Coniston Novara Construction and Installation Environment Plan Summary

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1. INTRODUCTION

Apache Energy Ltd (Apache) proposes to develop the offshore Coniston and Novara oil fields within the Exmouth Basin of the North West Shelf (NWS) in Production Licence WA-35-L (Commonwealth waters) in order to carry out its obligations under the permit.

The purpose of the Coniston Novara Development is to produce oil from the Coniston and Novara fields. The fields contain heavy oil reservoirs in the Barrow Sandstone.

The development will comprise a subsea production system tied back to the Van Gogh Operation. The Van Gogh Operation already has one gas and two injection wells in an existing operating field. The Coniston Novara subsea production system will include:

- Seven production wells, six in the Coniston field and one in the Novara field. A pipeline end manifold (PLEM) will be located between the Coniston and Novara production wells. The Coniston drill centre C manifold (DC3) is the production well for Coniston and the drill centre D (DC4) is the Novara production well;
- The production wells will be tied back to the Van Gogh operating field by two production flowlines, a gas lift flowline and an electro-hydraulic umbilical; and
- Gas (one) and water (two) injection wells exist in the Van Gogh operating field.

Apache is the operator of the WA-35-L permit (52.501%) and will be conducting the installation work on behalf of joint venture partner INPEX Alpha ltd. (47.499%).

1.1 Schedule

Construction and installation activities will commence late April 2013 when the Drill Centre 3 and Drill Centre 4 subsea infrastructure will be installed, tied into Van Gogh and tested. The Gas Production Manifold (GPM) will also be installed in Phase 1, which will have a duration of approximately 60 days.

Phase 2 will occur in Q1/2 2014 when the FPSO is away at the ship yard. It will consist of the recovery and replacement of Van Gogh flowlines and tie in of the GPM, and all associated testing. The estimated duration is approximately 20 days.

1.2 Compliance

The proposed Coniston Novara Field Development was referred under the Environment Protection and Biodiversity Conservation (EPBC) Act to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) on the 16th of June 2011 (Ref. EPBC 2011/5995). A decision on this action was subsequently provided on the 15th of July 2011, approving the development on the basis that it is a 'Controlled Action' and the project requires assessment and approval under the EPBC Act before it can proceed. Assessment of the project was undertaken through preparation of Preliminary Documentation and a Supplement, with conditional approval under the EPBC Act granted on the 15th of October 2012.

The Coniston Novara Installation EP has been prepared to comply with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS (E)) under the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGS Act) (Cmlth). The EP has been reviewed and accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

This EP summary has been prepared as per the requirements of Regulation 11 (7) and (8) of the referenced OPGGS(E) Regulations.

2. LOCATION OF THE ACTIVITY

The Coniston Novara Development is located approximately 65 km north of Exmouth and 35 km north of the Ningaloo Marine Park boundary in approximately 380 m of water (**Figure 2–1**). The geographic coordinates for the FPSO mooring and subsea infrastructure are provided in **Table 2-1**.

Table 2-1: Surface locations for the Coniston Novara oil field development infrastructure

Parameter	Coordinates (Datum/Projection: GDA 94 Zone 50)			
	Latitude	Longitude	Easting	Northing
FPSO mooring position	21° 24' 12.39"S	114° 05' 17.22"E	198096	7630400
Drill centre 3 (DC3)	21˚ 20’ 57.290”S	114˚ 04’ 23.613”E	196439	7636375
Drill centre 4 (DC4)	21˚ 23’ 41.6”S	114˚ 04’ 56.0”E	197345	7637777

For the purposes of defining operational boundaries, all project vessels are considered to be undertaking the described activity when they are located within the area defined (‘defined area’) by the geographic coordinates shown in **Figure 2-2.**

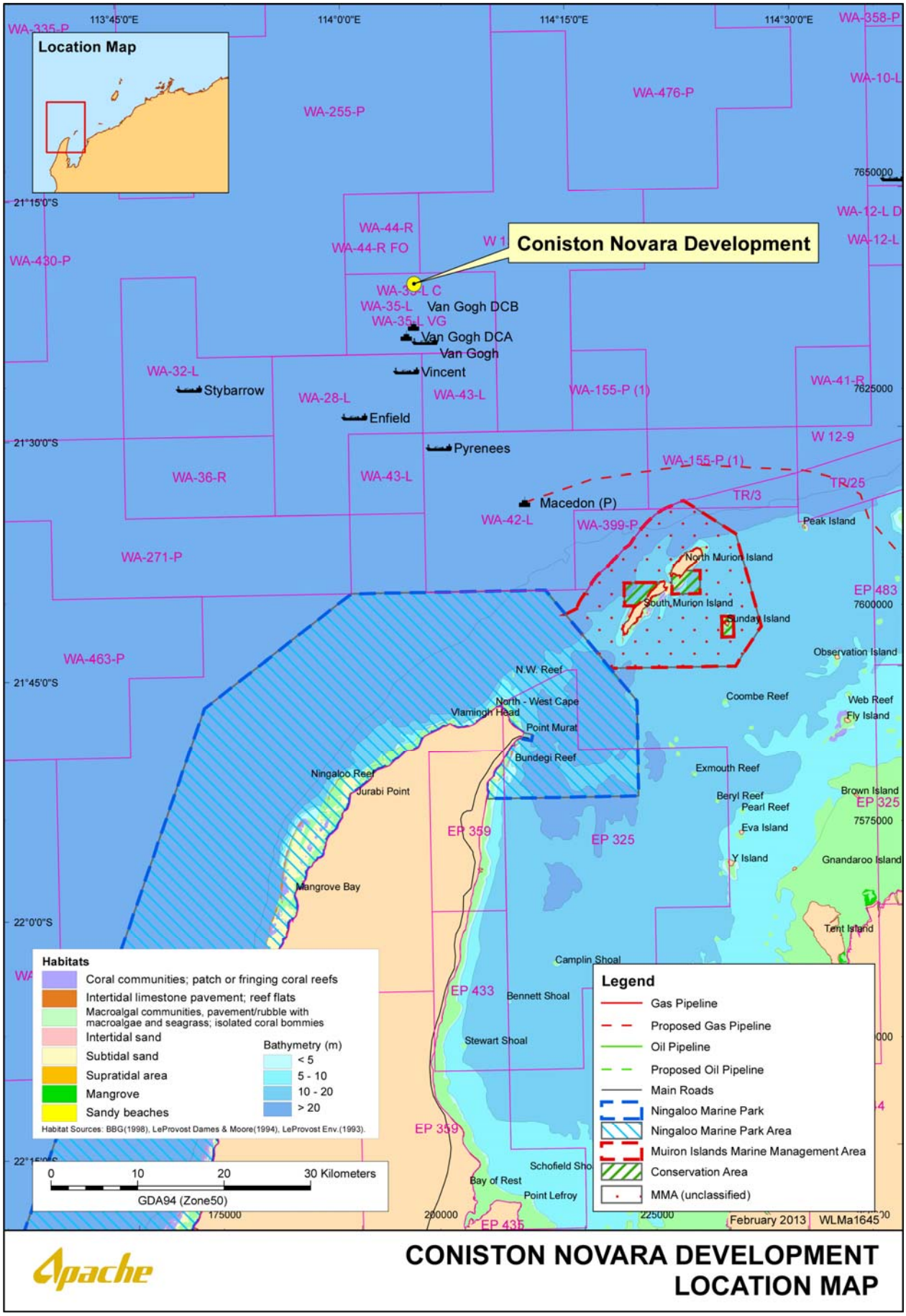

Figure 2-1: Location map for the Coniston Novara Field Development

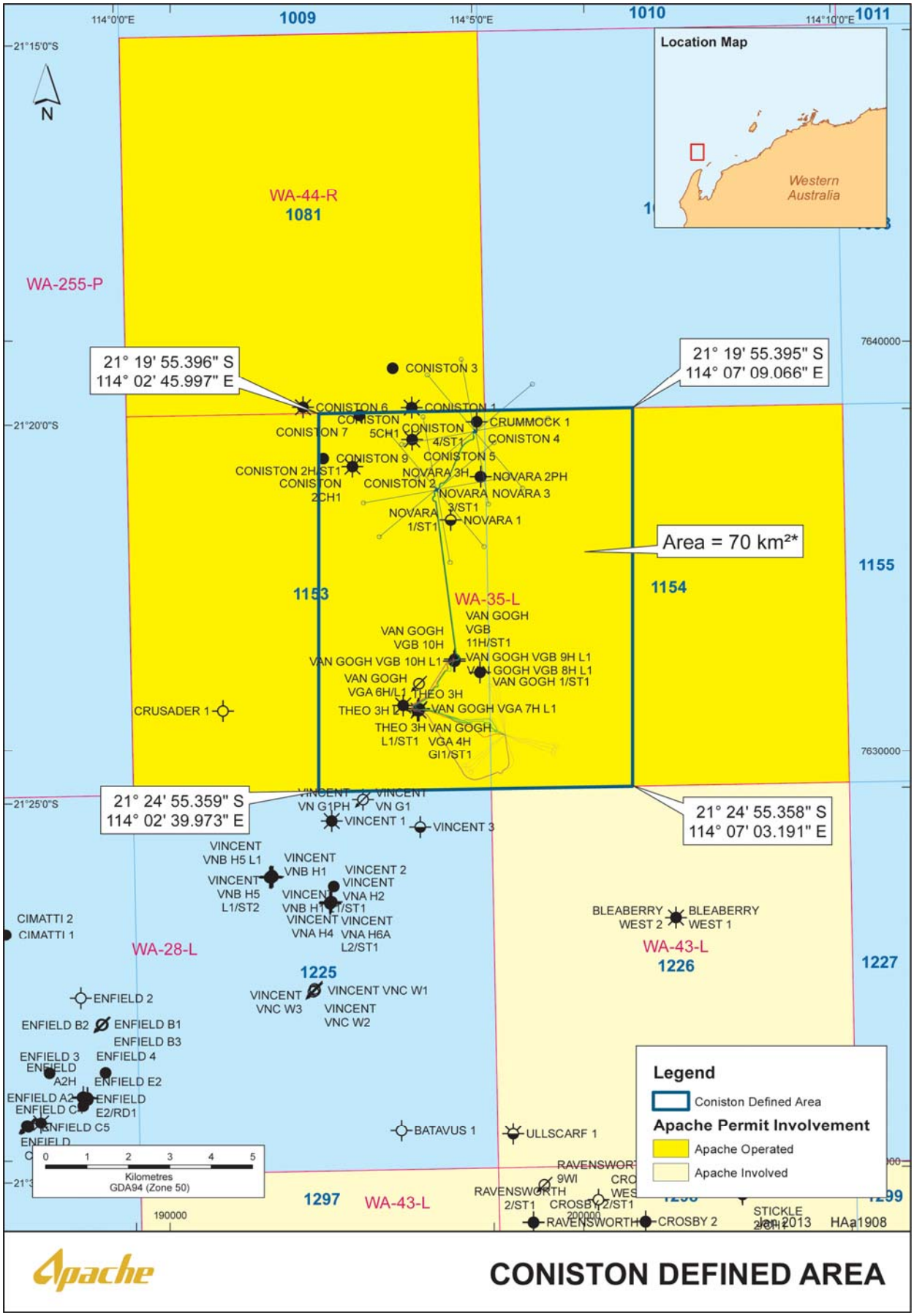

Figure 2-2: Coniston Novara Field Development 'defined area'

3. DESCRIPTION OF THE RECEIVING ENVIRONMENT

3.1 Physical Environment

The proposed Coniston Novara installation activity is located in the North West Shelf (NWS). The region is typical of the arid tropics; high summer temperatures, periodic cyclones and associated rainfall. Rainfall is generally low although intense rainfall may occur during passage of summer tropical cyclones. NWS waters are usually thermally stratified with a marked change in water density at approximately 20 m (SSE, 1993). Surface temperatures vary annually, being warmest in March (32^{o}C) and coolest in August (19^{o}C). Vertical gradients are correlated to sea surface temperatures, and are greatest during the warm-water season (SSE, 1991). Near bottom water temperature is approximately 23^{o}C, with no discernible seasonal variation.

Wind shear on surface waters generates local-scale drift currents that can persist for extended periods (hours to days). During summer (October–March), the prevailing non-storm winds are from the southwest, west and northwest at an average speed of less than 10 knots, peak average speeds of 15–25 knots, and maximum speeds of 30 knots. Winds from the southeast to northeast quadrant are experienced at a frequency of less than 10% over summer. In winter (May–August), winds are generally lighter and more variable in direction than in summer. Non-storm winds prevail from the northeast through to southeast at average speeds of 5–6 knots, peak average speeds of 10–15 knots, and maximum speeds of 20 knots. Transitional wind periods, during which either pattern may predominate, can be experienced in April and September of each year.

The wave climate is generally composed of locally generated wind waves (seas) and swells that are propagated from distant areas (WNI, 1995; 1996). In summer, seas typically approach from the west and southwest. Mean sea wave heights of less than 1 m with peak heights of less than 2 m are experienced in all months of the year (WNI, 1995). Tropical cyclones have generated significant swell heights of up to 5 m in this area, although the predicted frequency of swells exceeding 2 m is less than 5% (WNI, 1995).

The dominant sea surface offshore current (typically seaward of the 200 m isobath) is the Leeuwin Current, which carries warm tropical water south along the edge of WA's continental shelf, reaching its peak strength in winter and becoming weaker and more variable in summer. The Indonesian Throughflow is the other important current influencing the upper 200 m of the outer NWS (Woodside, 2005).

Offshore drift currents are represented as a series of interconnected eddies and connecting flows that can generate relatively fast (1–2 knots) and complex water movement. These offshore drift currents also tend to persist longer (days to weeks) than tidal current flows (hours between reversals) and thus will have greater influence upon the trajectory of slicks over time scales exceeding a few hours (APASA, 2011).

3.2 Biological environment

Benthic habitats within the ‘defined area’ are composed of sediments comprising a fine silt and mud substrate with >75% bioturbation, with a flat to gently sloping gradient. Epibenthic biota was sparse (<5%) including occasional invertebrates such as anemones, sea stars, soft corals, crabs, shrimp and urchins (RPS, 2011). Infauna sampled in this area was found to be diverse, with most of the species polychaete worms (61% of species and 55% of individuals sampled) and crustaceans (30% of species, 41% of individuals). The benthic habitats and assemblages in the Coniston Novara fields are considered to be of low conservation significance given their widespread distribution (RPS, 2011) and the community composition is common throughout the NWS (Gardline Marine Services, 2009).

The spatial and temporal distribution and density of these organisms depends on factors such as substrate composition, season, depth and water temperature (Ward and Rainer, 1988; Rainer, 1991; Kinhill, 1997). Ward and Rainer (1988) reported a seasonal pattern in the abundance of small species of decapod crustaceans in this region. It was not clear if this pattern was related to season or to other factors, such as storm events, which operate on much shorter time scales. By comparison, the diversity and abundance of large encrusting animal species in this region is relatively low (Ward and Rainer, 1988; LeProvost

Environmental Consultants (LEC), 1990). This is probably due to instability of the sediment and the lack of exposed and colonisable reef.

The Coniston Novara installation activity is located in Commonwealth waters, offshore from the WA mainland. Significant features in the region include Muiron Islands (44 km SE), North West Cape (50 km S), Ningaloo Marine Park (36 km S) and Barrow Island (138 km NE). The defined area does not overlie any of these identified features. Key ecological features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area. From the EPBC Act Protected Matters search two features were identified within the defined area:

- **Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula** contain unique seafloor features with ecological properties of regional significance; and
- **Continental slope demersal fish communities** with high species biodiversity and endemism.

The EPBC Act Protected Matters Database (DSEWPaC, 2012a) identified ten species of marine fauna found in the defined area area listed as threatened species (endangered or vulnerable) under the EPBC Act, all of which are migratory, and a further six migratory species were also identified. The species listed included two fish, seven cetaceans, five turtles and two seabirds.

3.3 Socio-economic environment

Both the offshore and coastal waters in the North West Cape Region support a valuable and diverse commercial fishing industry, mainly dominated by the Pilbara fisheries. There is one fishery overlapping or close to the area of the development: the North West Slope Trawl Fishery. Other Commonwealth fisheries, such as the Western Tuna and Billfish Fishery (WTBF), Southern Bluefin Tuna Fishery (SBFTF) and the Western Skipjack Tuna Fishery (WSTF), are licenced to fish within the defined area, but no recent fishing effort has been reported. No State managed fisheries overlap with the activity location.

There is a shipping route heading northeast to the west of the proposed installation location however, a relatively small number of vessels use this (Apache Energy Ltd, 2010; Woodside 2006).

The proposed installation area and surrounding waters are predominantly used for petroleum exploration and development. Within approximately 5 km of the proposed activity are five operating FPSO developments operated by Apache, Woodside Energy Ltd and BHP Petroleum.

Each year, around 104,000 tourists (about 70% domestic and 30% international) stay overnight in Exmouth. Activities undertaken in offshore waters include nature-based tourism such as humpback whale watching and whale shark encounters.

There are no World Heritage, Commonwealth Heritage or National Heritage sites, or Wetlands of International Importance (Ramsar sites) in or adjacent to the construction and installation. The nearest site is Ningaloo World Heritage Area (35 km S). No registered Aboriginal heritage sites are located within or in close proximity to the Coniston Novara installation activity. As activities will not occur outside of the defined area, no impact is expected on the Ningaloo World Heritage Area.

4. DESCRIPTION OF THE ACTIVITY

There are two phases to the construction and installation for the Coniston Novara Development: Phase 1 when the Drill Centre 3 and Drill Centre 4 subsea infrastructure will be installed, tied into Van Gogh and tested, scheduled to commence late April 2013. The Gas Production Manifold (GPM) will also be installed in Phase 1, which will have a duration of approximately 60 days. Phase 2 will occur in Q1/2 2014 when the recovery and replacement of Van Gogh flowlines and tie in of the GPM, and all associated testing will occur. The estimated duration is approximately 20 days.

The Boa Sub C Installation Vessel will be used during Phase 1 of the installation activity. In addition, one support vessel the *Mermaid Investigator* will be used during the activity as will an ROV support vessel.

Installation activities will be conducted 24 hours a day, seven days a week.

4.1 Installation activities

Phase 1 – Installation of the six mooring leg

The subsea infrastructure including manifolds, electro-hydraulic umbilicals (EHUs) and flowlines will be laid between drill centres 3 and 4 and the PLEM, and tied back to existing drill centre 2. Installation of the manifolds will be with a crane lift off the deck of the installation vessel down to the seabed, while installation of the flowlines and EHUs will be from rigid spools held on deck of the installation vessel to the seabed. The electro-hydraulic flying leads (EHFLs) provide electrical and hydraulic controls linkage between the four wells and the manifold. Subsea infrastructure will be connected using an ROV. Once all the subsea piping elements have been installed and tied-in, a hydrotest (or leak test) is carried out, followed by functional testing on completion of all installation works in the field.

Phase 2 – Recovery of 10" flowlines

Prior to the recovery of the 10" flowlines at DC1, flowlines will be flushed with a treated potable water/ surfactant mix (treated potable water >98%, surfactant <2%) for 48 hours. Treated water within the 10" flowlines will be recovered by a closed loop system that will allow all treated water to be processed and separated onboard the FPSO. Once flushing has been completed and the FPSO has departed the field, the installation vessel will recover the 10" flowlines and new 12" flowlines will then be installed, again using rigid spools onboard the installation vessel. The 12" flowlines will have been previously flooded with treated water onboard the installation vessel. As for phase 1, a hydrotest will be carried out upon completion of the installation works.

5. ENVIRONMENTAL HAZARDS AND CONTROLS

The environmental risk assessment for operational activities and unplanned events for the construction and installation phases of the Coniston Novara Field Development centred around a hazard identification workshop. The workshop, held on the 11th of July 2012, was attended by a subset of Apache's environmental scientists and construction and engineering personnel. In addition, a subsequent risk assessment workshop was held on 8 November 2012 to gather further detail on the risks associated with the construction and installation activities.

The purpose of the risk assessment was to understand and identify the potential environmental hazards, their causes and the potential impacts associated with Phase 1 and 2 installation activities to ensure they are reduced to As Low As Reasonably Practicable (ALARP). Apache's management and mitigation actions aim to reduce the environmental risks arising from the activities associated with the proposed Coniston Novara installation activity to ALARP. These have been developed from experience in the environmental management of offshore petroleum activities in Australia, and are based on Australian petroleum industry best practice environmental management guidelines, as defined by the APPEA Code of Environmental Practice (2008).

The environmental risk assessment identified ten routine environmental risks and five non-routine (unplanned events) environmental risks. The key environmental hazards and control measures to be applied to the Coniston Novara installation activity are provided in **Section 9**. These are consistent with Apache corporate and project specific performance objectives, standards and criteria. All commitments associated with these will be used to reduce environmental risk to ALARP and will be of an acceptable level.

6. MANAGEMENT APPROACH

The Coniston Novara installation activity will be managed in compliance with the *Coniston Novara Installation Environment Plan (EA-00-RI-232/1)* accepted by NOPSEMA under the OPGGS(E) Regulations, other environmental legislation and Apache's Management System (e.g. Apache Environmental Management Policy).

The objective of the EP is to ensure that potential adverse environmental impacts associated with the Coniston Novara installation activity during routine operational activities and unplanned events, are identified and assessed and to stipulate mitigation measures to avoid and/or reduce any adverse impacts to the marine environment to ALARP.

The EP details for each environmental impact identified (and assessed in the Environmental Risk Assessment) specific performance objectives, standards and procedures and identifies the range of controls to be implemented (consistent with the standards; refer **Section 9**) to achieve the performance objectives. The EP also identifies the specific measurement criteria and records to be kept to demonstrate the achievement of each performance objective.

The goals of the environmental implementation strategy as detailed in the EP are to direct, review and manage activities so that environmental impacts and risks are continually being reduced to ALARP, and performance objectives and standards are met over the duration of the construction and installation activity. It includes the following:

1. Details on the systems, practices and procedures to be implemented;
2. Key roles and responsibilities;
3. Training and competencies for all personnel (Apache and contractors);
4. Monitoring, auditing, inspections, management of non-conformance and review;
5. Record management;
6. Emergency response and preparedness including an OSCP (EA-00-RI-232/2);
7. Consultation; and
8. End of Activity Phase Reporting and Incident Reporting.

The reporting requirements for routine activities and environmental incidents (recordable and reportable) and reporting on overall compliance of the activity with the EP (e.g. conformance reports submitted to NOPSEMA within three months of each phase completion) are also detailed.

7. CONSULTATION

Apache maintains an updated stakeholder database containing fishing interest groups, government and non-government authorities and other stakeholder parties including the community of Exmouth and adheres to its Stakeholder Consultation Strategy. This database was used to identify stakeholders located, or operating, in the proximity of the Coniston Novara Field Development. Apache has maintained relationships to assist information sharing with key stakeholders for many years and regularly communicates with stakeholders on a variety of activities, always seeking comment and fielding enquiries.

Relevant interested parties for consultation directly relating to the construction and installation activities were identified on the basis of the 'defined area'. Stakeholders identified for the Coniston Novara construction and installation activities are listed in **Table 7-1**.

Apache's Exmouth Stakeholder Reference Group (SRG) comprises representatives from the Exmouth community, including local government, business, tourism, environmental groups and interest groups. The group was most recently convened on 11 October 2012 for a project briefing presented by Apache senior staff. This meeting was supplemented by the emailing of an information package the following day, including a map of the project and details. It is planned the group will meet regularly (biannually) for the life of the project for project updates.

Apache considers biannual meetings to be adequate, supported by email and telephone contact on an as needs basis. In addition, an information package detailing the construction and installation activity was sent to stakeholders on the 19th of February 2013. Apache will consider any feedback received from stakeholders on the information package prior to commencement of the activity, and over the 12 months between provision of the information package and commencement of phase 2 of the construction and installation activities.

Apache believes the information provided to stakeholders in December 2012, and subsequently the information pack provided in February 2013, provides adequate information on the Coniston Novara construction and installation activities, and adequate time for stakeholders to respond and seek further information or provide comment on the proposed activities.

Table 7-1: Summary of stakeholders consulted for the construction and installation phase of the Coniston Novara Field Development

Group	Stakeholder
Commercial fisheries	• Australian Fisheries Management Authority (AFMA) • Department of Fisheries (DoF) • Western Australian Fishing Industry Council (WAFIC) • A Raptis and Sons • WestMore Seafoods • Shark Bay Seafoods • Austral Fisheries • Pearl Producers Association
Recreational fisheries	• RecFish West
Marine conservation	• Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) • Department of Environment and Conservation (DEC) • Cape Conservation Group (CCG)
Shipping safety and security	• Australian Maritime Safety Authority (AMSA) • Royal Australian Navy and General Defence • Department of Defence
Hydrocarbon spill response	• Department of Transport (DoT) • Australian Marine Oil Spill Centre (AMOSC)
Adjacent regulators	• Department of Mines and Petroleum (DMP)

Group	Stakeholder
Regional representatives	• Shire of Exmouth • Exmouth District High School • Exmouth Game Fishing Club • Gascoyne Development Commission • Member Legislative Assembly • Ningaloo Station • North West Cape Aboriginal • DoT, Exmouth • DEC, Exmouth

8. CONTACT DETAILS

Further information about the Coniston Novara Field Development construction and installation activities can be obtained from:

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9. ENVIRONMENTAL ASPECTS, IMPACTS AND CONTROLS

The following tables (**Table 9–1** and **Table 9–2**) provide a summary of potential environmental impacts that could be expected from the Coniston Novara Development construction and installation activities. It lists the activities that might give rise to environmental impacts and the subsequent controls and measures which eliminate or ensure the environmental risk is reduced to ALARP.

Table 9-1: Environmental risk summary for operational activities for Coniston Novara construction and installation.

Hazard	Cause	Potential Impacts	Risk Treatment Avoidance, Mitigation & Management Measures
Vessel Movement	The physical presence of project vessels within the defined area	Death or injury to marine fauna, notably cetaceans, from vessel strike and behavioural disturbance.	• Fauna observation kits (including as a minimum binoculars and fauna observation recording sheets) will be available on all vessels to ensure crew have the necessary equipment available to record observations • All cetacean and whale shark sightings will be recorded on the Apache Marine Fauna Sighting Datasheet with data submitted to DSEWPaC • All crew will attend an environmental induction containing basic information on procedures to manage interactions between vessels and marine fauna • The interaction of all vessels with cetaceans and whale sharks will be consistent with *Part 8 of the EPBC Regulations 2000*, which for these installation activities includes the following: o A vessel will not travel at greater than 6 knots within 300 m (caution zone) of a cetacean (or whale shark) known to be in the area; o A vessel will not approach closer than 100 m of a cetacean (or whale shark) known to be in the area; o If a dolphin approaches the vessel or comes within 100 m the vessel master must not change the course or speed of the vessel suddenly.
Seabed disturbance	Laying of subsea infrastructure; Stirring up of sediments by ROV propellers; Dropped objects; Release of iron ore slurry during ballasting of riser column.	Localised disturbance to seabed, resulting in loss of or change in benthic habitat.	• No anchoring by the installation vessels within defined area – use of dynamic positioning only. Mooring and anchoring will only be undertaken in an emergency (e.g., poor weather) outside the project area. • A pre-installation survey will be conducted to prevent destruction of any previously unsighted significant seabed features • A remotely-operated vehicle (ROV) pre-lay survey along the chain corridors and at the anchor locations will be carried out to identify obstructions, rock outcrops and other seabed disturbances • Laying the DC3 manifold, DC4 PLEM, GPM and SDUs on the bottom (gravity foundations) rather than piling them • Implementation of Apache's Lifting Equipment Management System Safe Lifting Operations (AE-91-IF-017) and Lifting Equipment Management System Equipment Standards (AE-91-IF-011)). Engineered lifts will be used to overboard all subsea infrastructure, while a safe over boarding zone (approximately 50 m from trees and other subsea infrastructure) will be established and walking procedures with guidance from ROV (visual) and transponder array will be used to lift equipment into position • Detailed records of equipment lost overboard will be recorded • During mobilisation/demobilisation all equipment and gear on all vessels are securely sea fastened. • Mitigation measures for equipment handling and lifting procedures are included in Job Safety Assessments to minimise dropped objects entering the marine environment and will include:

Hazard	Cause	Potential Impacts	Risk Treatment Avoidance, Mitigation & Management Measures
			o Weather limits for crane lifts. o Use of competent crane operators. o Use of certified lifting equipment. • An ROV survey of the seabed will be completed at the end of the installation activity to check for dropped objects. Where practically feasible, dropped objects will be retrieved • Crew members involved with lifting and offloading equipment from the vessels will be trained in Apache's Lifting Equipment Management System Safe Lifting Operations (AE-91-IF-017) and Lifting Equipment Management System Equipment Standards (AE-91-IF-011)) and be aware of lifting and offloading requirements • Planned maintenance undertaken on material handling and lifting equipment undertaken in accordance with the Boa Sub C Planned Maintenance System (PMS) • Transfer of chemicals and hydrocarbons will only be carried out under suitable conditions at the discretion of both the vessels OIM and master and will be monitored at all times by competent crew.
Oily water discharges	Routine drainage system discharge from vessels Routine discharge of water through the drainage system.	Temporary reduction of water quality in the vicinity of the release point and the potential for toxicological impacts to marine flora and fauna.	• Oil filtering equipment will be designed and operated in compliance with MARPOL 73/78 Annex I, which requires: o Oily water discharged to sea after passing through filtering equipment not to exceed an oil content of 15 parts per million (ppm); and o The oily water discharge stream, on detection of an OIW content greater than 15ppm, shall be automatically shut-in or directed in-board for further treatment or storage; and o Oily water to be discharged while proceeding en route o A current and valid International Oil Pollution Prevention Certificate (IOPPC) • All shipboard operations associated with oil transfer/movement are recorded in the Oil Record Book • The Oil Detection Monitoring Equipment (ODME) on the discharge stream will be certified and routinely calibrated. It will also be maintained in accordance with manufacturer's specifications via the vessel's PMS • Vessels without oil filtering equipment will hold oily bilge water onboard and dispose of the oily water on return to port • Onshore oily water disposal will be at a reception facility or to a carrier licensed to receive the waste oil • The vessel operator will record the quantity, time and onshore location of the oily water disposal in the vessel Oil Record Book • Oily filtration residue separated in the treatment system will be collected in a dedicated onboard tank and will be disposed of onshore at a reception facility or to a carrier licensed to receive the waste • Hydrocarbon containers and any temporary equipment containing hydrocarbons will be packaged, marked, labelled and stowed in accordance with MARPOL 73/98 Annex I, II and III regulations • All temporary equipment (containing hydrocarbons) and hydrocarbons will be stored in appropriately bunded areas

Hazard	Cause	Potential Impacts	Risk Treatment Avoidance, Mitigation & Management Measures
			• A Material Safety Data Sheet (MSDS) will be available for all onboard hydrocarbons
Sewage discharges	Sewage and grey water will be produced through the routine operation of the vessels.	Temporary and localised water column turbidity, localised nutrient enrichment and toxicity of water, potential negative physiological or behavioural effects to some threatened marine fauna.	• Untreated sewage will be stored onboard and disposed of onshore at a reception facility or to a carrier licensed to receive the waste, or discharged at a distance of more than 12 nautical miles from the nearest land • Treated sewage will be discharged in compliance with Regulation 11 of MARPOL 73/78 Annex IV • Sewage system will be compliant with Regulation 9 of MARPOL 73/78 Annex IV and be maintained in accordance with manufacturer's specifications. If the STP system fails, untreated sewage will be stored onboard while the STP system is being repaired, and only discharged (more than 12 nm from shore) in an emergency situation if storage reaches capacity • Vessel masters will ensure that the maximum carrying capacity of the sewage system is not exceeded. Any vessel carrying more than 15 people is required to have an International Sewage Pollution Prevention Certificate
Food scrap discharges	Food-scraps will be produced through the routine operation of the vessels.	Temporary and localised water column turbidity and potential negative behavioural effects to some threatened marine fauna	• Food waste will be collected, stored, processed and disposed of in accordance with the vessel's garbage or waste management plan. Placards will be displayed vessels to provide guidance on vessel garbage disposal requirements • Offshore food waste disposal in accordance with MARPOL 73/78/97 Annex V including: o Food discharged at least 12 nautical miles from the nearest territorial baseline if unmacerated; or o Food discharged at least 3 nautical miles from the nearest territorial baseline if macerated to 25 mm or less. • Food macerators have the required Annex V MARPOL 73/78/97 approval and maintained in accordance with manufacturer's specifications • All onshore and offshore disposed food waste will be recorded in the vessel's Garbage Record Book • If there is no macerator onboard or macerator equipment breaks down, food will be frozen for disposal at an approved onshore facility
Planned discharges	Planned non-hazardous discharges that will enter the marine environment during the installation activity include cooling water, brine, anti-scalant	Temporary and localised water column turbidity and potential negative behavioural effects to some threatened marine fauna	• Potable water system is scheduled on the PMS and is maintained in accordance with manufacturer's specifications • Engines and machinery will be maintained in accordance with planned maintenance systems and will adhere to manufacturer's maintenance specifications • There will be no scale inhibitors used in the desalination water treatment systems • Chemical (biocide) dosage or anti-scalant chemicals used for cooling systems is maintained at the minimum dosage required to maintain vessel engines and machinery • The vessel masters will ensure that the persons on board do not exceed the stated maximum carrying

Hazard	Cause	Potential Impacts	Risk Treatment Avoidance, Mitigation & Management Measures
	and subsea control fluid.		capacity for the potable water systems • Chemical additives will be packaged, marked, labelled and stowed in accordance with MARPOL 73/98 Annex I, II and III regulations. Specifically, all chemicals (environmentally hazardous) will be stored in appropriately bunded areas • A Material Safety Data Sheet (MSDS) will be available for all onboard chemicals • All crew will be required to attend an environmental induction containing basic information on chemical management, as well as spill prevention, response measures and management of the waste from spill response. An oil spill exercise will be conducted prior to the commencement of the activities and at a minimum of every three months thereafter • Spill clean-up equipment will be located where chemicals and hydrocarbons are stored and frequently handled (i.e. 'high risk' areas) and will be regularly inspected • Chemical spills will be immediately cleaned up and contaminated material will be contained onboard for onshore disposal. All shipboard chemical spills will be managed in accordance with the Shipboard Oil Pollution Emergency Plan (SOPEP) • All vessels will be compliant with MARPOL 78/78/97 Annex I. Vessels over 400 gross tonnage will have a current SOPEP and IOPP certificate • Scupper plugs or equivalent will be available vessel decks where chemicals are stored and frequently handled (i.e.' high risk' areas). Non-hazardous, biodegradable detergents will be used for deck washing • Drip trays will be used under portable equipment • All subsea infrastructure will be pressure (strength) tested in the factory, minimising the offshore testing required to only a system leak test. Pressure will be used to test joint integrity in the field • Chemical additives have the lowest environmental toxicity possible for the purpose
Atmospheric emissions	Combustion fuel from the vessel and fixed and mobile deck equipment engines. The use of fuel to power vessel engines, generators and mobile and fixed plant.	Temporary and localised decrease in air quality, contribution to greenhouse gas loadings.	• Incinerators will be operated in accordance with a manufacturer's operating manual and the incineration of certain substances will be prohibited • Fuel oil will meet regulated sulphur content levels in order to control SOx and particular manner emissions • Vessel engines will be operated in a manner so that regulated NOx emission levels are achieved. To minimise emissions, vessel machinery will be maintained in accordance with the manufacturer's specifications and the vessels planned maintenance system • Vessels will hold a valid and current International Air Pollution Prevention Certificate (IAPPC) • Ozone-depleting substances (ODS) will not be deliberately released in the course of maintaining, servicing, repairing or disposing of systems or equipment. ODS will only be handled by qualified and trained personnel

Hazard	Cause	Potential Impacts	Risk Treatment Avoidance, Mitigation & Management Measures
			• All ODS recorded in ODS Record Book
Noise emissions	Underwater noise generated by vessels, helicopters and positioning transponders within the defined area.	Potential negative physiological or behavioural effects to threatened marine fauna.	• Noise generating engines and equipment is scheduled on the PMS and is maintained in accordance with manufacturer's specifications • Interaction of all vessels with cetaceans and whale sharks will be consistent with *Part 8 of the EPBC regulations 2000*, which for these installation activities includes the following: o A vessel will not travel at greater than 6 knots within 300 m (caution zone) of a cetacean (or whale shark) known to be in the area; o A vessel will not approach closer than 100 m of a cetacean (or whale shark) known to be in the area;. o If a dolphin approaches the vessel or comes within 100 m the vessel master must not change the course or speed of the vessel suddenly • All crew will attend an environmental induction containing basic information on procedures to manage interactions between vessels and marine fauna • Fauna observation kits (including as a minimum binoculars and fauna observation recording sheets) will be available on all vessels to ensure crew have the necessary equipment available to record observations • All cetacean and whale shark sightings will be recorded on the Apache Marine Fauna Sighting Datasheet with data submitted to DSEWPaC • Helicopters will maintain industry accepted horizontal, altitude and hovering exclusion zones. The helicopter exclusion zones will be consistent with the Australian National Guideline for Whale and Dolphin Watching (2005)
Artificial light	Deck floodlights and maritime navigational lighting kept on 24 hours a day for maritime safety purposes for all vessels.	Attraction of fauna such as fish, turtles and migratory birds, leading to possible increased predation.	• Deck lights will be switched off and spot lights directed inboard to reduce light spill onto marine waters unless inconsistent with navigation and vessel safety standards. • Night-time activities will be avoided, if practicable, to reduce direct lighting onto marine waters.
Interference with other users of the sea	500m exclusion zone around the vessels within the defined area.	Temporary loss of fishing area or inconvenience to fishing practices. Fishing gear snags or equipment damage.	• AFMA, Department of Fisheries and commercial fishing stakeholders five days prior to the activity commencing and three days after demobilization • Australian Hydrographic Office (AHO) at least six weeks prior to the activities, which will trigger AHO to issue a Notice to Mariners • Australian Maritime Safety Authority (AMSA) Rescue Coordination Centre (RCC) two weeks prior to the activities, which will trigger RCC to issue an AusCoast Warning

Hazard	Cause	Potential Impacts	Risk Treatment Avoidance, Mitigation & Management Measures
		Navigational hazard and vessel collision.	• Construction and Installation operations will be undertaken in accordance with all marine navigation and vessel safety requirements under the International Convention of the Safety of Life at Sea (SOLAS) 1974 and Navigation Act 1912.For the installation vessel and support vessels, this requires equipment and procedures to comply with AMSA Marine Orders Part 30: Prevention of Collisions and Marine Orders Part 21: Safety of Navigation and Emergency Procedures • Visual observations will be conducted by trained watch keepers on all vessels 24 hours per day

Table 9-2: Environmental risk assessment summary for unplanned events for Coniston Novara Field Development construction and installation.

Hazard	Cause	Potential Impacts	Risk Treatment Avoidance, Mitigation & Management Measures
Fluid release due to damaged Christmas Tree	Damage to tree due to installation of subsea infrastructure	Temporary and localised water column turbidity	• An analysis of all lifts will be completed prior to lifting activities (*Structures lift analysis report & rigging design report CO-35-RG-076*) • Prior to deployment survey calibration of long baseline transponder array (*Survey Positioning and Navigation Procedure CO-35-IU-002*) • Third party verification of installation documentation, including review and approval, prior to commencement of activity • *Boa Sub C* shall only move structures into final location after they have been deployed to a nominal 15 m off seabed; will be use of an array of transponders on the seabed that provides and accuracy for land-out of approximately <0.25m (*Structures installation & metrology procedure CO-35-IG-164*) • During installation analysis, evaluation of ambient weather conditions including currents and sea state (*Structures lift analysis report & rigging design report CO-35-RG-076*) • Visual confirmation of land-out will be made using ROVs (*Structures installation & metrology procedure CO-35-IG-164*) • Prior to commencement of works near Van Gogh producing wells at DC1 (phase II of construction and in installation activities), production activities will cease and flowlines and wells will be flushed with methanol mix prior to commencement of construction and installation activities • Lifting procedures during construction and installation activities include (*Structures installation & metrology procedure CO-35-IG-164*): o No lifting over existing subsea infrastructure, there will be designated safe lifting areas; o Equipment will be lowered to approximately 15m off seabed then walked in to final location; and o Certified lifting equipment. • The preservative fluids selected using the Apache *Environmental Guidelines for Drilling Fluid and Chemical Selection in Activities* (EA-91-II-007) have the lowest environmental toxicity possible for the required purpose

Hazard	Cause	Potential Impacts	Risk Treatment Avoidance, Mitigation & Management Measures
Solid waste discharges	Waste not properly contained.	Marine pollution. Injury or death of marine fauna through ingestion (e.g. flatback turtles) or entanglement	• Non-biodegradable and hazardous wastes will be collected, stored, processed and disposed of in accordance with the vessel's: o Garbage Management Plan as required under Regulation 9 of MARPOL 73/78 Annex V; and o Shipboard Waste Management Plan as required under AMSA Marine Order 95: Marine Pollution Prevention – Garbage. • All crew will be required to attend an environmental induction containing basic information on waste management • Hazardous wastes (e.g. used oils, lithium batteries, chemical and metallic wastes) will be segregated, labelled and stored onboard with secondary containment (e.g. bin located in a bund) • Incinerators will be operated in accordance with a manufacturer's operating manual and the incineration of certain substances will be prohibited (as defined in Regulation 16 (2) in MARPOL 73/78 Annex VI) • Solid non-biodegradable and hazardous wastes that cannot be incinerated will be disposed of onshore at a reception facility or to a carrier licensed to receive the waste if required by jurisdictional legislation
Discharge of treated water	Leak testing of the flowlines.	Marine Pollution Short-term reduction in water quality Toxic effects on marine fauna	• Hydrotest and preservative fluids will be packaged, marked, labelled and stowed in accordance with MARPOL 73/98 Annex I, II and III regulations. Specifically, all chemicals (environmentally hazardous) and hydrocarbons will be stored in appropriately bunded areas. • A Material Safety Data Sheet (MSDS) will be available for all onboard chemicals. • All crew will be required to attend an environmental induction containing basic information on chemical management, as well as spill prevention, response measures and management of the waste from spill response. An oil spill exercise will be conducted prior to the commencement of the activities and at a minimum of every three months thereafter. • Spill clean-up equipment will be located where chemicals and hydrocarbons are stored and frequently handled (i.e. 'high risk' areas) and will be regularly inspected. • Hydrotest and preservative fluids spills will be immediately cleaned up and contaminated material will be contained onboard for onshore disposal. All shipboard chemical spills will be managed in accordance with the Shipboard Oil Pollution Emergency Plan (SOPEP). • All vessels will be compliant with MARPOL 78/78/97 Annex I. Vessels over 400 gross tonnage will have a current SOPEP and IOPP certificate. • All subsea infrastructure will be pressure (strength) tested in the factory, minimising the offshore testing required to only a system leak test. • The hydrotest and preservative fluids have the lowest environmental toxicity possible for the purpose.
Spillage of hydrocarbons and chemicals to	Equipment malfunction, corrosion and inadequate	Short term decrease in surface water quality and subsequent	• All crew will be required to attend an environmental induction containing basic information on chemical and hydrocarbon management, as well as spill prevention and response measures. An oil spill exercise will be conducted prior to the commencement of the construction and installation activities and at a minimum of every three months thereafter

Hazard	Cause	Potential Impacts	Risk Treatment Avoidance, Mitigation & Management Measures
the sea	bunding.	contamination of marine organisms.	• Chemicals and hydrocarbons will be packaged, marked, labelled and stowed in accordance with MARPOL 73/98 Annex III regulations. Specifically, all chemicals (environmentally hazardous) and hydrocarbons will be stored in appropriately bunded areas • A Material Safety Data Sheet (MSDS) will be available for all onboard chemicals and hydrocarbons • Chemical and hydrocarbon storage areas will be frequently inspected (at least weekly) • All vessel machinery will be included on the vessel's PMS and maintained in accordance with manufacturer's specifications • Spill clean-up equipment will be located where chemicals and hydrocarbons are stored and frequently handled (i.e. 'high risk' areas) • Chemical and hydrocarbon spills will be immediately cleaned up and contaminated material will be contained onboard for onshore disposal. All shipboard chemical and hydrocarbon spills will be managed in accordance with the Shipboard Oil Pollution Emergency Plan (SOPEP) and the Coniston Novara Construction and Installation OSCP (EA-00-RI-232/2) • Scupper plugs or equivalent will be available on vessel decks where chemicals and hydrocarbons are stored and frequently handled (i.e.' high risk' areas). Non-hazardous, biodegradable detergents will be used for deck washing. • Marine Diesel Oil compliant with the MARPOL Annex VI Regulation 14.2 (i.e. sulphur content of less than 3.50%m/m) is the only engine fuel recorded on the fuel bunkering register for vessels
Hydrocarbon spill from ruptured vessel fuel tank	Vessel collision	Surface water diesel slick, with death, physiological or behavioural impacts to marine fauna Decrease in surface water quality	• The Australian Hydrographic Office of proposed activity, location (i.e. vessel location) and commencement date to enable a Notice to Mariners to be issued • The AMSA RCC of proposed activity, location (i.e. vessel location) and commencement date to enable a AusCoast warning to be issued • Consultation with other users, e.g. fishing industry • Vessel operations will be undertaken in accordance with all marine navigation and vessel safety requirements under the International Convention of the Safety of Life at Sea (SOLAS) 1974 and Navigation Act 1912. For vessels, this requires equipment and procedures to comply with AMSA Marine Orders Part 30: Prevention of Collisions and Marine Orders Part 21: Safety of Navigation and Emergency Procedures, Marine Orders Parts 3 and 6 – Seagoing Qualifications and Marine Radio Qualifications Marine Orders Part 27 – Radio Equipment • All vessels undergo an International Marine Contractors Association (IMCA), Common Marine Inspection Audit (CMID) inspections to confirm that they meet international HSE and maintenance standards • Surveillance of the 500 m safety exclusion zone to prevent third party vessels colliding with the installation vessel • 24 hour visual, radio and radar watch will be maintained by all vessels • A support vessel will be employed to aid in the detection of other vessels and to provide additional communication with other vessels where necessary. The support vessel will assist in maintaining the 500 m exclusion zone around the installation vessel

Hazard	Cause	Potential Impacts	Risk Treatment Avoidance, Mitigation & Management Measures
			• Marine Diesel Oil compliant with the MARPOL Annex VI Regulation 14.2 is the only engine fuel recorded on the fuel bunkering register for vessels • In the event diesel is released from a vessel due to a ruptured fuel tank, the following tier 2 spill response source control activities would be immediately implemented in accordance with the *Coniston Novara Construction and Installation OSCP (EA-00-RI-232/2*): o Reduce the head of cargo by dropping or pumping the tank contents into an empty or slack tank; o Consider the possibility of pumping water into the leaking tank to create a water cushion to prevent further cargo loss (only if density lower than water); o If the affected tank is not easily identified, reduce the level of the cargo in the tanks in the vicinity of the suspected area if stability of the vessel will not be compromised; o Evaluate the transfer of cargo to other vessels; and/or o Trimming or lightening the vessel to avoid further damage to intact tanks. • Oil spill exercises are conducted prior to the commencement of the installation activity and every 3 months thereafter • Vessel crew will be experienced and competent to standards required by the International Convention of Standards of Training, Certification and Watch-keeping for Seafarers (STCW95) and/ or AMSA marine orders, seagoing qualifications • All crew must attend an environmental induction containing basic information on spill response measures
Hydrocarbon Spill Response	Implementation of hydrocarbon spill response strategies	Increased emissions, light, noise; Reduction in water quality Continued release of hydrocarbon into the pelagic environment, with death or physiological impacts to sensitive species.	Management controls for activities and associated hazards have been previously described above relating to: • Artificial lights and noise associated with response vessels and aircraft • Movement of response vessels to minimise disturbance to marine fauna • Planned discharges from response vessels • Release of air emissions from response vessels and aircraft • Interference with other users of the sea during operation of response vessels • Solid waste releases that may occur from response vessels • Unplanned chemical/hydrocarbon spills that may arise from response vessels Management controls identified for hazing activities include: • Artificial lights and noise associated with response vessels and aircraft • Movement of response vessels to minimise disturbance to marine fauna • Planned discharges from response vessels

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