Otway Phase 3
Geographe Installation Campaign
Environment Plan Summary

S4100AF706613

January 2013

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1. Introduction

Origin Energy Resources Ltd (Origin) is the joint owner and operator of the Otway Phase 3 Project. The project consists of connecting the Geographe gas wells to the existing Otway gas pipeline. Commercial production of gas is planned to start in mid 2013.

An Environment Plan (EP) is in place for the Otway Phase 3 Geographe Installation Campaign [S4200AF704929]. The EP was accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) on 10th January 2013. This EP Summary document summarises the content of the Geographe Installation Campaign EP in accordance with Regulation 11(8) of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009.

Origin has assessed the environmental impacts and risks of the installation activities and believes them to be minor with only low risks identified.

The Otway Phase 3 project is being implemented under Origin Energy Health, Safety and Environment (HSE) Policy and Standards and the HSE Management System (HSEMS). Origin Energy's commitment to environmental protection and biodiversity conservation is expressed in its HSE Policy and Standards. These provide the foundation of its management practices and the operations performance that must be attained by the company and its contractors. The HSEMS is central to implementing those policies and standards supported by ongoing compliance monitoring, auditing and reporting to ensure that any adverse effects from company activities are identified, assessed and as far as reasonably practicable, eliminated or minimised.

2. Geographe Installation Campaign Activity Description

2.1 Background

Origin Energy Resources Ltd together with its Joint Venture partners Toyota Tsusho (Australasia) Pty Ltd and Benaris International Pty Ltd propose to commercially develop the Geographe field. The field is located in Licence Block VIC/P43 in 85 m of water, approximately 55 km offshore Port Campbell, Victoria.

The Geographe field is proposed to be developed by tying the field into the Otway Gas Production Pipeline (OGPP) for production to the Otway Gas Plant (OGP), and controlling the field from the OGP via the existing Thylacine 'A' Wellhead platform (TAWHP).

The Geographe field consists of two subsea wells, which are currently being drilled and completed. This activity was covered by a separate Environment Plan (EP) [OEUP-V9000-PLN-ENV-003]. This EP Summary document covers the installation workscope, which consists of the installation of tie-in piping and equipment to connect the Geographe trees into the Otway pipeline.

Origin has contracted SapuraClough to supply the Normand Clough, an Offshore Installation Vessel, to undertake the installation campaign. The installation campaign activities can be summarised as:-

- Initial preparations
- Installation of subsea structures (a valve skid and two heat exchangers)
- Umbilical installation including pull-in through the TAWHP J-tube and hang off on the TAWHP
- Flexible Flowline installation and tie-in
- Flying Lead installation and tie-in
- Tie-in Spool installation and tie-in
- Tee protection frame installation
- Precommissioning and testing
- Secondary stabilisation as required
- Tee stabilisation
- As Built Survey
- Site clean-up of any debris or items left at the Site

Commissioning (Flowing) of the Geographe trees is not covered by this EP.

The Normand Clough (NC) will be supported in the field by a Hyperbaric Recovery Vessel (HRV). Petroleum exploration and production contributes to the Australian economy by meeting domestic energy demands and international exports. Currently, "*offshore oil and gas makes up over 50% of the economic value of Australia's marine industry and continues to grow, increasing in value by 12% between 2007-08 and 2008-09*" (AIMS, 2010). Economic activity associated with the marine environment contributed an estimated $44 billion (AUD) to the Australian economy between 2007 and 2008 (AIMS 2010).

The development of the Otway Basin is also important to the energy supply of the State of Victoria, where there is a major deficit. Demand for gas in southern Australia is predicted to grow by approximately 40% over the next 15 years (ABARE 2005). Major infrastructure will need to be in place to meet this demand and provide security of supply at competitive prices.

Geographe and Thylacine are significant fields within the Otway Basin that have added to south-eastern Australia's natural gas resources at a time when production is about to decline. Origin estimates that these fields contain sufficient gas to provide for more than 10 % of current annual

demand in south-eastern Australia for at least 10 years and have the potential to operate for much longer.

Origin intends that large amounts of the produced gas be supplied to the Otway Gas plant, and to the Mortlake and Ladbroke Grove power stations. Because the Otway Basin represents the future for Origin in Southern Australia, the company will seek to acquire new permit areas for exploration and development in addition to those that it currently holds.

2.2 Location

The Geographe gas field lies under 85 m of water and will be controlled by the Otway Gas Plant via the Thylacine platform. The Geographe wells are located approximately 55km south of Port Campbell.

The relevant permit or licence areas along with distances to key mainland locations are listed in Table 2.1.

Table 2.1 Geographe Installation Campaign Area Locality

Installation campaign area	Approximate distance from (in kilometres)				
	King Island (km)	Cape Otway (km)	Port Campbell (km)	Warrnambool (km)	Closest point on mainland (km)
Geographe trees (Vic/L23)	99	57	55	90	45
Thylacine A WellHead Platform (TAWHP)	92	72	70	100	60

A locality map of the proposed installation campaign area and a schematic of planned activities are provided in Figure 2-1 and Figure 2-2.

A petroleum safety zone is in place for the Geographe wells and subsea facilities. This prohibits unauthorised vessels from entering the area without the consent in writing from NOPSEMA. A schematic of the exclusion zone including the coordinates of the Geographe wells and pipeline tie-in is provided as Attachment 1.

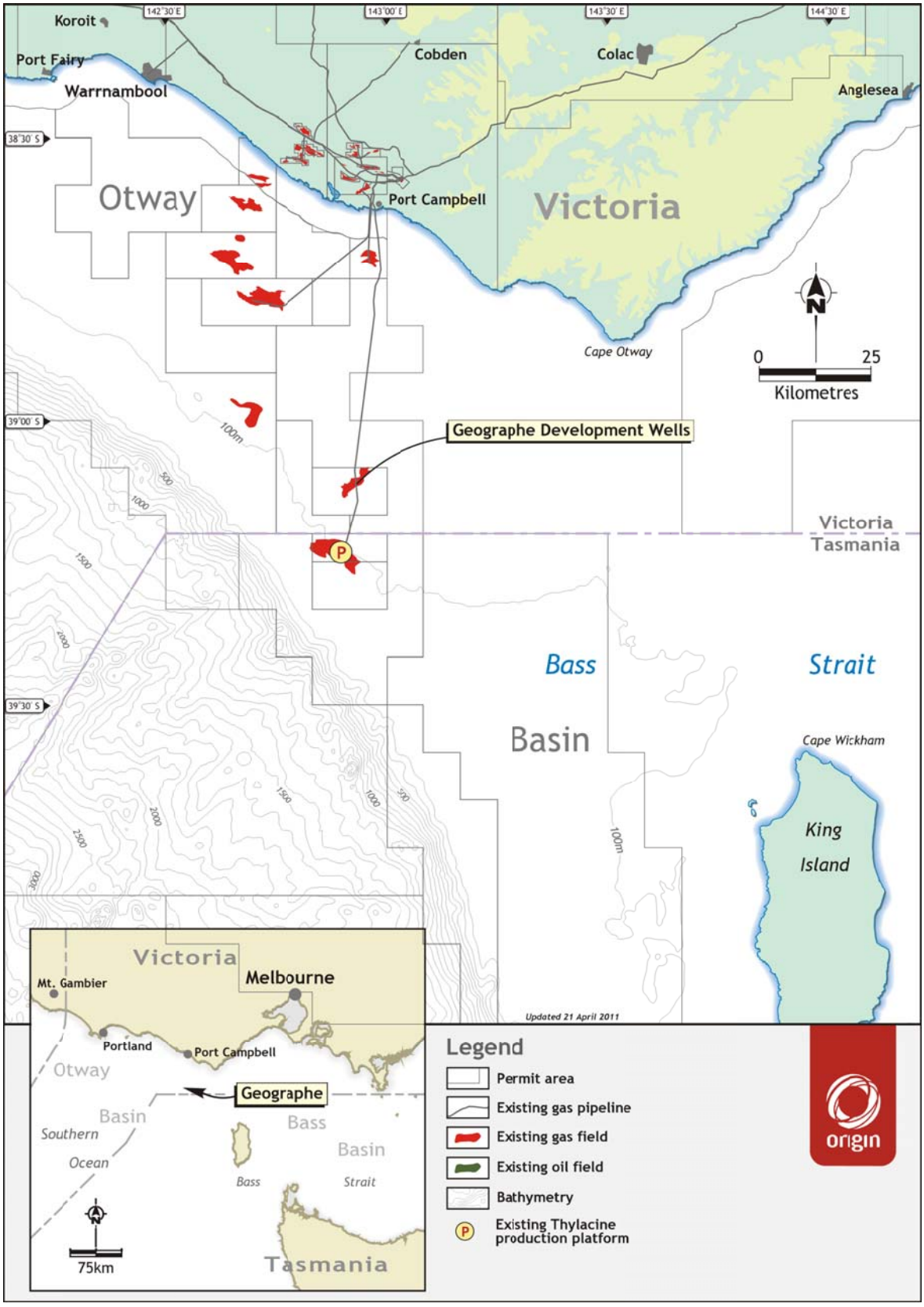


Figure 2-1: Locality Map

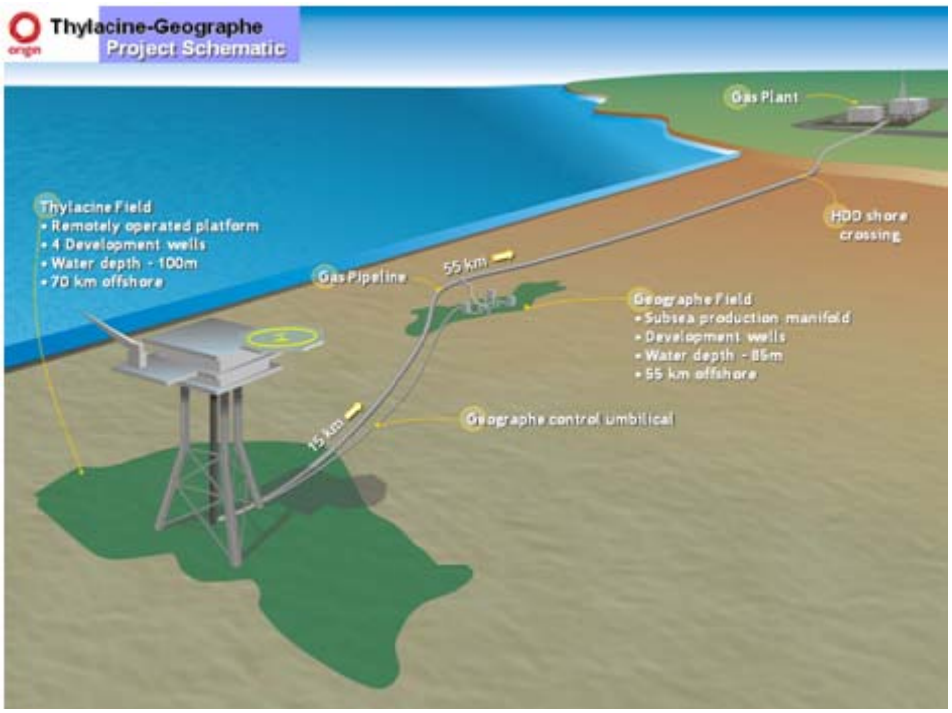


Figure 2-2: Existing and Planned activities

2.3 The Normand Clough

The Normand Clough (NC) is managed by Solstad Shipping AS and operated by Sapura Helix Joint Venture Pty Ltd (SHJV). It is a 117.4m long, DP2 monohull multipurpose diving and offshore installation vessel. It is designed by Marin Teknokk AS, constructed in Norway by Kleven Verft AS in 2008. It is DnV class *+1A1,-SF-EO-DYNOPOS AUTR DK(+) HELDK-S-COMF-V(3) –Clean.*

The vessel has a 250 tonne rated heave compensated crane and a 22.2m diameter helideck. It is equipped with a saturation dive system, 2 x Remotely Operated Vehicles (ROVs), moon pool and accommodation for 120 people.

The vessel will operate under a currently accepted safety case when on location in the Geographe/Thylacine fields. The NC is expected to have operated in Australian waters prior to this campaign.

The NC is expected to be in the field for six to eight weeks. Prior to the start of the campaign, the NC will be loaded with installation equipment and logistics supplies (food, water, diesel) prior to mobilising to the Geographe field. During the campaign, the NC will return to Portland to pick up additional installation equipment, and will take this opportunity to resupply at that time. No offshore refuelling or bunkering will occur in the field.

2.4 Support and Supply Vessels

The NC will be supported by a Hyperbaric Recovery Vessel (HRV). The HRV will comply with all MARPOL and AQIS requirements. The role of the HRV is to support the NC diving activities.

No specific supply vessel is necessary as the NC will return to Portland for refuelling and reprovisioning.

2.5 Helicopters and Aircraft

During the installation campaign, an estimated ten helicopter trips per week will be needed to ferry personnel and equipment to either the NC, or when necessary the TAWHP. The helicopter will be based at and refuelled from Essendon or Warrnambool. Bristow have been contracted to supply helicopter services for the Otway installation campaign. This represents a significant increase in helicopter flights in comparison to normal operations at TAWHP, however this increase will only be sustained for a short period of time.

2.6 Thylacine A Wellhead Platform (TAWHP)

For the majority of the installation campaign the NC will be approximately 15 km distant from the TAWHP. During the campaign the NC will need to approach the TAWHP to assist in the J-tube preparation and umbilical pulling operations that are described in further detail in Section 2.7 below.

The TAWHP is a steel jacket structure with topsides consisting of an integrated deck on four levels. The platform facilities are required to:

- Support four platform wellheads and umbilical connection to the two Geographe subsea wells
- Meter production of gas, condensate and water for each Thylacine well and for the total Platform export stream
- Enable access for wireline interventions to service the Thylacine Platform wells
- Enable occasional pigging of the Production Pipeline to shore.

The platform jacket structure is a four leg fixed template structure with two piles at each leg. The substructure is a steel lattice structure with 3 legs in the upper tower section top and 4 legs at the base. The jacket and topsides have been designed in accordance with API RP 2A- WSD for the specified normal and accidental loads for the design life of 30 years. The platform has been designed to include the combinations of both a 100 year storm condition and a 1 year operating storm condition with topside loadings and has been designed to account for expected field subsidence.

Production from TAWHP is exported to the Otway Gas Plant (OGP) near Port Campbell by a 20 inch subsea pipeline, the Otway Gas Production Pipeline (OGPP). The pipeline was designed and installed with facilities to enable the tie in of the Geographe. A schematic of the field showing the Geographe facilities is included as Figure 2-3.

The J-tube for the umbilical for the Geographe wells is located on the Sub Cellar Deck beside the TA-1 wellhead. Access is through the grating on the Cellar Deck.

The operation of the TAWHP and the pipeline are covered by the Otway Offshore Environment Plan [OEUP-V9000-PLN-ENV-001].

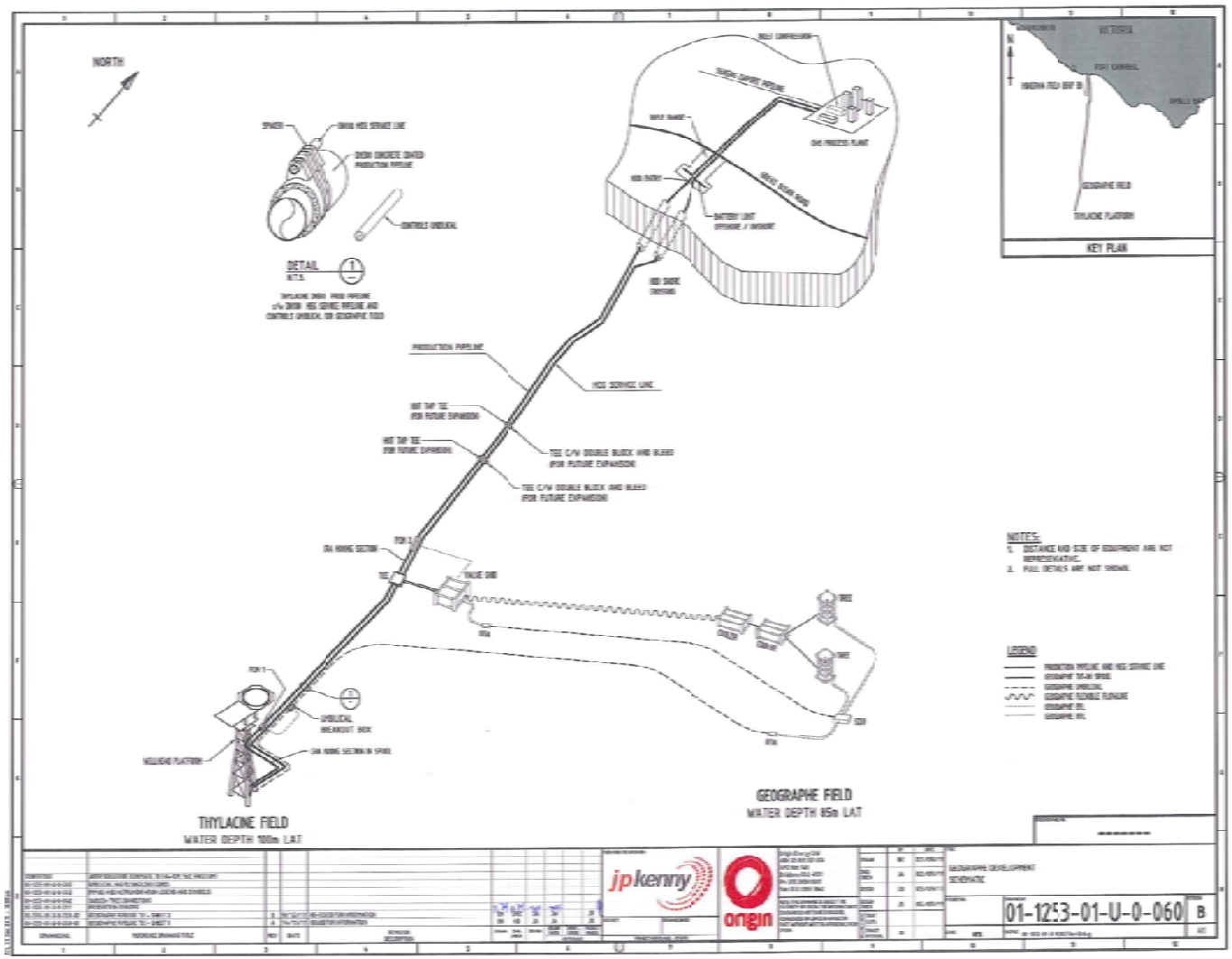


Figure 2-3: Overall schematic of the Otway basin development showing the Geographe field

2.7 Geographe Installation Campaign Activities

The installation campaign activities can be summarised as follows:-

- OGPP Tee preparation
- Installation of subsea structures (a valve skid and two heat exchangers)
- Umbilical installation including pull-in and hangoff on the TAWHP
- Flexible flowline installation and tie-in
- Flying lead installation and tie-in
- Tie-in spool installation and tie-in
- Tee protection frame installation
- Recommissioning and testing
- Secondary stabilisation as required
- OGPP Tee stabilisation
- As Built Survey
- Site clean-up of any debris or items left at the Site

These are described in further detail below. Note the sequence of the activities may be subject to change.

2.7.1 OGPP Tee Preparation

The two existing Geographe tee valves are initially inspected and leak tested using treated (corrosion inhibitor, biocide, oxygen scavenger and dye) 80% MEG solution. Following successful valve testing the blind flanges are removed and the ring groove and sealing surfaces inspected by divers. Any external marine growth on the tee assembly, ROV buckets, valve position indicators etc will be removed by high pressure water jetting or mechanical means.

If the function test fails then the OGPP will have a smart plug inserted downstream of the tee and the pipeline will be back filled with treated potable water. This removes any risk of significant hydrocarbon release. Following completion of the tie-in activity, the treated water would then be pushed back to the TAWHP and appropriately.

The existing Geographe tee protection frame will be unbolted and removed by the NC crane and recovered to the deck.

2.7.2 Subsea Equipment Installation

The following subsea structures will be installed:

- Subsea Valve Skid at the Geographe tee
- Two heat exchanger structures (coolers) at the Geographe Drill Centre

The structures will be installed with gravity foundation bases. No drilling or grouting at the sea bed is expected to be required, based on seabed surveys conducted to date. The seabed at the installation locations is generally flat calcisiltite/calcarenite with a sand covering of 0.2 to 0.5m depth, but has sand 'ripples' across the surface up to a height of 0.2m. These will require levelling prior to landing the structures. This will be achieved using water jetting by either ROV or divers. The structures will be installed in two sections, the foundation 'mudmat' equipped with guideposts, that then allows the exchanger/valve skid to be lowered into position using ROV operable levelling devices. If levelling cannot be achieved by this method, then remedial work may be required to achieve the correct levels and this will involve the use of grout bags.

Tie-in spools connecting the valve skid to the OGPP tee, and the coolers to the existing Geographe subsea tees will then be installed. Installation and connection will be diverless with the use of an ROV, divers will be used for final metrology prior to installation.

2.7.3 Flexible Flowline and Umbilical Installation

Flexible Flowline

The 2km long 280mm ID flexible flowline to connect the valve skid to the coolers will then be installed. This is installed using diverless (ROV) connections. All connections are subject to an appropriate back seal test prior to deployment. The flowlines contain a solution of up to 80% MEG that has been dosed with corrosion inhibitor, oxygen scavenger, dye and biocide.

Main Umbilical

To control and power the Geographe wells and to provide communication to process instrumentation a main umbilical will be installed between the TAWHP and the Geographe well site. The umbilical is approximately 16 km long. A Pipeline Corrosion Monitoring (PCM) breakout box is located 270m from the umbilical pull in head at TAWHP to allow connection of a flying lead to the PCM on the OGPP.

Prior to installing the TAWHP umbilical the TAWHP J-tube needs to be prepared using divers. This involves:

- Disconnecting and capping the Pipeline PCM umbilical from the PCM spool at the TAWHP on the OGPP. Some cleaning of marine growth on the PCM spool may be required (physical means).
- Removing the PCM umbilical and Seal from the J-tube and recover to the TAWHP deck. Cleaning the bellmouth at the bottom of the J-tube using divers with either water jetting or physical means. Cleaning the internal surface of the J-tube using scrapper or brush pig.
- A gauge check of the J-tube will be performed with a dummy pull-in head to ensure that the umbilical and umbilical pulling head will pass through the J-tube without obstruction.
- Sandbags on the platform tie-in spool will be removed as necessary to avoid interference between the umbilicals.

The main umbilical is then pulled in through the platform J-tube using a winch located on the TAWHP. The J-tube will then be resealed (using divers) and filled with treated water. The umbilical is then laid along the route from the TAWHP to the Umbilical Terminal Assembly (UTA) at the Geographe well site using the NC. The umbilical is laid in two sections, with the inter-umbilical connection being made up on the NC. Any span rectification will be performed using concrete grout bags. Once laid, the umbilical is tested prior to hookup. The umbilical will be laid with hydraulic fluid, HW 443 and MEG filling the main cores.

Infield Umbilical and PCM Cable

The infield umbilical providing control, power and communication to the valve skid and also providing a flow path for MEG injection to the well site is then laid between the UTA and the Subsea Distribution Unit (SDU). This umbilical is approximately 2km long and will be installed in one piece. Any span rectification will be performed using concrete grout bags.

The infield PCM cable is then tied into the PCM spool downstream of the Geographe tee on the OGPP and the UTA on the infield umbilical near the Geographe tee.

2.7.4 Flying Lead Installation

To allow umbilical connections to occur, the flying leads (electrical and hydraulic) need to be installed. These flying leads include EFLs (Electrical Flying Leads) and HFLs (Hydraulic flying Leads) between the SDU and the trees, SDU and UTA, UTA and subsea valve skid, and trees and the temperature gauge located on the heat exchanger structure. All flying leads tie-ins have ROV mateable connectors.

Where required flying leads will be stabilised and this is likely to be by using grout bags approximately every 5 to 6m giving a total of 200 stabilisation locations or concrete mattresses placed along the length of the flying lead.

2.7.5 Tie-in Spool Installation

The following tie-in spools will be installed:

- Two production tie-in spools between the trees and the first comingling heat exchanger
- One production tie-in spool between the heat exchangers
- One production tie-in spool between the valve skid and the Geographe production tee on the OGPP
- One MEG tie-in spool between the valve skid and the Geographe MEG tee on MEG line piggybacked to the OGPP

The production and MEG spools at the Geographe tee have flange connections and shall be made up using divers. All other spools shall have diverless connectors.

The Geographe tee production and MEG tie-in spools will be leak tested immediately after they are installed. All spools contain up to 80% dosed MEG solution.

2.7.6 Tee Protection Frame Supply and Installation

A new protection frame will then be installed after the tie-in spools have been connected to the tee using the NC crane.

2.7.7 Concrete Mattress Supply and Installation

A total of approximately 40 concrete mattresses may be installed to stabilise the umbilical and flexible flowlines.

2.7.8 OGPP Tee Stabilisation

The Otway Gas Production Pipeline (OGPP) will then be stabilised and restrained at the existing Geographe tee. This is likely to be by installing rock bolts to pin the pipeline. This involves anchoring the pipeline in four locations. At each location rock bolts may be drilled into the sea bed with two pairs of chains to restrain the pipeline on either side of the existing tee connection piece. These bolts are of approximate diameter 219mm and penetrate the sea bed by up to 3.5 metres. The drilling will be monitored by divers supported from the NC.

The rock bolts would be installed using a dual mast rock bolting rig which is capable of drilling and grouting the twin rock bolts simultaneously. The drill rig will be overboarded from the NC using the NC crane with divers guiding the landing to the sea bed over the OGPP. The drill rig will be levelled using its four stabilising legs, and the crane disconnected. The preloaded drilling heads will then be engaged and the rock bolts drilled to the required depth. The drill head is lubricated/cooled by circulating water. Grout mixture is then pumped to the rock bolts until positive returns are noted. The drill rig is then moved to the next rock bolt location by the NC crane.

The location for rock bolts has been selected based upon a seabed survey where there is minimal sand cover to reduce the potential for scour. The rock bolts are located at a 100-140mm distance from the pipeline.

2.7.9 Testing and Precommissioning

Production System

Following installation, leak testing of the spool pieces, structures and flowlines will be undertaken. The test medium will be a dosed mixture of up to 80% MEG. An appropriate dye shall also be used in the test medium to identify any leaks, if they occur.

Umbilicals

During umbilical installation the electric cables and hydraulic hoses in the umbilical will be tested. These tests involve pressure testing of the hydraulic hoses and a full range of electric tests for the electrical cables.

2.7.10 As-Built Survey and Testing

The as-built survey includes:

- A visual survey (ROV) of all installed components
- Measurements of as-built configurations and locations of installed components

Once installation is complete pressure tests will be performed on the umbilical system from the TAWHP, and a complete function test of valves will also be completed.

Once all tests and preparatory activities have been performed the ROV operable valves will be opened on the Geographe tee and trees. The system will be handed over to the operations group to allow commissioning of the Geographe trees to occur, the wells will not be flowed prior to commissioning. Commissioning and operational activities will be covered by a separate EP.

2.7.11 Site Clean Up

Prior to completion, all temporary materials, construction equipment and surplus materials associated with the work will be removed. While at sea, no debris shall be dumped overboard but will be disposed of in accordance with statutory requirements/regulations. The NC Marine Operation Manual includes procedures for the disposal of waste, including food waste.

3 Description of Receiving Environment

The Otway Basin is characterised by high wave energy and cold temperature waters subject to upwelling events around the continental shelf margin. The nutrient enrichment associated with these upwelling events plays an important role in the generation of plankton blooms and the associated aggregation of other marine species as well as the structure of the ocean floor as the continental shelf transitions to the coastal mainland.

The Zone of Potential Impact (ZPI) for the installation campaign can be described the area around the Geographe trees, the tie-in tee to the OGPP, the TAWHP, the pipeline at the Geographe tee, and the surrounding ocean for a distance of 70km including the coastline stretching from Cape Otway through to Apollo Bay.

The Bass Strait and Otway Basin are known for the complex, high energy wave climate and strong ocean currents, and is a migratory path for a number of EPBC Act listed species. The existing environment of the proposed activities is described in the following sections.

3.1 Physical Environment

The Geographe installation campaign area is located in the Otway Basin, on the western fringe of Bass Strait: a cool temperate region with cold, wet winters and warm dry summers.

Winds in the eastern Otway and western Bass Strait are generally strong, with average speeds of 15 knots (8 m/s) and maximum recorded speeds of 45 knots (23m/s). Bass Strait is located on the northern edge of the westerly wind belt known as the Roaring forties. The data indicated that wind speeds are typically in the range of 12 to 45 knots (or ~6 to 23 m/s). The wind direction is predominantly easterly during summer when the installation campaign is planned, and westerly in the winter months (average: 15 knots and maximum: 45 knots).

Waves are also predominantly south-westerly to westerly and the largest occur during winter months when mean heights range from 3.1m to 3.7m and maximum heights are between 7.6m and 10.3m. Wave heights in the summer months average between 2.5m and 3.0m, and maximum heights range between 5.6m and 7.7m.

3.1.1 Tides and Currents

The tidal range within the Geographe campaign area is estimated to be 1.0m at spring tides (those with the greatest range) and 0.2m at neap tides (those with the smallest range).

Currents in the Otway region are typically wind-driven, due to the regional bathymetry. The orientation of the Victorian coastline cause wind systems to blow eastward, and promotes exchange between continental and oceanic air masses. In summer a high-pressure ridge settles over the South Australian Basin and along the Great Australian Bight and induces a consistent south-easterly wind pattern. In winter, the winds move northward over central Australia and result in mainly westerly winds. Despite seasonal changes, a consistent positive wind pressure throughout the year over the South Australian Basin drives permanent deep-sea water movement along the coastline.

In addition to the Bass Strait currents, local, mostly westerly winds along the Victorian coast produce local currents, particularly when they blow strongly, this is most of the time.

Currents within the Geographe campaign area are mostly from the south-southwest and south-southeast in winter and from the north-northwest (with some from the south-southeast) during summer. At spring tides, the maximum current speed, averaged over the water depth, is approximately 0.35 m/s. During a storm, the currents are stronger, and the maximum current speed, combining the tides and weather-driven currents, is estimated to reach 1 m/s for a 100-year return interval.

3.1.2 Waves

There are two principal sources of wave energy in the Otway Basin:

- from the westerly swell from the Great Australian Bight and Southern Ocean
- from locally generated winds, mostly from the west and southwest.

The Otway area is fully exposed to westerly swell from the Great Australian Bight and Southern Ocean. The largest waves are associated with eastward-moving low pressure and frontal systems that cross the site every 4 to 6 days in winter. In such conditions it not uncommon for waves with a height in excess of 10 m to be generated, albeit less frequently in summer. The main direction for wave energy is from the west to south west and the periods are typically in the range of 8s to 20s.

The wave climate is primarily derived from locally generated wind mostly from the west and southwest. Wave heights from these winds generally range from 1.5m to 2m with periods of 8s - 13s, although waves heights of 5m – 7m can occur during storm events. The 100-year average recurrence interval (ARI) for waves near the Geographe campaign area has a maximum significant wave height of 8.3m with a period of 12s from a west to west-northwest direction. Maximum significant wave heights for 1-year and 10-year ARI's were 6.7m and 7.4m respectively. Smaller 100-year ARI maximum significant wave heights (range of 4.4m - 7.4m and periods of 7.6s - 10.2s) have been estimated for non-critical directions. A directional spread of wave energy within the campaign area can be assumed as 25 degrees.

3.1.3 Water Temperature

The waters of the Otway are cool-temperate, with mean sea surface temperatures ranging from 14ºC in winter to 19ºC in summer. Intrusions of cooler nutrient rich water occur along the seafloor during mid to late summer, although this is usually masked in satellite images by a warmer surface layer. The boundary with cooler 15ºC water occurs at a depth of 30m in December, and moves to 100m in May. It is then rapidly destroyed when mixing occurs during winter months. The cooler water is an extension of the regional Bonney Upwelling system, which is an eastward flow of nutrient rich water across the continental shelf of the southern coast of Australia during the summer months. It is a result of south-east winds pushing surface water layers offshore with a compensatory intrusion of colder nutrient rich water along the bottom.

Prevailing winds in Bass Strait and the Otway Basin support a well-mixed water column to 80m deep particularly during autumn and through to spring. Near-surface water temperatures at these times range from between 15°C and 18°C with a similar spread of water temperatures throughout the water column. In warmer months some thermal stratification can occur, particularly during calmer periods. Annually, water temperatures range from a minimum of about 10.5°C near the seabed in winter to a maximum of more than 21°C at the surface in summer.

3.1.4 Seabed and Sedimentation

The seafloor in the installation area is at depths of 85m to 100m located near the outer edge of the slope of the Australian Continental Shelf, centred approximately 70km south of Port Campbell (Otway historical studies Woodside bathymetry and video footage).

Mainland Tasmania and the Bass Strait islands belong to the same continental landmass as mainland Australia. The continental shelf is narrow along the east coast of Tasmania but broadens in the northwest, underlying Bass Strait and the Otway and Gippsland basins. The central portion of Bass Strait contains a depression that exchanges water with the ocean to the north of King Island. The Bassian Plain is the main seafloor feature of Bass Strait; a ridge along the western edge of this plain extends from King Island to northwest Tasmania.

The Western Bass Strait Shelf Transition region has a sloping offshore gradient, dominated by bio-clastic carbonate sediments. Adjacent to King Island, Palaeozoic granite and associated sediments dominate the offshore environment. The characteristics of the coastline and marine environment of this region include very steep to moderate offshore gradients, high wave energy and cold temperature waters subject to upwelling events.

The seabed sediment in the installation area consists of calcarenite, limestone, sandstone, marl and granite, with areas of sand of varying grain size.

3.2 Biological Environment

The Otway Environment Effects Statement/Environmental Impact Statement provides an extensive description of the marine environment and biodiversity within the Otway basin and that is proximal to the Geographe infrastructure.

Bathymetric maps indicate that the seafloor is gently sloping, dropping gradually from 85m at the Geographe Tee to water depths of about 100 metres at the Thylacine platform site. Seabed surveys conducted in the vicinity of the Geographe wells and along the flowline route indicate that the seabed is comprised of shallow sandy sediments over a very hard calcerite seabed, no features such as active shelves or reef systems were identified.

There are no marine reserves, World Heritage properties, or areas listed or nominated on the Register of the National Estate, Australian (Ramsar) Wetlands Database or historic shipwrecks near the Geographe facilities.

Species of whales, dolphins, fur seals, birds, turtles, sharks, pipefishes and pipehorses listed under the Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act 1999 may migrate or move through the project area. The Bonny Upwelling is close and this provides a feeding area for Blue Whales and Southern Right Whales also frequent the inshore area along the coast. However based on the risk assessment and the oil spill modelling, the installation activities are not expected to have any significant impact.

The project is located within zones of several Commonwealth and Victorian commercial fisheries but very little fishing is undertaken in the area of the Geographe offshore facilities. A major Australian shipping lane passes the Geographe location but the impact from installation activities is considered minor, during the 4 months of the drilling campaign no vessels have encroached the petroleum safety zone.

4 Environmental Impact Assessment

To satisfy the requirements of the EPBC Act, the original EES/EIS for the Otway Gas project identified the potential environmental effects and risks from Thylacine and Geographe construction and operational activities. In summary, the EES/EIS indicated there would be minor, localised effects to the biota at and near the locations during installation.

A systematic process of hazard identification and risk assessment was completed in order to review the impacts and risk to the environment from the Geographe Installation Campaign. Through the implementation of specific control measures to prevent or mitigate the environment impacts, risks to the existing environment from the installation activities are As Low As Reasonably Practicable (ALARP). The environmental impacts and risks are summarised in Table 4-1.

Table 4-1 Environmental Risk Assessment Summary

Risk ID	Hazard	Potential Impact	Risk with no project specific controls in place			Key Control Measures and other considerations	Risk with controls in place		
			Consequence	Likelihood	Inherent Risk		Consequence	Likelihood	Residual Risk
Routine Impacts									
R1	Physical presence of the installation vessels	Impact on the fishing industry or maritime users-e.g. limited access to fishing area, nets entangling in installation equipment	1	3	Low	• Short campaign duration • Geographe field not in major fishing area or shipping lane • Navaids and watch keeping • Geographe subsea installation safety zone marked on navigation charts • Fisheries consultation shows minimal direct impact on fishermen or access to grounds • Communication to relevant fishing operators in the location • Engagement of a Fisheries Liaisons Officer with practical and academic fisheries experience in the region to consult with fishermen and provide them with co-ordinates of facilities • Fisheries Management Plan with formal grievance procedure for genuine/validated losses incurred • Notice to mariners • Emergency response arrangements in the event of an approaching vessel	1	2	Low
R2	Light emissions from the vessels	Disruption to/disorientation of migrating birds and other marine life that may be attracted to lighting from the vessels.	1	3	Low	• Any migrating birds that become confused by the lighting will have somewhere to land and rest until daylight, and induction training to not disturb wildlife that may have landed • Short campaign duration • Lighting levels required to maintain platform safety and to comply with navigational requirements.	1	2	Low

Risk ID	Hazard	Potential Impact	Risk with no project specific controls in place			Key Control Measures and other considerations	Risk with controls in place		
			Consequence	Likelihood	Inherent Risk		Consequence	Likelihood	Residual Risk
R3	Noise from the installation vessels and activities	• Behavioural change in marine fauna (localised avoidance/attraction) • Hearing impairment and pathological damage to marine fauna (from acoustic related vibration) • Increase stress levels in marine fauna • Disruption to marine fauna underwater acoustic cues • Secondary ecological effects – alteration of predator prey relationship	1	2	Low	• Noise levels on the vessel have been assessed and minimised as far as practical for OH&S reasons • Compliance with the Australian National Guidelines for Whale and Dolphin Watching for Vessels (approach distance minimised) • Preventative maintenance of major noise generators - The NC has a PC based spare parts and maintenance system of type 'TM Master'. The maintenance system is interfaced to rotating equipments (motors, thrusters gear etc) above 10 kW, in order to monitor running hours. • Competency training, records and inductions managed by SapuraClough • Origin HSEMS Standard 13 Contractor selection, management and monitoring • No evidence that vessel noise unduly impacts cetacean population. • Noise from vessels considered to be not significant in comparison to other vessels that pass the area <u>Additional controls considered but rejected:-</u> Installation using moored vessels requires changing anchor spreads with associated seabed impact, not considered practical for short duration activities.	1	2	Low

Risk ID	Hazard	Potential Impact	Risk with no project specific controls in place			Key Control Measures and other considerations	Risk with controls in place		
			Consequence	Likelihood	Inherent Risk		Consequence	Likelihood	Residual Risk
R4	Noise from the helicopter operations	• Behavioural change in marine fauna (localised avoidance/attraction) • Hearing impartment and pathological damage to marine fauna • Increase stress levels in marine fauna • Disruption to marine fauna underwater acoustic cues • Secondary ecological effects – alteration of predator prey relationship	1	2	Low	• Compliance with the *Australian National Guidelines for Whale and Dolphin Watching* for Helicopters • Helicopter flight paths and elevation minimises noise levels at sea surface. • No evidence that helicopter noise unduly impacts the resident seal population at nearby facilities. • Short term intermittent helicopter use exposing cetaceans only to short term limited disturbance <u>Additional controls considered but rejected:-</u> Helicopters are used for transferring personnel to and from the TAWHP or vessels. The safety risk of boat to boat transfer using either pilot ladder or basket transfer using the vessel cranes in open seas is considered to be higher than helicopter safety risks; no other form of transfer is possible.	1	2	Low
R5	Seabed interference	Physical damage to the sea floor and benthic environment	2	2	Low	• Highly localised impact • Historical evidence suggests benthic communities rapidly recolonise any disturbed areas • Use of dynamic position (DP) rather than anchors • Zone affected is of low sensitivity • Installation Procedure	1	2	Low

Risk ID	Hazard	Potential Impact	Risk with no project specific controls in place			Key Control Measures and other considerations	Risk with controls in place		
			Consequence	Likelihood	Inherent Risk		Consequence	Likelihood	Residual Risk
R6	Domestic and sanitary wastes, primarily sanitary waste (sewerage) and grey water.	Localised increase in nutrient loading/biological oxygen demand	1	1	Low	• Sewage treated in MARPOL/USCG compliant system prior to disposal to sea • High energy marine environment with significant current flow, water depth (Natural dispersion achieved) • There are no sensitive marine ecosystems in the vicinity of the installation <u>Additional controls considered but rejected:</u> Remove all sewage and macerated waste to shore. Rejected as this would require additional vessel visits with commensurate increase in diesel usage and exhaust emissions. Also requires temporary storage on the facility which introduces hygiene issues. This is not supported by site personnel. It is not in accordance with standard practice and introduces additional environmental and health risks.	1	1	Low
R7	Putrescibles wastes (Galley wastes discharged via a macerator)	Localised increase in nutrient loading/biological oxygen demand	1	1	Low	• Food waste macerated prior to disposal to sea • High energy marine environment with significant current flow, water depth (Natural dispersion achieved) • There are no sensitive marine ecosystems in the vicinity of the installation <u>Additional controls considered but rejected:</u> Remove all food waste to shore. Rejected as this would require additional vessel visits with commensurate increase in diesel usage and exhaust emissions. Also requires temporary storage on the facility which introduces hygiene issues. This is not supported by site personnel. It is not in accordance with standard practice and introduces additional environmental and health risks.	1	1	Low

Risk ID	Hazard	Potential Impact	Risk with no project specific controls in place			Key Control Measures and other considerations	Risk with controls in place		
			Consequence	Likelihood	Inherent Risk		Consequence	Likelihood	Residual Risk
R8	Discharge of cooling Water	Temporary and localised temperature increase in the water column with impact on marine biota	2	1	Low	• Short campaign duration • Cooling water is seawater • Cooling water temperature is only a few degrees above ambient conditions and high energy marine environment promoting rapid temperature equilibration to ambient. • Preventative maintenance to ensure equipment not running 'hot' -the NC has a PC based spare parts and maintenance system of type 'TM Master'. The maintenance system is interfaced to rotating equipments (motors, thrusters gear etc) above 10 kW in order to monitor running hours.	1	1	Low
R9	Reverse Osmosis Unit discharge	Localised increase in salinity in the water column	1	1	Low	• Short campaign duration • High energy marine environment promoting rapid dispersion of saline solution in seawater • Preventative maintenance of Reverse Osmosis (RO) unit to ensure running efficiently - The NC has a PC based spare parts and maintenance system of type 'TM Master'. • Back flushing procedures as per the automated logic system <u>Additional controls considered but rejected:</u> Replacing the RO unit with a supply of freshwater from shore was rejected because of the logistics and energy use involved in shipping fresh water out to the vessels would have a greater environmental impact (diesel usage, emissions) than use of an RO unit	1	1	Low

Risk ID	Hazard	Potential Impact	Risk with no project specific controls in place			Key Control Measures and other considerations	Risk with controls in place		
			Consequence	Likelihood	Inherent Risk		Consequence	Likelihood	Residual Risk
R10	Atmospheric emissions from combustion engines	Decline in air quality / air pollution, contributions to global warming	1	2	Low	• The tie-in of the Geographe facilities will provide continued gas supply to southern Australia. The utilisation of gas in preference to coal provides a significant environmental benefit in terms of greenhouse gas emissions. Over the life of the Geographe well there will be net reduction in atmospheric emissions when compared with generating the same energy from coal. • Preventative maintenance - the NC has a PC based spare parts and maintenance system of type 'TM Master'. The maintenance system is interfaced to rotating equipments (motors, thrusters gear etc) above 10 kW, in order to monitor running hours. • Short campaign duration • MARPOL 73/78: Air pollution prevention certificate – certified to comply with emission standards and use low sulphur fuel • NC exhaust emissions are measured daily and registered to unisea 14001 emission control • Logisitics planning minimises vessel and helicopter movements • Solstad shipping 'Greenmaster' system	1	1	Low

Risk ID	Hazard	Potential Impact	Risk with no project specific controls in place			Key Control Measures and other considerations	Risk with controls in place		
			Consequence	Likelihood	Inherent Risk		Consequence	Likelihood	Residual Risk
Non-routine impacts									
N1	Release of Mono ethylene glycol (MEG) during installation activities	Localised impact on marine life	1	4	Medium	• MEG is a category 'E' OCNS chemical, readily biodegradable and low potential for bioaccumulation • Design of fittings reduces MEG released to negligible quantities • Origin installation procedures minimise potential for release • Competency training, records and inductions managed by SapuraClough • Origin HSEMS Standard 13 Contractor selection, management and monitoring • Selection of materials for the marine environment <u>Additional controls considered but rejected:</u> Not using MEG solution in spool pieces would result in seawater ingress to piping and potential for corrosion and loss of equipment integrity with greater safety and environmental impact, also required to deal with any hydrates formed during startup of the trees so inert gas cannot be used as an alternative.	1	1	Low
N2	Loss of Solid wastes	Discharge of waste materials into the marine environment and impact on marine species.	2	4	Medium	• Discharge of solid wastes under MARPOL prohibited • All wastes segregated and disposed of onshore in accordance with Solstad Shipping waste management procedure • Competency training, records and inductions managed by SapuraClough • Origin HSEMS Standard 13 Contractor selection, management and monitoring <u>Additional controls considered but rejected:</u> The use of water coolers rather than bottled water has been adopted. This will minimise plastic waste.	1	2	Low

Risk ID	Hazard	Potential Impact	Risk with no project specific controls in place			Key Control Measures and other considerations	Risk with controls in place		
			Consequence	Likelihood	Inherent Risk		Consequence	Likelihood	Residual Risk
N3	Loss of Hazardous wastes	Discharge of chemicals into the marine environment and impact on marine species.	1	4	Med	• The NC has a limited inventory of chemicals • All wastes segregated and disposed of onshore in accordance with Solstad Shipping waste management procedure (Appendix H) • Det Norske Veritas DNV rated containers • Competency training, records and inductions managed by SapuraClough • Origin HSEMS Standard 13 Contractor selection, management and monitoring	1	2	Low
N4	Deck drainage overboard	Discharge of chemicals / oil into the marine environment and impact on marine species.	1	4	Med	• All spills directed to isolated bilge system • Bilge has oil in water separator and oil in water analyser, maintained in accordance with the TM master system • Equipment provided with drip trays which drain to dirty oil tank • All discharges monitored and recorded • No bilge discharge whilst in field • Competency training, records and inductions managed by SapuraClough • Origin HSEMS Standard 13 Contractor selection, management and monitoring • Spill kits located on deck	1	3	Low
N5	Release of refrigerant due to equipment failure	Release of ozone depleting chemicals into the atmosphere	3	1	Low	• No ozone depleting refrigerant used on board	N/C	N/C	N/C

Risk ID	Hazard	Potential Impact	Risk with no project specific controls in place			Key Control Measures and other considerations	Risk with controls in place		
			Consequence	Likelihood	Inherent Risk		Consequence	Likelihood	Residual Risk
N6	ROV or diver operated hydraulic tools	Release of hydraulic fluid into marine environment on equipment failure	2	2	Low	• Pre-dive checks and hose management as per Origin recommendations • Preventative maintenance system – TM master • Competency training, records and inductions managed by SapuraClough • Origin HSEMS Standard 13 Contractor selection, management and monitoring • Installation Procedure	2	1	Low
N7	Umbilical leak leading to release of hydraulic fluid	Release of hydraulic fluid into marine environment	1	2	Med	• Selection of hydraulic fluid • Installation procedures to minimise need for, and quantity released • Competency training, records and inductions managed by SapuraClough • Origin HSEMS Standard 13 Contractor selection, management and monitoring	1	1	Low
N8	Release of treated water from J-tube during umbilical installation	Small quantity of contaminated water released to the marine environment	1	2	Low	• Selection of chemicals for the marine environment • Limited discharge – J-tube contents only • Testing of J-tube contents suggests presence of biocide only. • Installation Procedure	1	2	Low
N9	Release of treated water from pipeline flooding operations	Release of contaminated water to the marine environment			N/C	This contingency has been designed to ensure that contaminated water can be pushed through the pipeline for treatment onshore, rather than release into the marine environment. Hazard is therefore no longer credible			N/C
N10	Release of grout to the marine environment	Temporary disturbance of benthic communities, temporary loss of visibility, localised mortality to benthic communities	1	2	Low	• Inert product – material selection • Rock bolting procedures and grout bag installation procedures • Training and experience of team undertaking work • Origin HSEMS Standard 13 Contractor selection, management and monitoring	1	2	Low

Risk ID	Hazard	Potential Impact	Risk with no project specific controls in place			Key Control Measures and other considerations	Risk with controls in place		
			Consequence	Likelihood	Inherent Risk		Consequence	Likelihood	Residual Risk
N11	Marine biofouling on hull or in ballast water	Introduction of invasive marine species	3	4	Med	• NC mobilised from Portland, as there are no invasive species in Portland that pose a risk to the Geographe location • Vessel has AQIS certificate • Vessel to comply with ballast management procedures –	3	1	Low
Hydrocarbon events									
H1	Release from OGPP or Geographe wells	▪ Loss of gas and condensate into the marine environment ▪ Shoreline hydrocarbon impacts	2	3	Med	• Loss of gas from the Geographe trees is not credible during the installation phase as these trees are isolated sub surface by an ROV operable manual isolation valve in addition to the SSSV and tree isolation valves • Rigging certification and other lifting controls • Contractor selection • Approved installation procedures, minimise height of lift over pipeline preventative control • Training and competency • Offset of vessel during lifts • OSCP and ERP – mitigative control	2	1	Low
H2	Diesel spill during refuelling	▪ Loss of fuel oil into the marine environment	2	3	Med	• No offshore refuelling will take place	N/C	N/C	N/C

Risk ID	Hazard	Potential Impact	Risk with no project specific controls in place			Key Control Measures and other considerations	Risk with controls in place		
			Consequence	Likelihood	Inherent Risk		Consequence	Likelihood	Residual Risk
H3	Diesel spill – vessel collision/foundering	▪ Loss of fuel oil into the marine environment ▪ Shoreline hydrocarbon impacts	3	3	Med	• Vessel's bridge manned at all times • Vessels equipped with Automatic Identification System (AIS) • Vessel navigation lighting in place as per class certification • Position of installation gazetted and notice to mariners provided • Local stakeholders informed of installation location and duration • Multiple fuel tanks in place on supply vessels to minimise consequence of collision • Emergency Response Plans and arrangements • Oil Spill Contingency Plan in place • Oil Spill Response training drills	3	1	Low

Note: N/C denotes "Not credible"

5 Environment Management

5.1 Origin Corporate Environment Policy

Origin's Health, Safety and Environment (HSE) Policy provides a public statement of the company's commitment to minimise adverse effects on the environment and to improve environmental performance continuously.

Origin commits to:

- Eliminate or manage hazards and practices that could cause accident, injury or illness to people, damage to property or unacceptable impacts on the environment.
- Assist all employees to meet their health, safety and environment obligations; and
- Conduct all activities in recognition of short and long term economic, environmental and community considerations.

This commitment is backed by Origin's HSE policy which requires:

- Integrating HSE management into the planning and operation of all Origin Energy's businesses.
- Allocating clear lines of accountability to implement HSE policy and communicate effectively the principles by which Origin Energy operates.
- Providing systems to identify, classify, assess, control and review HSE risks in all areas.
- Establishing and communicating documented processes to control risks and effectively manage incidents.
- Ensuring that adequate human resources, with appropriate training and qualifications, are provided to manage, maintain and implement HSE systems and controls.
- Developing, implementing and maintaining systems for work procedures that will be reviewed regularly as appropriate.
- Ensuring communication channels are available to provide staff with relevant HSE information;
- Measuring, monitoring and reviewing HSE performance, maintaining records and reporting results to senior management, relevant authorities and other stakeholders.
- Ensuring that procedures for the purchase or supply of goods or services address HSE principles and requirements.
- Ensuring that contractors comply with the HSE standards and requirements.
- Taking all necessary steps to minimise the impact of an environmental event; and
- Taking opportunities to reduce waste and greenhouse gas emissions, conserve energy and recycle materials.

Origin (and its contractors) also operates under the Origin Corporate HSE Management System (HSEMS) to minimise and manage the impacts on employees, contractors, the environment and the communities in which the company operates. The Origin HSEMS has been developed in accordance with Australian/New Zealand Standard ISO 14001:2004 Environmental Management Systems.

Origin's focus on improving environmental management practices are supported by business unit and site level Health, Safety and Environment plans that outline specific strategies to manage energy efficiency, greenhouse gas emissions, waste, water and, where applicable, land within a specific locality and context. They are however, implemented within the overall framework of the Origin Corporate HSEMS.

The Origin Corporate HSEMS ensures that environmental incidents and non-compliances are identified and reported to management and regulators as required and that there is a constant focus on improving management practices to reduce environmental impacts. Where incidents involving regulatory non-compliance are reported the level of routine auditing of HSE procedures will be reviewed and increased as required.

5.2 Performance Objectives, Standards and Measurement Criteria

Origin has identified a number of environmental performance objectives, environmental performance standards, and measurement criteria to address sources of risks identified for the Geographe Installation Campaign.

An implementation strategy is in place to review and manage activities so that environmental impacts and risk are continually being reduced to ALARP and performance objectives and standards are met for the duration of the Geographe Installation Campaign.

6 Environment Plan Consultation

6.1 Employee Consultation

Consultation with employees in the development of this EP can be demonstrated through employee participation in the Environmental Risk Assessment conducted in May 2012 and August 2012. The risk assessments were a workshop-based approach for identifying and assessing the risk events associated with the Geographe Installation Campaign. The workshops involved a multi-disciplinary team including representatives from Origin management, HSE, SapuraClough engineering, marine operations and project management. The Implementation Strategy for this EP was developed based on the outcomes from the environmental risk assessment.

6.2 Consultation with the Regulator

Through the development and initial assessment of this EP, NOPSEMA has been consulted with respect to the content of the document. Feedback received has been incorporated into this revision as have lessons learnt on the Otway Drilling Campaign Environment Plan, and advice to operators from various environmental consultation workshops facilitated by NOPSEMA.

6.3 Stakeholder Consultation

Origin has undertaken an appropriate level of stakeholder engagement with relevant stakeholders in the Otway basin. The Geographe Installation Campaign is in a remote location near the continental shelf and is of short duration. The Otway basin is nearly mature and the community has a sufficient experience with the industry to comprehend the level and types of activities which will occur in the region.

Origin has undertaken extensive stakeholder consultation prior to the arrival of the Normand Clough in Portland. The first exploration fact sheet issued to stakeholders in November 2011. In February an Oil Spill contingency plan factsheet was development for stakeholders with questions regarding Origins Oil Spill Contingency Planning. A further two fact sheets were developed in March and August 2012 to provide additional context in response to feed back from NOPSEMA in relation to the first fact sheet circulated in November 2011. The purpose of fact sheets is to provide high level general information to relevant stakeholders in order to provide initial interaction and the ability to communicate with an identified Origin representative.

Stakeholders have not expressed direct opposition to the project. Fisheries have knowledge and the ability to implement the Origin conflict resolution process and Origin has had successful relationships with key stakeholders for several years.

In development of the OSCP, a number of external government agencies and non-government organisations were identified as key stakeholders in responding to an oil spill. On-going consultation is held with these stakeholders via communication and review of the OSCP to ensure the responsibilities and expectations of each party are clearly defined, understood and agreed upon. The consultation process will continue as required throughout the duration of the installation campaign.

A summary of the main topics raised by stakeholders during the initial consultation process is provided in Table 6-1.

Table 6-1: Summary of Main Topics raised by Stakeholders

Issues/concerns/comments constant across category	Origin's Response to stakeholders within category
Negative interaction during installation activities which resulting in conflict	During the installation campaign the Normand Clough and the support vessels will have full radio contact. They have been made aware of the importance Origin has placed in interactions with the fishing industry and encourage any affected fisherman to contact Andrew Levings if there are problems so Origin can correct negative interactions as quickly as possible. Origin has a fisheries management process which is available to any and all claims for compensation of conflict resolution. The point of contact with Origin is our Origin Fisheries Liaison Officer, Andrew Levings. Andrew Levings may be reached by e-mail at alevings@hotkey.net.au or by phone at 0401843338.
Subsea structures and safety exclusion zone	Detailed briefings have been provided about the design and installation of the Geographe subsea trees and associated installations. A permanent safety exclusion zone will be gazetted that will apply to the well heads, flowline and tie in point to the existing production pipeline. Details of the coordinates have been provided to all fishers to assist them to enter details into their plotters.
Compensation for lost catch/Compensation for displacement	Origin has a fisheries management process which is available to any and all claims for compensation of conflict resolution. Your point of contact with Origin is our Origin Fisheries Liaison Officer, Andrew Levings. He can be reached by e-mail at alevings@hotkey.net.au or by phone at 0401843338.
Provide information regarding the location and transit paths for the vessels and equipment during the drilling campaign.	Origin will provide information about location and timing of activities though out the campaign. As soon as Origin has an Accepted EP all stakeholders will be notified when mobilisation to site is imminent.
Proximity to busy shipping lane.	Origin has provided location coordinates and requested a safety exclusion zone be gazetted. Notice to mariners has been issued. Marine stakeholders notified across a number of networks.
Contingency planning for oil spill or hydrocarbon event.	Formal Oil Spill Contingency Plan (OSCP) developed and submitted for approval. Details of OSCP widely distributed to related stakeholders. Confirmation of capacity to respond sought from key contractors.
Confirmation of effective consultation with key stakeholders	Origin has provided confirmation of an extensive consultation process conducted by Origin personnel with expertise in Community Relations, Fisheries Liaison and Environmental effects. A project information sheet and invitation to comment has been widely circulated by regulatory agencies and industry peak bodies.

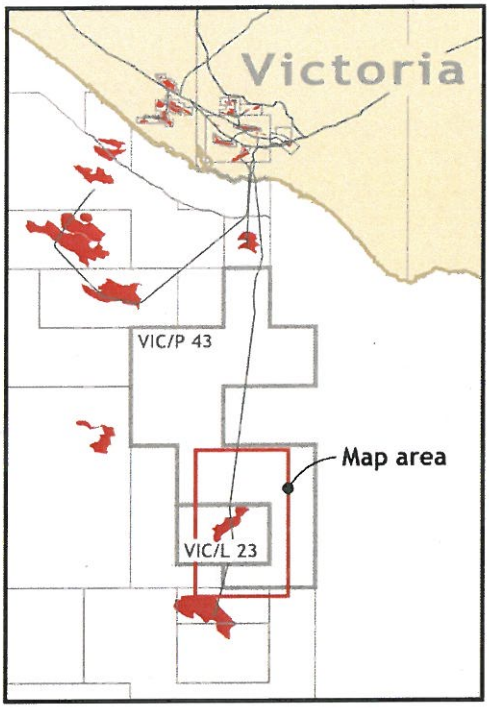
7 Environment Plan Liaisons

The Origin contact person for the Otway Phase 3 Installation Campaign EP is:

Ms Ivonne Milano
Australian Business Unit Regulatory Affairs Advisor
Phone: 03-9652 5887
Mobile: 0427 723 098
Email: ivonne.milano@originenergy.com.au

Attachment 1 – Geographe Facilities Safety Exclusion Zone

Proposed safety exclusion zone for Geographe facilities



Legend

- VIC/P 43 permit boundary
- Gas pipeline
- Bathymetry

Thylacine/Geographe Pipeline

Pipeline location sourced from GPinfo Jan 2012

75m

80m

39°05' S

Geographe Wells
Lat: -39°:06':29.4"
Long: 142°:57':6"

Pipeline Tie-In
Lat: -39°:06':56.4"
Long: 142°:56':0"

VIC/L 23

VIC/P 43

85m

Existing
Safety exclusion zone
500m from wells

Proposed
Safety exclusion zone
500m from flowline

Proposed
Safety exclusion zone
500m from pipeline tie in

Otway

90m

39°10' S

Vacant

Basin

95m

VIC/P 43

T/L 2

N

0 1 2

Kilometres
GDA94 / MGA Zone 54