resulting from boom deployment as far as practicable ♦ Daily checks of booms ♦ Recovery of any trapped fauna ♦ Recovery of booms at the end of response	Low (9)
Implementation of shoreline clean–up in the event of a spill	♦ Disturbance of wildlife feeding or breeding (including damage to nests) as a result of access and activity. ♦ Damage to dune structures, vegetation or habitats from access by people, vessels and equipment.	♦ Instruction by the shoreline assessment team to avoid disturbance to fauna, vegetation and habitats. ♦ Shoreline clean-up conducted in accordance with Oil Spill Operational Response Plan.	Low (7)
Implementation of Oil Wildlife Response (OWR)	♦ Hazing wildlife resulting in significant injury to fauna	♦ Hazing conducted in accordance with Oil Spill Operational Response Plan	Low (9)
	♦ Treatment and cleaning of wildlife resulting in significant injury or death to fauna	♦ Fauna handling training	
	♦ Fauna exclusion barriers to fauna access to oiled area resulting in	♦ Booming to be supervised at all times ♦ Any trapped fauna recovered	

Sources of Risk (Hazards)	Potential Environmental Impacts (Consequences)	Control Measures	Residual Risk
	significant injury or death to fauna		
Waste Management and Disposal.	♦ Insufficient waste management resources inhibit recovery operations. ♦ Poor waste storage and disposal can result in further environmental impacts after clean-up and recovery operations.	♦ Sufficient and appropriate waste containers for expected volume and segregation ♦ All waste material collected offshore, will be segregated, stored, handled, transported and disposed appropriately ♦ Implement in accordance with Oil Spill Operational Response Plan	Low (9)
Establishment of onshore waste collection area.	♦ Decline in sediment quality. ♦ Decline in water quality.		Low (9)
Storage of waste.	♦ Decline in sediment quality. ♦ Decline in water quality.		Low (9)
Transport of waste by vessel, and vehicle.	♦ Decline in sediment quality. ♦ Decline in water quality. ♦ Injury to marine fauna. ♦ Injury to terrestrial fauna. ♦ Temporary reduction in air quality.	♦ Tracking of waste to final disposal ♦ Final disposal location is appropriate to waste type.	Low (9)

5.0 MANAGEMENT APPROACH

The implementation strategy identifies the systems, practices and procedures to be used to ensure the environmental impacts and risks of the activities are reduced to ALARP and are acceptable, and the environmental performance outcomes and standards are met. The implementation strategy is split between planned operational activities and unplanned event response, enabling roles and responsibilities to be clearly defined and to provide a clear chain of command for both.

The implementation strategy is to be enacted in accordance with Chevron Australia's Operational Excellence Management System. Chevron's Operational Excellence Management System is aligned to ISO 14001:2004 and key components of the management system are described in the subsections below.

5.1 Roles and Responsibilities

Accountabilities and responsibilities are defined for personnel involved in the projects implementation for both planned activities and emergency conditions.

5.2 Training and Competency

All personnel are required to attend environmental inductions and training relevant to their role for the activities. Training and induction programs facilitate the understanding personnel have of their environmental responsibilities, and increase their awareness of the management and protection measures required to reduce potential impacts on the environment. In addition to project training, select personnel will also receive spill response training.

5.3 Monitoring and Reporting

The implementation strategy outlines the requirements for the following:

- marine fauna observations
- oil spill monitoring plan
- emissions and discharges, and
- routine external reporting and non-routine reporting (including internal incident reporting and investigations and external incident and near misses reporting).

5.4 Compliance assurance

A multi-tiered environmental compliance assurance program will be implemented for the duration of the activities described in the detailed Plan, including tools, processes and procedures to deliver and verify compliance with the EP. Assurance activities will include both Chevron-led and contractor-led audits and inspections. Chevron-led audits and inspections will be undertaken as required and in accordance with Chevron's ABU Compliance Assurance Process and the Health, Environment and Safety Audit Schedule for the Project.

5.5 Documentation and Records

Chevron Australia's ABU Operational Excellence Management System (OEMS) has dedicated information management tools and processes to ensure critical information is developed, accessible and maintained by the workforce. Wheatstone documentation shall be managed in accordance with this Process, and specifically via the Project's Document Management System. Accordingly, all documentation and records demonstrating compliance against environmental performance objectives and standards will be effectively maintained and retained for the life of the Project and not less than five years.

5.6 Environment Plan Review

Chevron's Management of Change process will be followed to document and assess the impact of any changes to the activities described in the EP. These changes will be addressed to determine if there is potential for any new or increased environmental impact or risk not already provided for in the EP. Where required the EP will be re-submitted to NOPSEMA for approval in accordance with Regulation 17 of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS(E)R).

6.0 OIL SPILL OPERATIONAL RESPONSE PLAN

An Oil Spill Operational Response Plan (OSORP) has been developed specific to the Subsea Equipment Installation activities. The OSORP addresses the specific response measures and procedures that would be implemented to minimise the impact of an oil spill. The OSORP interfaces with Chevrons broader emergency response framework and management systems.

The OSORP adopts a tiered response philosophy to oil spill responses, which is consistent with that adopted by the National Marine Oil Spill Contingency Plan (AMSA 2005) and the WA Marine Oil Pollution Emergency Management Plan (Department of Planning and Infrastructure 2007).

The OSORP contains the necessary information and details the response capability required to respond to the worst case credible spill event identified from Subsea Equipment Installation activities which has been determined to be a Heavy Fuel Oil (HFO) spill due to vessel collision, maximum spill volume of 950 m^3 based on largest fuel volume stored on vessels related to these activities. Modelling of this scenario (and other smaller credible spill scenarios) are the basis of the environment that may be affected (EMBA) which is described in Section 3.0. The spill response strategies described within the OSORP focus on the identified resources at risk within the EMBA.

The credible spill scenarios considered in the EP are able to be managed within the framework of the OSORP and include;

- Hydraulic oil and chemical spills due to single point failure (<1 m^3 for both onboard and overboard spills)
- HFO/MDO spill due to vessel refuelling (1.2 m^3 – quantity in transfer hose)
- HFO/MDO spill due to vessel refuelling (50 m^3 – failure of dry break couplings)
- MDO and MGO spill due to vessel collision of a structure installation vessel, heavy lift vessel or support vessel (maximum spill volume of 400 m^3 of MDO) based on largest fuel volume stored on vessels)
- HFO spill due to vessel collision of a structure installation vessel or heavy lift vessel (maximum spill volume of 950 m^3)

The OSORP is designed to be an operational document to ensure a rapid and appropriate response in the unlikely event of an oil spill and provides guidance on:

- Specific response options to be adopted for scenarios specific to the Subsea Equipment Installation activities
- Practical information required to undertake a rapid and effective response
- Co-ordination of external resources through AMOSC, AMSA, or the WA Department of Transport (DoT).

The following spill response strategies have been assessed as applicable for potential hydrocarbon spill events related to the Subsea Equipment Installation activities:

- Source Control
- Monitor, Evaluate and Surveillance (MES)
- Containment and Recovery (if feasible)
- Assisted Natural Dispersion (AND)
- Dispersant Application
- Shoreline Protection and Deflection
- Shoreline Clean up

- Oiled Wildlife Response (OWR)
- Waste Management.

In accordance with Protection of the Sea (Prevention of Pollution from Ships) Act 1983 (11A), a current SOPEP or equivalent for vessels >400 T will be kept on-board. In the event of a marine pollution incident from a vessel, the vessel's SOPEP will be enacted and Chevron will be alerted via the OSORP. The response operation will be under the umbrella of the OSORP, with Chevron taking control of the situation, including escalation of Level if required. Both SOPEPs and the OSORP contain update and review provisions to address necessary changes. The OSORP is tested at least annually.

7.0 CONSULTATION

Chevron prepared a Stakeholder Consultation Plan specific for this activity. The Stakeholder Consultation Plan describes:

- stakeholder identification and analysis
- communication engagement plan, comprising the level and trigger of engagement, type of engagement, and frequency
- stakeholder engagement log, including information provided and Chevron responses
- full text of consultation.

7.1 Relevant Stakeholders

Relevant stakeholders have been identified through a stakeholder analysis process to ensure persons or organisations that may potentially be affected by the overall Wheatstone Platform and associated activities including Subsea Equipment Installation work have been consulted (Table 7.1).

Table 7.1 Stakeholders Engaged for Subsea Equipment Installation activities

Stakeholder	Stakeholder Type
AECOM	Response Organisation (Monitoring)
AMSA	Government Agency
Apache Energy	Response Organisation
AMOSC	Response Organisation
Department of Transport (OSRC Unit)	Response Organisation
Environmental Resources Management (ERM)	Response Organisation (Monitoring)
Intertek Geotek	Response Organisation
OSRL	Response Organisation
SKM	Response Organisation (Monitoring)
ToxFree	Response Organisation (Monitoring)
URS	Response Organisation (Monitoring)
Apache Energy Ltd	Interested Party
KUFPEC	Interested Party
Vermillion Energy	Interested Party
Woodside Burrup Pty L:td	Interested Party
Australian Fisheries Management Authority (AFMA)	Government Agency
Australian Southern Bluefin Tuna Industry Association	Interested Party
Commonwealth Fisheries Association	Interested Party
WA Department of Fisheries (DoF)	Government Agency
Pearl Producers Association (PPA)	Potentially Affected Party
Western Australian Fisheries Industry Council (WAFIC)	Interested Party
Mackerel Managed Fisher (State)	Potentially Affected Parties
Marine Aquarium Fish (State)	Potentially Affected Parties
North West Slope Trawl Fishery (State)	Potentially Affected Parties
Onslow Prawn (State)	Interested and Potentially Affected Parties
Pearl Oyster Managed Fishery (State)	Potentially Affected Parties
Pilbara Line Fishery (State)	Potentially Affected Parties
Pilbara Trap Managed Fishery (State)	Potentially Affected Parties
Professional Specimen Shell Fishermen Association	Interested and Potentially Affected Parties
Western Skipjack Tuna Fishery (Commonwealth)	Interested Parties
Western Tuna Billfishery (Commonwealth)	Interested and Potentially Affected Parties
Marine Tourism WA	Interested and Potentially Affected Parties

RecFishwest	Interested and Potentially Affected Parties
Australian Hydrographic Service (AHS)	Government Agency
Dept of Broadband Communication and the Digital Economy	Government Agency
Dept of Defence	Government Agency
Depart of Mines and Petroleum (DMP)	Government Agency
Dept Parks and Wildlife	Government Agency
Dept of Transport	Government Agency
Port Authority Dampier	Government Agency
NOPSEMA	Government Agency

7.2 Stakeholder Engagement Outcome

No objections or claims about adverse impacts relating directly to the activity (Subsea Equipment Installation activities) were raised by relevant stakeholders. Some feedback has been received and clarifications have been requested and Chevron has responded appropriately to ensure queries were adequately addressed and resolved. Information obtained from the consultation process was considered in the development of the Environment Plan, where relevant.

7.3 Communication Engagement Plan

In line with Chevrons Communication Engagement Plan initial and ongoing stakeholder engagement for both planned activities and emergency conditions has been established for relevant stakeholders. Chevron will maintain communications with identified stakeholders as required ensuring they are informed of any aspects of the Subsea Equipment Installation activities that may potentially affect their respective interests within the area. Additionally, Chevron can continue to be contacted about the activities described in this Summary via the contact details provided in Section 8.0.

8.0 CONTACT DETAILS

Further information associated with the proposed activities may be obtained from:

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