Otway Phase 3

Geographe Offshore Operations Environment Plan Summary

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Contents

1. Introduction

Origin Energy Resources Ltd (Origin) is the joint owner and operator of the Otway Gas Project. The project consists of the Geographe gas wells, the Otway gas pipeline, the Thylacine gas wells and the Thylacine 'A' production platform. The Geographe gas field lies under 85 m of water and is controlled by the Otway Gas Plant via the Thylacine platform. The Geographe wells are located approximately 55km south of Port Campbell.

The Geographe field has been installed to tie the resource into the Otway Gas Production Pipeline (OGPP) for production to the Otway Gas Plant (OGP), and will be controlled from the OGP via the existing Thylacine 'A' Wellhead platform (TAWHP).

The Geographe gas field lies within the VIC/L23 Production Licence. As of 1 January 2012, offshore petroleum activities in Commonwealth waters are regulated by two national authorities:

- The National Offshore Petroleum Titles Administrator (NOPTA), a branch of the Resources Division of the Department of Resources, Energy and Tourism (RET) responsible for administration of titles, including production licences and pipeline licences; and
- The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), the national regulator for safety, well integrity and environmental management for offshore oil and gas operations, including the assessment of environment plans.

There are currently two accepted Environment Plans in place for the Otway Gas Project. The initial Environment Plan covered the Thylacine platform, wells and operation of the Otway Gas Pipeline. A second Operations Environmental Plan (EP) has been developed solely for the Geographe subsea facilities and this summary covers this Geographe Operations specific EP. The summary has been prepared in accordance with Regulation 11(8) of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009.

The Geographe operation EP was accepted by National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) on the 20th May 2013.

Origin has assessed the environmental impacts and risks associated with Geographe Offshore Operations and believe them to be minor with only low risks identified.

The Otway Gas 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 Offshore Operations – Activity Description

The Geographe subsea facilities have been installed to tie-in the Geographe field into the Otway Gas Production Pipeline (OGPP) for production to the Otway Gas Plant

The Environment Plan addresses the operation of the Geographe offshore facilities, which include:

- The Geographe wells and associated subsea structures (coolers at the Geographe well site and Valve Skid at the tie-in to the Otway pipeline)
- The 15km control umbilical from Thylacine to the well site
- A 2km flexible flow-line from the well site to the existing Otway Pipeline
- An infield umbilical between the valve skid and the well site
- Tie-in spools

The activities associated with the Geographe offshore facilities as described in the Environment Plan (EP) broadly consist of:

- Hydrocarbon commissioning activities / starting and operation of the Geographe wells.
- Vessel activities in support of ROV surveys, maintenance and interventions.

2.1 Location

The Geographe facilities are in the Otway Basin within Commonwealth waters. The Geographe gas field lies under 85m of water approximately 55km south of Port Campbell.

The relevant permits and licence areas along with distances to key mainland locations are listed in Table 1.1.

Table 1-1: Geographe operations area locality

Operations 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 installed Geographe subsea gas facilities and a schematic of the planned activities are provided in figure 1.1 and figure 1.2.

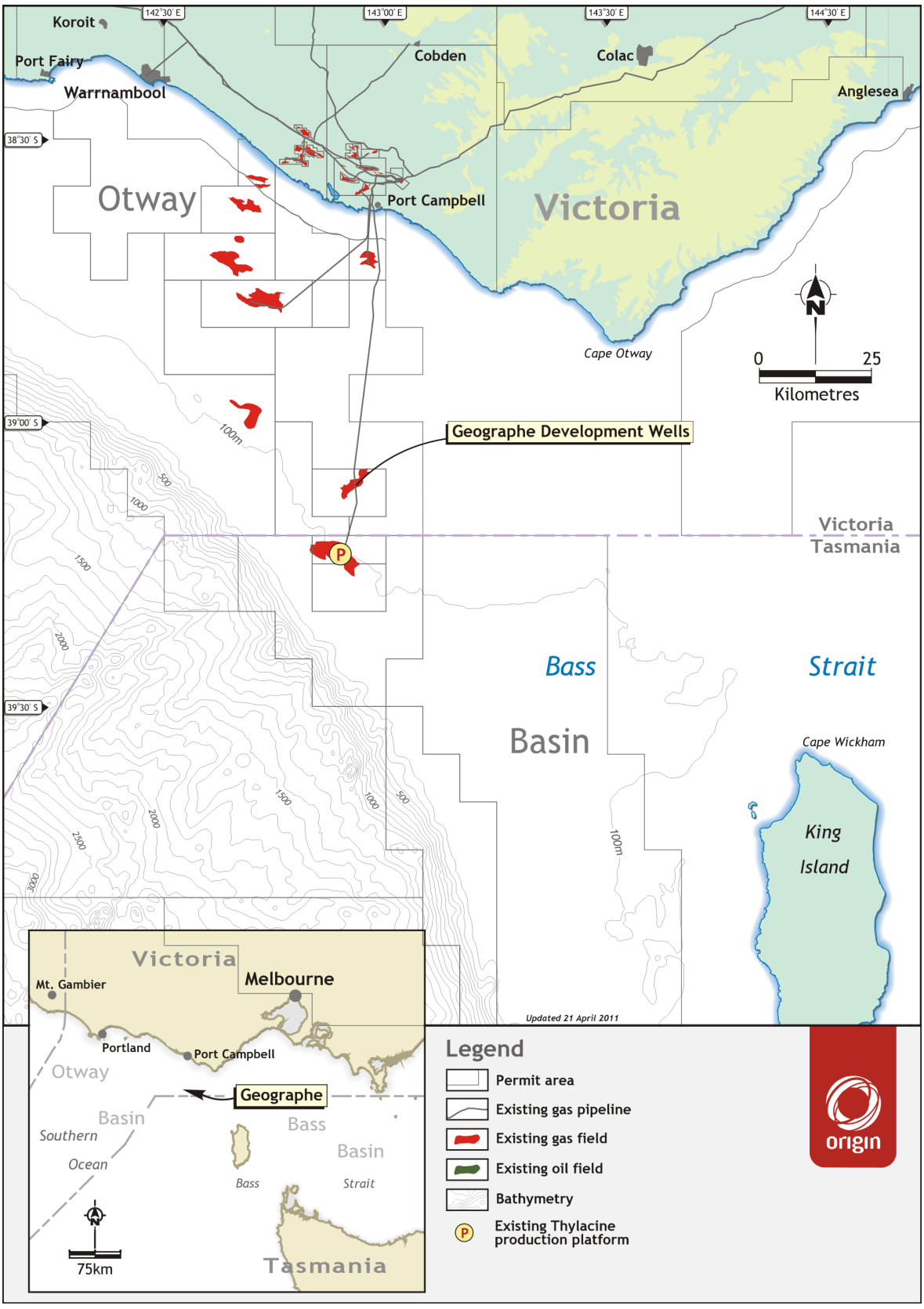

Figure 1-1: Locality Map and proposed activities

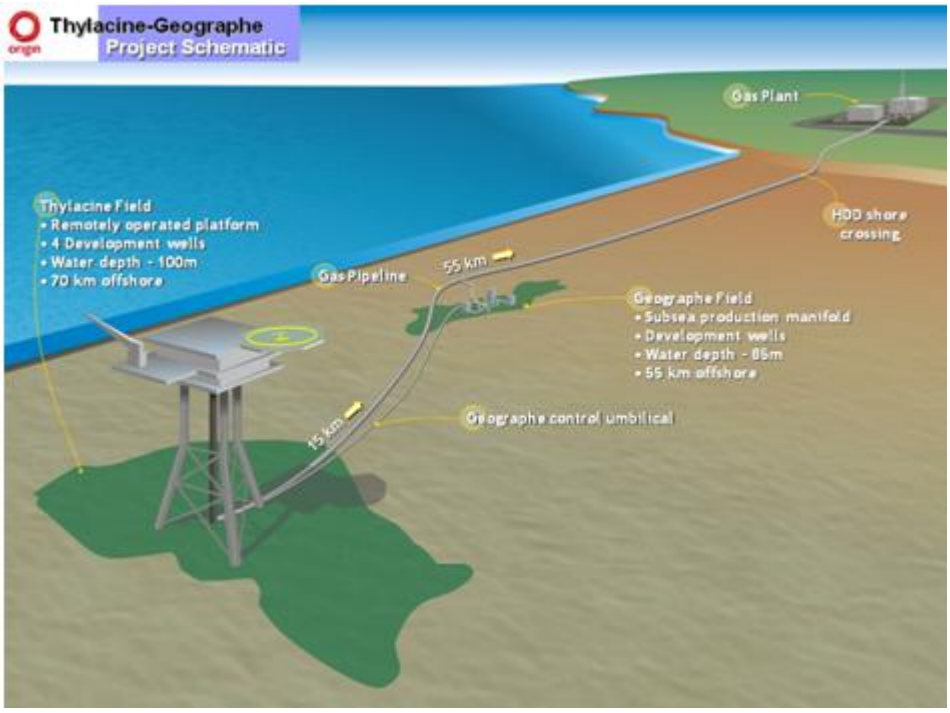

Figure 1-2: Thylacine existing and Geographe activities

A Petroleum safety zone is in place for the Geographe wells and subsea facilities. This prohibits unauthorised vessels from entering the area without consent in writing from NOPSEMA. A schematic of the exclusion zone including the coordinates of the Geographe wells and pipeline tie-in is provided is figure 1.3.

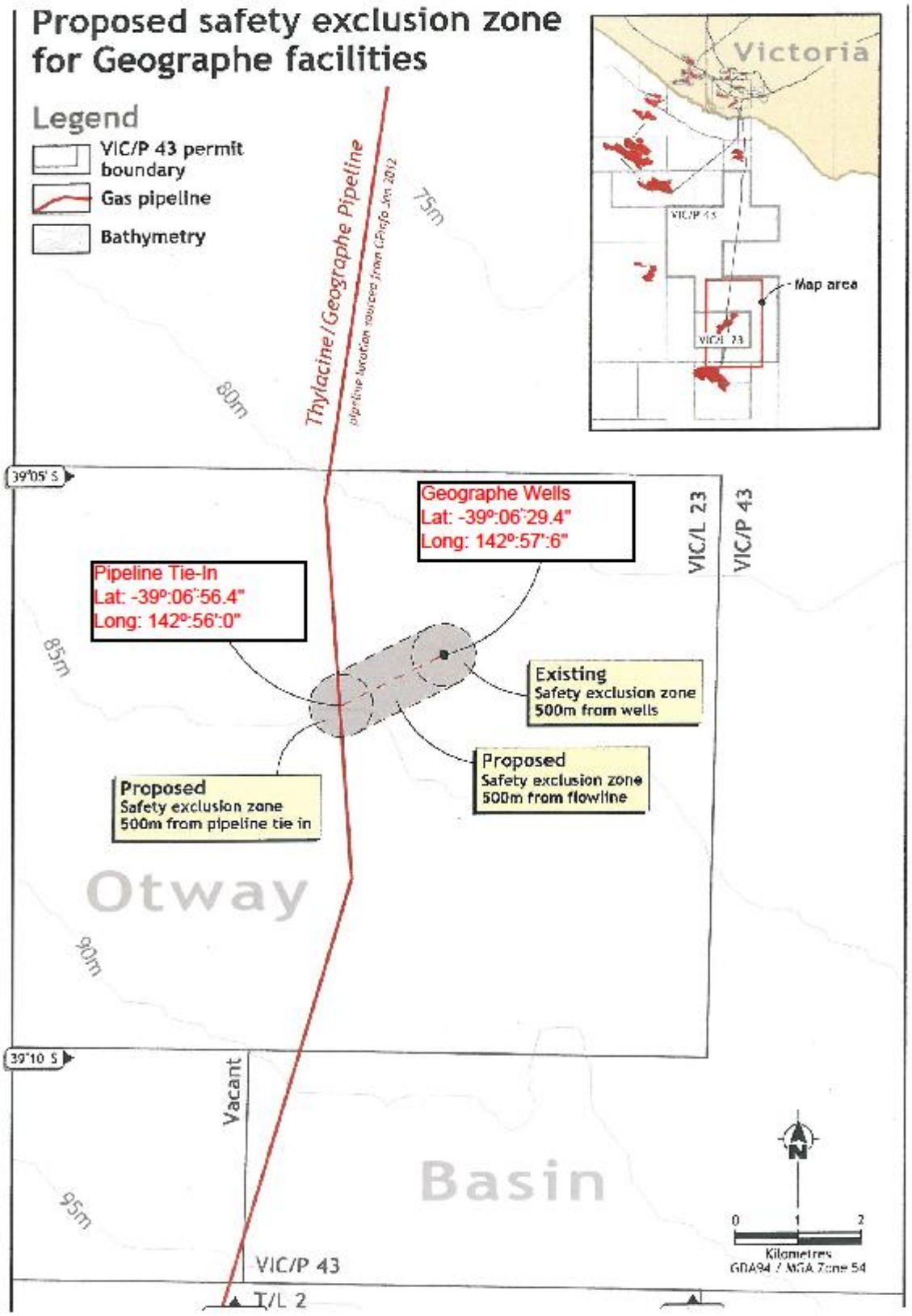
Proposed safety exclusion zone for Geographe facilities
Legend
VIC/P 43 permit boundary
Gas pipeline
Bathymetry
Thylacine/Geographe Pipeline
75m
80m
85m
90m
95m
Victoria
Map area
39°05' S
39°10 S
Geographe Wells
Lat: -39°:06':29.4"
Long: 142°:57':6"
Pipeline Tie-In
Lat: -39°:06':56.4"
Long: 142°:56':0"
VIC/L 23
VIC/P 43
Existing
Safety exclusion zone
500m from wells
Proposed
Safety exclusion zone
500m from flowline
Proposed
Safety exclusion zone
500m from pipeline tie in
Otway
Basin
Vacant
VIC/P 43
T/L 2
N
0 1 2
Kilometres
GDA94 / MGA Zone 54

Figure 1-3: Geographe facilities safety exclusion zone as gazetted by NOPSEMA

2.2 Operational Activities

The Geographe subsea facilities are operated from the Otway onshore gas plant via communication links on the Thylacine platform and the main control umbilical from the platform to the subsea facilities.

The control umbilical provides electrical power, communications, and hydraulic fluid for valve operation and can also supply methanol. A separate in field umbilical provides MEG from the main Otway pipeline to the subsea wells.

The main operational activities involve;

- Changing the well choke settings to regulate gas flow
- Injection of MEG to prevent hydrate formation
- Injection of methanol during cold starts to prevent hydrates
- Testing the main tree valves and isolation valves periodically to confirm their operation.

The only regular discharge is from the hydraulic system during valve operations. The hydraulic fluid is water based fluid selected for low environmental impact and is one commonly used in Australia. The hydraulic fluid keeps the valves open and when asked to close small volumes (several litres) of hydraulic fluid are discharged.

2.3 Maintenance Activities

The Geographe Subsea facilities were designed with minimal requirement for intervention and maintenance. However to monitor and maintain the subsea facilities it is expected that approximately once per year a vessel will be mobilised with an ROV to carry out routine inspections and testing of the facilities. In the event of equipment failure a vessel would also be mobilised with an ROV or with divers to affect a repair.

3. Description of Receiving Environment

The Zone of Potential Impact (ZPI) for the Commissioning and operations can be described as 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.

3.1 Physical Environment

The Geographe facilities are 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 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 month's average between 2.5m and 3.0m, and maximum heights range between 5.6m and 7.7m.

3.1.1 Seabed and Sedimentation

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 flow-line 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.

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.

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 commissioning and operations 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 commissioning and operation activities is considered minor, during the 4 months of the drilling campaign no vessels have encroached the petroleum safety zone.

4. Environmental Impacts and Risks

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 operations.

During the development of the Geographe operations EP a systematic process of hazard identification and risk assessment was completed in order to review the impacts and risk to the environment from operation of the Geographe wells, flow-lines and umbilicals. Control measures were identified and implemented to prevent or mitigate the environment impacts, risks to the existing environment from operation of the Geographe wells to be As Low As Reasonably Practicable (ALARP) and the EP has been accepted by NOPSEMA.

The risk register is a live document and Origin will maintain it in line with its corporate risk management process and as required by the EP.

The credible environment impacts identified from these risk assessments are categorised as follows:

Table 4-1 : Geographe hydrocarbons commissioning and operations - environment risk summary

Routine Operational impacts:	
R1	Discharge of Hydraulic Fluid through subsea valve operations
R2	Physical presence of Geographe facilities – impact on marine environment
R3	Physical presence of Geographe facilities – impact on other marine users
Non Routine Impacts	
N1	Loss of Containment of Hydrocarbons – Subsea equipment damage
N2	Loss of Containment of MEG – Subsea equipment damage
N3	Loss of Containment of Methanol – Subsea equipment damage
N4	Loss of Containment of Hydraulic Fluid – Subsea equipment damage
Impacts from Vessels / ROV operations	
V1	Physical presence of Vessel – collision with marine fauna
V2	Physical presence of Vessel - Noise
V3	Physical presence of Vessel - Lighting
V4	Discharge of Ballast Water, physical presence
V5	Discharge of putrescible waste
V6	Discharge of hazardous waste
V7	Discharge of solid waste / garbage
V8	Discharge of sewage / grey water
V9	Deck drainage
V10	ROV discharges
V11	Vessel diesel spills

The following section provides additional detail on each of these identified hazard is detailed, along with a summary of the controls and measures in place that ensure the risk is both acceptable and ALARP.

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 Impact									
R1	Discharge of Hydraulic Fluid through subsea valve operations	Release of hydraulic fluid into marine environment – leading to localised impact on marine life	1	3	Med	**Key Controls** • Validated design to limit discharges • Selection of hydraulic fluid, HW443 is a category 'D' OCNS chemical, readily biodegradable and with a low potential for bioaccumulation • Volume of hydraulic fluid released is small (approximately 4L per valve operation and approximately 200L total per month and will be recorded and monitored and compared with the predicted hydraulic fluid loss. **Additional Considerations** • Discharged hydraulic fluid will rapidly mix and disperse in the marine environment to levels that are not expected to have any impact. A cumulative amount of 375 tonnes per annum of an OCNS category 'D' chemical is allowed to be discharged into the North Sea without UK government approval. The North Sea criteria will be the criteria Limit monitored against for the Geographe Operations per annum.	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
R2	Physical presence of Geographe facilities – impact on marine environment	Increase in structure / reef leading to changes in the number and / or type of marine organisms and marine environment (note temporary damage was addressed in the Installation EP accepted by NOPSEMA] and is not relavant to the permanent placement of the infrastruture). Negative impact of static structures in the operational phase is not considered to be credible as the sea floor is a high energy sandy bottom as described in Section 6.	1	1	Low	**Key Controls** • ROV surveys have been conducted during installation which will ensure the site is left in as near a pristine condition as before the campaign. • The petroleum safety zone will exclude commercial fishermen and hence protect marine communities from their activities **Additional Considerations** • The Geographe facilities take up a very small footprint in a non sensitive marine environment (the sea floor is sandy with no sensitive / rare communities identified) • ROV surveys indicated that there are no sensitive systems that would be adversely affected by Geographe. • An environmental risk associated with the physical presence of Geographe has already been accepted within the EPBC referral and the accepted Geographe Installation EP. • The physical presence of the Geographe facilities provides structure for the accumulation of marine organisms. Only positive impacts are envisaged consistent with the Otway Gas Pipeline.	Not applicable as no negative impact considered credible		

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	Physical presence of Geographe facilities – impact on other marine users	Impact on the fishing industry or maritime users-e.g. limited access to fishing area, nets entangling in subsea equipment, impact on navigation	1	1	Low	**Key Controls** • Geographe safety zone gazetted and marked on navigation charts **Additional Considerations** • Geographe field not in major fishing area • Fisheries consultation shows minimal direct impact on fishermen or access to grounds • Consultation for the drilling and installation EPs indicated no community concerns with regards the establishment of the Geographe petroleum safety zone. • Fisheries Management Plan with formal grievance procedure for genuine/validated losses incurred • The number of passing vessel is relatively light based on observation during the drilling and installation campaigns, there is ample marine space and there were no incursions into the petroleum safety zone during the drilling campaign in 2012. • If passing vessels fail to comply with the petroleum safety zone there is no real impact as the facilities are all subsea.	Not applicable – no impact		

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	Loss of Containment of Hydrocarbons – Subsea equipment (wells, coolers, flowline, valve skid and spools) damage Causes: Design error, fabrication/installation error, external impact / interference	Loss of gas and condensate into the marine environment Shoreline hydrocarbon impacts	3	4	Med	**Key Controls** • Third party validation (by Lloyds) of the design for NOPSEMA acceptance of the safety case • Installation and pre-commissioning procedures, Project assurance review and handover processes to Operations prior to start-up • Training and Competency of personnel • Operating and maintenance procedures, including Safety Case and Well Operations Management Plan accepted by NOPSEMA. • Process control, alarms and trips including Low pressure shutdowns and isolation valves at the wells (including SSCSV) and at the SVS subject to regular testing. • OSCP and ERP – mitigative control	3	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
						Additional Considerations • Geographe well fluids are predominantly methane with small volumes of light condensate. There are no crude oils or persistent / toxic hydrocarbons – confirmed during well testing. • Oil spill modelling completed by APASA shows that a subsurface blowout will have a very small area of impact and that shoreline impact is not credible.			

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
N2	Loss of Containment of MEG – Subsea equipment (including umbilical) damage	Release of MEG (and additives) into marine environment - localised impact on marine life	1	4	Medium	**Key Controls** • Third party validation (by Lloyds) of the design for NOPSEMA acceptance of the safety case • Installation and pre-commissioning procedures, Project assurance review and handover processes prior to start-up • Training and Competency of personnel • Operating and maintenance procedures • Process control, alarms and trips including Low pressure shutdown and isolation valve at the SVS. • Chemical selection MEG is a category 'E' OCNS chemical, readily biodegradable and low potential for bioaccumulation • Chemical selection process for MEG additives such that OCNS category 'D' or better or CHARM silver or better is used where operationally feasible **Additional Considerations** • Any MEG discharge will be to a large and high energy receiving environment. Discharges will be rapidly diluted and dispersed. • A technical monitoring program (by operations and engineering) is in place for inventory balancing checks for MEG.	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
N3	Loss of Containment of Methanol – Subsea equipment (including umbilical) damage	Release of methanol into marine environment - localised impact on marine life	1	4	Medium	**Key Controls** • Third party validation (by Lloyds) of design • Installation and pre-commissioning procedures, Project assurance review and handover processes prior to start-up • Training and Competency of personnel • Operating and maintenance procedures • Process control, alarms and trips including Low pressure shutdown and isolation valve at the SVS. • Chemical selection - Methanol is a category 'E' OCNS chemical, readily biodegradable and low potential for bioaccumulation. **Additional Considerations** • Limited volume of methanol on Thylacine (maximum of $3m^3$)	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
N4	Loss of Containment of Hydraulic Fluid – Subsea equipment (including umbilical) damage	Release of hydraulic fluid into marine environment - localised impact on marine life	1	4	Med	**Key Controls** • Third party validation (by Lloyds) of design • Installation and pre-commissioning procedures, Project assurance review and handover processes prior to start-up • Training and Competency of personnel • Process control, alarms and trips including Low pressure shutdown and isolation valve at the SVS. • Chemical selection of hydraulic fluid, HW443 is a category 'D' OCNS chemical, readily biodegradable and low potential for bioaccumulation **Additional Considerations** • Limited volume of hydraulic fluid on Thylacine (maximum of $3m^3$)	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
Impacts from Vessel / ROV Operations									
V1	Physical presence of Vessel	Collision with marine fauna, potential mortality	1	1	Low	**Key Controls** • Compliance with the Australian National Guidelines for Whale and Dolphin Watching (DEH 2005) for Vessels (recommended minimum approach distance complied with) – i.e. Vessel movements are slow and not sudden • Origin vessel induction to include requirements to prevent / minimise impact on the environment. **Additional Considerations** • Some marine fauna exhibits avoidance behaviour, removing themselves from the area of potential impact • Geographe facilities are not located in shallow or confined waters • Vessel expected to be required less than once a year on average and for only a limited number of days.	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
V2	Physical presence of Vessel - Noise	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	1	Low	**Key Controls** • Compliance with the Australian National Guidelines for Whale and Dolphin Watching (DEH 2005) for Vessels (approach distance minimised) • Preventative maintenance of major noise generators • Origin vessel induction to include requirements to prevent / minimise impact on the environment. **Additional Considerations** • Noise levels on the vessel are assessed and minimised as far as practical for OH&S reasons • Competency training, records and inductions • Using moored vessels requires changing anchor spreads with associated seabed impact, not considered practical for short duration activities. • Vessel expected to be required less than once a year on average and for only a limited number of days.	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
V3	Physical presence of Vessel - Lighting	Disruption to/disorientation of migrating birds and other marine life that may be attracted to lighting from the vessels.	1	1	Low	**Key Controls** • Any migrating birds that become confused by the lighting will have somewhere to land and rest until daylight, • Origin vessel induction to include requirements to prevent / minimise impact on the environment i.e. to not disturb wildlife that may have landed. **Additional Considerations** • Lighting levels required to maintain platform safety and to comply with navigational requirements. • Vessel expected to be required less than once a year on average and for only a limited number of days.	1	1	Low
V4	Discharge of ballast water, physical presence of vessel	Introduction of non-endemic / translocated species or pathogens via the ballast water or hull fouling	4	1	Medium	**Key Controls** • Pre-mobilisation audit to confirm Vessel acceptability and compliance with AQIS • Vessels to comply with quarantine requirements prior to operating in Australian waters • No discharge of ballast water at Geographe	3	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
						Additional Considerations • ROV support vessels are likely to be vessels already within Australian waters and may even be sourced from Bass Strait / Otway Basin • Vessels sourced from North West shelf / SE Asia unlikely to pose a risk due to the tropical species they may have being unsuited to the temperate conditions at Otway • Vessel expected to be required less than once a year on average and for only a limited number of days.			
V5	Discharge of putrescible waste	Localised increase in nutrient loading/biological oxygen demand	1	1	Low	**Key Controls** • Vessel waste management plan and crew training • Pre-mobilisation audit to confirm Vessel holds a current pollution prevention certificate and appropriate certified pollution control equipment is in place • Pre-mobilisation audit to confirm appropriate MARPOL compliant putrescible waste system i.e. Food waste macerated prior to disposal to sea	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
						Additional Considerations • There are no sensitive marine ecosystems in the vicinity of the Geographe facilities. • High energy marine environment with significant current flow, water depth (Natural dispersion achieved) • Vessel expected to be required less than once a year on average and for only a limited number of days.			
V6	Discharge of hazardous wastes	Discharge of chemicals into the marine environment and impact on marine species.	1	1	Medium	**Key Controls** • Pre-mobilisation audit to confirm vessel holds a current pollution prevention certificate and has appropriate certified pollution control equipment on board • No routine discharge of hazardous wastes – waste sent to shore for treatment and disposal. Discharge of solid wastes under MARPOL prohibited • Vessel waste management plan and crew training	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
						Additional Considerations • There are no sensitive marine ecosystems in the vicinity of the Geographe facilities. • High energy marine environment with significant current flow, water depth (Natural dispersion achieved) • Vessel expected to be required less than once a year on average and for only a limited number of days.			
V7	Discharge of solid waste / garbage	Marine pollution by floating or sunken debris. Ingestion of plastics by or entanglement of marine fauna, potential mortality. Smothering of benthic fauna	2	4	Medium	**Key Controls** • Pre-mobilisation audit to confirm vessel holds a current pollution prevention certificate and has appropriate certified pollution control equipment on board • No routine discharge of solid waste / garbage – waste sent to shore for recycling (where relevant), treatment and disposal • Vessel waste management plan and crew training • Origin vessel induction to include requirements to prevent / minimise impact on the environment, i.e. no waste overboard.	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
						Additional Considerations • There are no sensitive marine ecosystems in the vicinity of the installation • High energy marine environment with significant current flow, water depth (Natural dispersion achieved) • Vessel expected to be required less than once a year on average and for only a limited number of days.			
V8	Discharge of sewage / greywater	Localised increase in nutrient loading/biological oxygen demand	1	1	Low	**Key Controls** • Pre-mobilisation audit to confirm appropriate MARPOL compliant sewage discharge system is in place and functioning **Additional Considerations** • Sewage treated in MARPOL/USCG compliant system prior to disposal to sea in some vessels • Vessel expected to be required less than once a year on average and for only a limited number of days.	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
V9	Deck drainage	Discharge of chemicals / hydrocarbons into the marine environment and impact on marine species	1	1	Medium	**Key Controls** • Pre-mobilisation audit to confirm vessel holds a current pollution prevention certificate and has appropriate certified pollution control equipment on board • All spills directed to isolated bilge system and bilge has oil in water separator and oil in water analyser, • Equipment maintained in accordance with Vessel Preventative Maintenance System • All discharges monitored and recorded • Competency training, records and inductions • Vessel SOPEP **Additional Considerations** • There are no sensitive marine ecosystems in the vicinity of the Geographe facilities. • High energy marine environment with significant current flow, water depth (Natural dispersion achieved) • Vessel expected to be required less than once a year on average and for only a limited number of days.	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
V10	Loss of ROV Fluid	Minor localised and temporary impact to the water column	1	1	Low	**Key Controls** • ROV and in particular hose maintenance • ROV pre and post dive checks **Additional Considerations** • ROV fluid likely to be relatively non toxic and water based • Fluid volumes are limited and ROV shutdown systems would limit the loss of fluid • The Otway environment is a high energy environment – any loss of hydraulic fluid would be rapidly dispersed.	1	1	Low
V11	Diesel Spill	Loss of fuel oil into the marine environment Shoreline hydrocarbon impacts	3	2	Medium	**Key Controls** • Pre-mobilisation audit to confirm vessel has appropriate systems and processes in place to prevent collision. • Vessel's bridge manned at all times • Vessel navigation systems (lighting and radar) in place as per class certification • Vessel Emergency Response Plans and arrangements • Oil Spill Contingency Plan in place • Geographe Petroleum Safety Zone	3	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
						Additional Considerations • An ROV vessel is only required if there is a failure of some subsea equipment and as such ROV vessels would only occasionally be required. Vessel expected to be required less than once a year on average and for only a limited number of days. • Whilst the Geographe location is close to some major shipping lanes the amount of passing traffic is relatively low. During the drilling campaign there was only one vessel than came within 3 N miles of the drill rig. Likelihood of a potential collision is therefore very low. • The volume of diesel in the ROV vessel is likely to be significantly less than that modelled for the installation EP and in the event of a tank failure; the volume of diesel lost would be controlled by tank management.			

4.1 Performance Objectives

Origin has established a series of performance objectives to assist ongoing management of the environmental performance of the Geographe commissioning and operation.

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 operations.

These objectives are monitored and reported in accordance with the requirements set out in the Otway Phase 3 Geographe Offshore Operations [S4200AF706806] Environmental Plan Revision 2, in the Otway Health, Safety and Environment Management system (HSEMS) and in the Oil Spill Contingency Plan (OSCP).

5. Corporate Environment Policy

Origin's Health, Safety and Environment (HSE) Policy (Figure 2.1**Error! Reference source not found.**) provides a public statement of the company's commitment to minimise adverse effects on the environment and to improve environmental performance.

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 HSE Management Systems (HSEMS) to minimise and manage the impacts on employees, contractors, the environment and the communities in which the company operates. The Origin HSEMS [Figure 2.1] has been developed in accordance with Australian/New Zealand Standard ISO 14001:2004 Environmental Management Systems.

The Origin 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.

The environment plans provide strategies to use energy efficiently and to manage greenhouse gas emissions, waste and water within a specific locality and context, but they are implemented within the overall framework of the HSEMS.

Figure 2-1: Origin's Health, Safety and Environment Policy

Health Safety & Environment

Policy

ORG-HSE-POL-01

At Origin, we value the wellbeing of our employees, contractors, customers, the communities in which we operate and the environment. We are committed to responsible management practices that minimise any adverse health, safety or environmental impacts, and enhance benefits associated with our activities, products or services.

We have in place a Health, Safety and Environment management system for our activities that drives continual improvement. The HSE Management System outlines accountabilities to implement this Policy and requires that we:

- Identify hazards and reduce risks to as low as reasonably practicable where there is potential to cause injury or illness to people, or to adversely impact the environment or the community
- Provide safe work places and systems of work, empower employees and contractors to address unsafe or hazardous situations and carry out their work in a manner that does not present a risk to themselves, others or the environment
- Support the recovery and rehabilitation of employees in the event of work related injury or illness
- Set objectives and targets which promote the efficient use of energy and resources, the minimisation of wastes and emissions and the prevention of pollution
- Comply with relevant HSE legal requirements and other commitments
- Require Contractors to manage HSE using standards and practices that accord with this Policy
- Regularly review and report HSE performance.

In implementing this Policy we will engage with our employees, contractors, suppliers, business partners, customers and Government and communicate expectations to all persons working with or on behalf of Origin.

Accountabilities

The Board is responsible for establishing and overviewing the Company's commitment to manage HSE in accordance with this Policy and for monitoring the performance of the Company with respect to its implementation.

The Managing Director is responsible for the implementation of the HSE Management System to ensure the commitments made in this Policy are being met.

Grant King
Managing Director
March 2010

6. Stakeholder consultation

Origin has undertaken extensive consultation with stakeholders in relation to the Geographe development. The number of responses received has been limited and most stakeholders have indicated they do not have any major concerns with the proposed development. Origin has developed systems to regularly assess the general community's expectations of Origin as a corporate citizen. A community Environmental Liaison Group (ELG) meeting forum has been established to respond to external feedback and engage with the general community and key regulators. The meetings, held on a quarterly basis, are open to the general community and key stakeholders and act as a consultation forum to communicate Origin's goals and HSE performance. The community consultation meetings ensure that HSE management issues arising from the operation of the Otway Gas Project are managed to the satisfaction of the relevant regulatory authorities and the local community. Meetings are minuted, issued to all meeting participants and filed on the Origin DMS.

Stakeholders were notified of Origin's intention to lodge an Environment Plan with NOPSEMA and invited to provide further comment on 15 January 2013. A project information sheet was also provided. Consultation has and will continue to be undertaken with stakeholders for the operational phase of the project. To date no stakeholders have 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 operation of the Geographe development.

For further information on the environmental aspects associated with the operation of the Geographe facilities contact should be made with:

Mr Robert Meagher

ANZ Environmental Manager

Phone: +61730377219
Mobile: +61457539035
e-mail: Robert.Meagher@originenergy.com.au