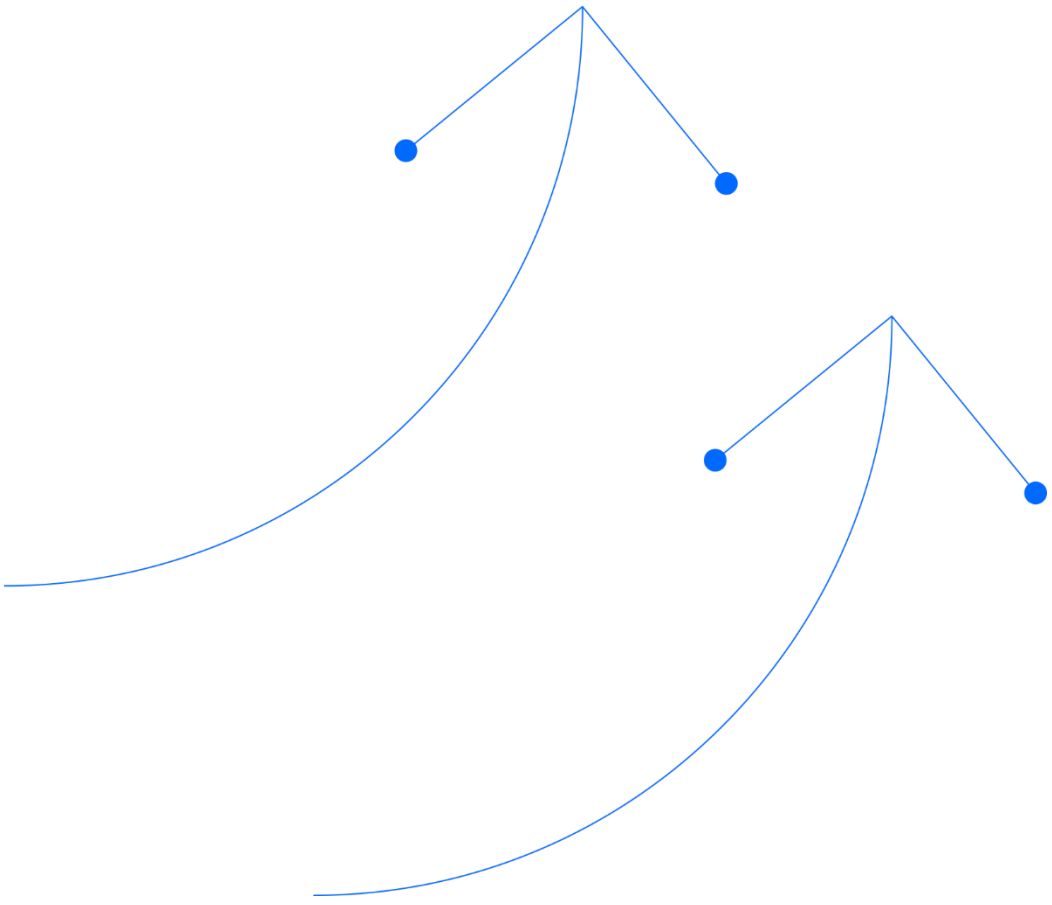
Santos

Devil Creek Pipeline and Reindeer Well Head Platform

Oil Pollution Emergency Plan

9 September 2024

Document No.: EA-14-RI-10001.02



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Document No.: EA-14-RI-10001.02

Project / Facility	Devil Creek & Reindeer WHP
Review interval (months)	30 Months
Safety critical document	NO

Rev	Owner	Reviewer/s *Managerial/ Technical/ Site*	Approver
	Lead Oil Spill Risk & Planning Coordinator	**Manager Environment (WA, NA & TL)** **Principal Oil Spill and Emergency Response Coordinator**	**Senior Manager Environmental Approvals (WA, NA & TL)**
14			

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Rev	Rev Date	Author / Editor	Amendment
14	09.09.24	Santos	Updated to include both operations and CoP phases.
13.1	09/05/2024	Santos	Updated to incorporate changes in ERT structure and communications as outlined in MoC 301.
13	18/05/2023	Santos	Response to DMIRS comments received on 05.05.23.
12	13/04/2023	Santos	Response to DMIRS comments received 03.03.23. Response to DoT comments received 16.03.23.
11	10/01/2023	Santos	2.5 year regulatory revision to DMIRS
10.1	31/01/2022	Santos	Updated to incorporate changes in IMT structure, roles and responsibilities and exercise requirement as outlined in MoC 241.
10	29/07/20	Santos	Revised following DMIRS comments Minor updates for revised DoT Industry Guidance Note, AMOSC oiled wildlife State-board and information on DISER
9	22/05/20	Santos	Revised following DMIRS comments
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6	10/05/19	Advisian	5-year revision to NOPSEMA
5	04/05/17	N/A	Revised following DMP and DoT comments
4	13/02/17	N/A	2.5 year regulatory revision to DMP
3	05/08/14	N/A	Revised following NOPSEMA acceptance of Rev 2 when taken with the 'request for further written information' (RFFWI)) – This revision includes the RFFWI content for submission to DMP (05/08/14)
2	30/05/14	N/A	Revised with DMP comments (email 9/04/14) – submitted to NOPSEMA (30/05/14) and DMP (17/06/14)
1	07/03/14	N/A	Revised with NOPSEMA comments (notice dated 9/10/14) and DoT comments (DMP email 29/11/13) – submitted to DMP (10/03/14)
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Distribution	OPEP
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WA DoT	●
AMSA	●
AMOSC	●
OSRL	●
DEMIRS	●
Intranet – Emergency Preparedness – both Oil Spill tile and SO ER Documentation	●

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Terms

Term	Definition
AEP	Australian Energy Producers (formerly Australian Petroleum Production and Exploration Association [APPEA]; from 13 September 2023)
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
AMOSC	Australian Marine Oil Spill Centre Pty Ltd
AMP	Australian Marine Park
AMSA	Australian Marine Safety Authority
API	American Petroleum Institute
APPEA	Australian Petroleum Production & Exploration Association
BAOAC	Bonn Agreement Oil Appearance Codes
BIP	Bridging Implementation Plan
CCR	Central Control Room
CMT	Crisis Management Team
CSB	Commonwealth State Boundary
DBCA	Department of Biodiversity, Conservation and Attractions
DBNGP	Dampier to Bunbury Natural Gas pipeline
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DCGP	Devil Creek Gas Plant
DEMIRS	Department of Energy, Mines, Industry Regulation and Safety
DISR	Department of Industry, Science and Resources
DoT	Department of Transport
DPIRD	Department of Primary Industries and Regional Development
DWER	Department of Water and Environmental Regulation
EMBA	Environment That May Be Affected
EP	Environment Plan
ER	Emergency Response
ERT	Emergency Response Team
ESD	Emergency Shutdown
EVA	Environmental Value Areas
FOB	Forward Operating Base
GAPA	Government and Public Affairs
GIS	Geographic Information System
GPS	Global Positioning System
HDD	Horizontal Directional Drilling
HMA	Hazard Management Agency
HR	Human Resources
IAP	Incident Action Plan
IC	Incident Controller/Commander
ICC	Incident Coordination Centre
IMMR	Inspection, Maintenance, Monitoring and Repair
IMT	Incident Management Team

Term	Definition
IR	Incident Response
LOWC	Loss of Well Control
MARPOL	International Convention for the Prevention of Pollution from Ships
MDO	Marine Diesel Oil
MEECC	Maritime Environmental Emergency Coordination Centre
MEER	Maritime Environmental Emergency Response (WA)
MNES	Matters Of National Environmental Significance
MODU	Mobile Offshore Drilling Unit
MoU	Memorandum Of Understanding
MSA	Master Services Agreement
NEBA	Net Environmental Benefit Analysis
NOPSEMA	National Offshore Petroleum Safety and Environment Management Authority
OMP	Operational Monitoring Plans
OPGGS(E) Regulations	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023
OSC	On-Scene Commander
OSCP	Oil Spill Contingency Plan
OSM	Operational and Scientific Monitoring
OSM-BIP	Operational and Scientific Monitoring- Bridging Implementation Plan
OSRL	Oil Spill Response Limited
OSTM	Oil Spill Trajectory Modelling
OWA	Oiled Wildlife Advisor
OWR	Oiled Wildlife Response
PPA	Priority Protection Area
RCC	Rescue Coordination Centre (AMSA)
ROV	Remotely Operated Vehicle
SCAT	Shoreline Clean-up Assessment Technique
SHP-MEE	State Hazard Plan for Maritime Environmental Emergencies
SIMA	Spill Impact Mitigation Assessment
SLA	Service Level Agreement
SMP	Scientific Monitoring Plans
SMPC	State Marine Pollution Coordinator
SMPEP	Shipboard Marine Pollution Emergency Plan
SOPEP	Shipboard Oil Pollution Emergency Plans
STR	Shoreline Treatment Recommendations
TRP	Tactical Response Plan
UAV	Unmanned Aerial Vehicle
VI	Varanus Island
VOC	Volatile Organic Compound
VOO	Vessels Of Opportunity
VPO	Vice President Offshore Upstream WA
WA	Western Australia
WAOWRP	Western Australian Oiled Wildlife Response Plan

Term	Definition
WSP	Waste Service Provider

1. Quick reference information

Parameter	Description	Further information
Petroleum Activity	The Reindeer facilities comprise the wellhead platform (WHP) infrastructure, three wells tied back to the WHP, one open ocean well that is permanently abandoned and approximately 43 km of the Devil Creek supply pipeline located in Commonwealth waters. The Devil Creek (DC) facilities comprise the approximately 48 km long state waters section of the DC supply pipeline, an approximately 11 km long onshore section of the DC supply pipeline to the Devil Creek Gas Plant (DCGP), and approximately 40 metres of onshore pipeline (DC sales gas pipeline) (collectively referred to as the DC pipelines herein) from the DCGP to the Dampier to Bunbury Natural Gas Pipeline (DBNGP). The petroleum activity comprises of any of the following: <u>Commonwealth Jurisdiction:</u> Operations phase: • Presence of infrastructure on title • Operation of the WHP and DC pipelines • Transporting dry unprocessed natural gas from the Reindeer field to DCGP via the DC pipelines • Vessel based activities associated with operations Cessation of Production (CoP) (preservation) phase: • CoP commences when the DC pipelines are filled with preservation fluid or nitrogen (N_2) • the DC pipelines remain filled with preservation fluid or N_2 • the Reindeer facilities will remain in preservation phase until a decision is made to either repurpose the facilities for CCS or decommission all, or part of the facilities • Activities including bird deterrence and inspection, maintenance, monitoring and repair (IMMR) may be undertaken during the operations phase or CoP phase. <u>State Jurisdiction</u> Operations Phase: • Ongoing presence of infrastructure onshore and offshore on title • Operation of the DC pipelines • Transporting dry unprocessed natural gas from the Reindeer field to DCGP via the DC pipelines Cessation of Production (CoP) Phase: • CoP commences when the DC pipeline is filled with preservation fluid or nitrogen (N_2) • the DC pipeline remains filled with preservation fluid or N2 • the DC pipelines will remain in preservation phase until a decision is made to either repurpose the facilities for CCS or decommission all, or part of the facilities <u>Inspection, maintenance, monitoring and repair (IMMR):</u> IMMR activities, including vessel-related activities, within the Operational Area will continue through the above phases.	Reindeer and Devil Creek Environment Plan (EP) Section 2
Location	The Reindeer WHP is located approximately 80 km northwest of the Port of Dampier, Western Australia (WA) in Commonwealth waters. The DC pipeline crosses Commonwealth and State waters and continues onshore as a buried pipeline until it reaches the DCGP. The DCGP is located approximately 10 km inland from Gnoorea Point and Forty Mile Beach.	Reindeer & DC EP Section 2.1 Figure 3-1
Petroleum title/s (Blocks)	The Reindeer WHP and Offshore Gas Supply Pipeline lie within Production License WA-41-L and WA-18-L. The WA State waters component of the pipeline lie within TPL/20.	N/A

<table>
<tr><th>Parameter</th><th colspan="3">Description</th><th>Further information</th></tr>
<tr><td>Mobile Offshore Drilling Unit (MODU)/Vessels</td><td colspan="3">Reindeer & DC operations involve the use of a support vessel for replenishment of chemicals, MDO fuel and potable water. Dedicated equipment-specific vessels may also be used.</td><td>Reindeer EP Section 2.4 and 2.6 and DC EP Section 2.5 and 2.7</td></tr>
<tr><td>Water depth</td><td colspan="3">0 to 58 metres (m)</td><td>N/A</td></tr>
<tr><td rowspan="4">Worst-case spill scenarios</td><td>Scenario</td><td>Hydrocarbon</td><td>Worst-case volume</td><td rowspan="4">Section 6.1</td></tr>
<tr><td>Surface loss of well control</td><td>Reindeer condensate</td><td>4,029 m^3</td></tr>
<tr><td>Hydrocarbon spill from loss of pipeline containment</td><td>Reindeer condensate</td><td>121.4 m^3</td></tr>
<tr><td>Surface spill from vessel collision</td><td>Marine Diesel Oil (MDO)</td><td>325 m^3</td></tr>
<tr><td rowspan="2">Hydrocarbon properties</td><td colspan="3">Reindeer condensate:
Density at 15 °C = 784.2 kg/m^3
Dynamic viscosity = 0.683 cP @ 20 °C
API Gravity = 48.9
Wax content = <5%
Pour point = -36 °C
Oil property classification = Non-Persistent (Group 1)</td><td rowspan="2">Appendix A</td></tr>
<tr><td colspan="3">MDO:
density at 15 °C = 890 kg/m^3
Dynamic viscosity = 14 @ 25 °C)
API Gravity = 27.5
Wax content = 1%
Pour point = −9 °C
Oil property classification = Persistent (light) (Group 2)</td></tr>
<tr><td rowspan="2">Weathering potential</td><td colspan="3">Reindeer condensate:
Reindeer condensate assay results show the condensate to be highly volatile with low viscosity. The weathering curve for Reindeer condensate indicates that a large proportion of the condensate will evaporate rapidly; approximately 74% of the volatile components, is expected to evaporate within the first 12 hours.</td><td rowspan="2">Appendix A</td></tr>
<tr><td colspan="3">MDO:
MDO is a mixture of volatile and persistent hydrocarbons with low viscosity. It will spread quickly and thin out to low thickness levels, thereby increasing the rate of evaporation. Up to 40% will generally evaporate over the first two days. Approximately 5% is considered ‘persistent’, which is unlikely to evaporate, though it will decay over time.</td></tr>
<tr><td>Protection priorities</td><td colspan="3">Dampier Archipelago & Northern Islands Coast</td><td>Reindeer EP Section 3.2, 6.2, 7.5, 7.7 and 7.8
DC EP Section 3.2, 6.2, 7.7 and 7.8.</td></tr>
</table>

2. First-strike response actions

The initial response actions to major incidents at Devil Creek facilities are outlined within the Devil Creek Emergency Response Plan (DC-40-IF-00096). This includes site and role-specific information relevant to the initial stages of an incident response including notifying the Central Control Room (CCR), raising the alarm, mustering of personnel and emergency shutdown (ESD) of facility infrastructure. The Devil Creek Emergency Response Plan (DC-40-IF-00096) should be consulted as an overall guide to incident response at Devil Creek Facilities, which includes all major incidents additional to oil spills.

For hydrocarbon spills to the environment, the Emergency Commander (Facility OIM) is to contact the on-call IMT Duty Manager in Perth.

Following the initial actions undertaken by the Facility OIM / Vessel Master to ensure the safety of, and to control the source of the spill, the Facility OIM / Vessel Master will assess the situation based on:

- What has caused the spill?
- Is the source under control?
- What type of hydrocarbon was spilled?
- How much was spilled?

For spills from support vessels, initial response actions to major incidents are under the direction of the Vessel Master and in accordance with vessel-specific procedures (e.g. Shipboard Oil Pollution Emergency Plans [SOPEPs]).

Response information contained within this Oil Pollution Emergency Plan (OPEP) is concerned primarily with a large scale (Level 2/3) hydrocarbon spill where the Perth-based Incident Management Team (IMT) is engaged for support and implementation of response strategies. Level 1 spills are managed through on-site response and the IMT is available to assist with regulatory requirements/notifications and support if required. Therefore, the immediate response actions listed in Table 2-1 are relevant for any spill. Once sufficient information is known about the spill, the Incident Commander at the Santos IMT in Perth will classify the level of the spill. If the spill is classified as a Level 1 spill, then the actions related to Level 2/3 spills do not apply, unless specified by the IMT Incident Commander.

For Level 2/3 spills from offshore petroleum facilities (petroleum activity spills) the Control Agency is Santos (Commonwealth waters), DoT (State waters) or both Santos and DoT (spill crossing between Commonwealth and State waters). Santos will provide first strike response and then work in coordination with DoT if DoT is required to assume Control Agency responsibilities. First strike activations for a level 2/3 offshore non-vessel spill are found below in Table 2-1.

The Devil Creek Emergency Response Plan (DC-40-IF-00096) and/or Reindeer First Strike Plan (both located on the Santos Emergency Response (ER) SharePoint) should be referred to alongside the first strike activations in Table 2-1.

Table 2-1: First-strike activations

When (indicative)	Activations		Who
	Objective	Action	
All spills			
Immediate	Manage the safety of personnel	Implement site incident response procedures or vessel-specific procedures, as applicable	Emergency Commander (Facility OIM) / Vessel Master
Immediate	Control the source using site resources, where possible	Implement site source control procedures or Vessel Shipboard Oil Pollution Emergency Plans (SOPEP) Refer to source control plan in Section 9	Emergency Commander (Facility OIM) / Vessel Master
30 minutes of incident being identified	Notify Santos Offshore Duty Manager/Incident Commander	Verbally communicate to Offshore Duty Manager/Incident Commander's duty phone	Emergency Commander (Facility OIM) / Vessel Master
As soon as practicable	Obtain as much information about the spill as possible	Provide as much information to the IMT (Incident Commander or delegate) as soon as possible	Emergency Commander (Facility OIM) / Vessel Master
60 minutes	Gain situational awareness and begin on-site spill surveillance	Level 1 spills may only require the use of onsite resources to conduct monitor and evaluate activities (e.g. vessel surveillance). Refer to Monitor and Evaluate Plan in Section 10	Emergency Commander (Facility OIM) / Vessel Master / Incident Commander (Perth based IMT)
Refer to timeframes in Section 7	Notify regulators and stakeholders within specified timeframes	Activate the External Notifications and Reporting Procedures – Section 7	Initial notifications by Planning Section Chief – Section 7
Level 2/3 spills (in addition to actions above)			
Immediately once notified of spill (to Incident Commander)	Activate IMT, if required	Notify IMT	Offshore Duty Manager/ Incident Commander
IMT actions (0 to 48 hours)			
Within 90 minutes from IMT call-out	Set up IMT room	Refer to IMT tools and checklists for room and incident log set-up	Incident Commander IMT Data Manager
	Gain situational awareness and set incident objectives, strategies and tasks	Begin reactive Incident Action Planning process Refer to Section 8 Review First-strike Activations (this table)	Incident Commander Planning Section Chief
Refer to timeframes in Section 7	Notify regulators and stakeholders as required Notify and mobilise/put on standby external oil spill response organisations and support organisations, as required	Refer to Section 7	Initial notifications by Planning Section Chief Oil Spill Response Organisations (Australian Marine Oil Spill Centre [AMOSC] and Oil Spill Response Ltd [OSRL]) activation by designated call-out authorities (Incident Commanders/Duty Managers)

When (indicative)	Activations		Who
	Objective	Action	
Refer to timeframes in Section 10	Implement monitor and evaluate tactics in order to provide situational awareness to inform IMT decision making	Vessel Surveillance (Section 10.1) Aerial Surveillance (Section 10.2) Tracking Buoys (Section 10.3) Oil Spill Trajectory Modelling (Section 10.4) Satellite imagery (Section 10.5)	Operations Section Chief Logistics Section Chief/ Supply Unit Leader Environment Unit Leader
Activate on Day 1 as applicable to the incident	Activate source control support to stop the release of hydrocarbons into the marine environment. **Degree of IMT support will be scenario dependent**	Activate the source control plan. Refer to Section 9	Operations Section Chief (Source Control Branch Director as appropriate to scenario) Logistics Section Chief/ Supply Unit Leader
Activate on Day 1 as applicable to the incident Refer to Section 11	Reduce exposure of shorelines and wildlife to floating oil through mechanical dispersion	Activate the Mechanical Dispersion Plan Refer to Section 11	Operations Section Chief Logistics Section Chief/ Supply Unit Leader
Activate on Day 1 as applicable to the incident Refer to Section 16	Assess and monitor effectiveness of response strategies and impacts from spill and response	Activate the Santos North West Shelf Operational and Scientific Monitoring Bridging Implementation Plan (7715-650-ERP-0002) Refer to Section 16	Environment Unit Leader Logistics Section Chief/ Supply Unit Leader Operations Section Chief
Day 1	Identify environmental sensitivities at risk and conduct operational Net Environmental Benefit Analysis (NEBA)	Review situational awareness and spill trajectory modelling Review strategic NEBA and begin operational NEBA (Section 6.7)	Environment Unit Leader
Day 1	Develop forward operational base/s to support forward operations	Begin planning for forward operations base as per Forward Operations Plan (Appendix N)	Operations Section Chief Logistics Section Chief/ Supply Unit Leader
Day 1	Ensure the health and safety of spill responders	Identify relevant hazards controls and develop hazard register Begin preparing site health and safety management requirements Refer Oil Spill Response Health and Safety Management Manual (SO-91-RF-10016)	Safety Officer
If/ when initiated Refer to Section 12	Protect identified shoreline protection priorities	Activate the Shoreline Protection and Deflection Plan Refer to Section 12	Operations Section Chief Logistics Section Chief /Supply Unit Leader Environment Unit Leader
If/ when initiated Refer to Section 15	Prevent or reduce impacts to wildlife	Activate the Oiled Wildlife Response (OWR) Plan Refer to Section 15	Environment Unit Leader Operations Section Chief

When (indicative)	Activations		Who
	Objective	Action	
			Logistics Section Chief/ Supply Unit Leader
If/ when initiated Refer to Section 13	Clean-up oiled shorelines	Activate Shoreline Clean-Up Plan Refer to Section 13	Operations Section Chief Logistics Section Chief/ Supply Unit Leader
If/when initiated Refer to Section 17	Safely transfer, transport and dispose of waste collected from response activities	Activate the Waste Management Plan Refer to Section 17	Operations Section Chief Logistics Section Chief/ Supply Unit Leader
IMT Actions (48+ hours)			
Ongoing	For ongoing incident management – indicatively 48 + hours – adopt a formal incident action planning process is to be adopted to continue with the spill response strategies identified above. An Incident Action Plan (IAP) is to be developed for each successive operational period. Santos will maintain control for those activities for which it is the designated Control Agency/ Lead IMT. Depending on the specifics of the spill, the Australian Maritime Safety Authority (AMSA) and/or Western Australia (WA) Department of Transport (DoT) may be relevant Control Agencies (see Section 4.2). If another Control Agency has taken control of aspects of the response, Santos will provide support to that Control Agency. Santos' support to WA DoT (for a WA State waters response) is detailed in Section 4.7.1.		Control Agency IMT Santos to provide the following roles to DoT Maritime Environmental Emergency Coordination Centre (MEECC) / IMT for WA State waters response (refer to Table 5-5): • Crisis Management Team (CMT) Liaison Officer • Deputy Incident Controller • Deputy Intelligence Officer • Deputy Planning Officer • Environment Support Officer • Deputy Public Information Officer • Deputy Logistics Officer • Deputy Waste Management Coordinator • Deputy Finance Officer • Deputy Operations Officer • Deputy Division

3. Introduction

This document is the accompanying Oil Pollution Emergency Plan (OPEP) to the Reindeer Wellhead Platform and Offshore Gas Supply Pipeline Operations Environment Plan (EP) WA-41-L and WA-18-PL (7715-650-EMP-0023) required by the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Environment Regulations) and also the accompanying Oil Spill Contingency Plan (OSCP) to the Devil Creek Gas Supply Pipeline and Sales Gas Pipeline Operations Environment Plan (EP) (onshore & State waters) (7715-650-EMP-0022-01) required by the Petroleum (Submerged Lands) (Environment) Regulations 2012).

3.1 Description of activity

This OPEP covers the continuous operational activities at the Reindeer WHP and associated 16” gas/condensate export pipeline (referred to as the DC supply pipeline). The DC supply pipeline runs from the WHP to the Devil Creek Gas Plant (DCGP) (Figure 3-1). This OPEP does not cover activities within the DCGP.

Gas and condensate is produced from the Reindeer gas field at the WHP, approximately 80 km northwest of the Port of Dampier, situated in 58 m water depth. The gas/condensate from production wells is transported ashore through the DC supply pipeline and processed at the DCGP. The DC supply pipeline crosses Commonwealth and State waters and continues onshore as a buried pipeline from the horizontal directional drilling (HDD) entrance point just offshore from the shoreline until it reaches the DCGP. The DC supply pipeline comprises 43 km in Commonwealth waters, 48 km in State waters and approximately 11 km onshore. Dry sales gas produced at the DCGP is fed into the Dampier Bunbury Natural Gas Pipeline (DBNGP), for industrial customers via the DC sales gas pipeline.

Operations covered by the OPEP include, but are not limited to the following:

- Production and transport of gas/condensate between the WHP and the DCGP via the DC supply pipeline
- Transport of dry sales gas from DCGP to DBNGP via the DC sales gas pipeline
- Inspections, surveys, maintenance and modifications of the WHP and DC pipelines (comprised of the DC supply pipeline and the DC sales gas pipeline)
- Vessel based operations supporting the above
- Transfer of personnel, equipment and chemicals to the WHP by vessel
- Cessation of production activities including flushing and filling of DC pipelines with preservation fluids or nitrogen and IMMR activities as needed.

A detailed description of the operational activities associated with the Reindeer WHP and associated pipeline are provided in the Reindeer WHP and Offshore Gas Supply Pipeline Operations Environment Plan WA-41-L and WA-18-PL (Reindeer EP;7715-650-EMP-0023) and Devil Creek Gas Supply and Sales Gas Pipeline Operations Environment Plan (onshore & State waters) (Devil Creek EP; 7715-650-EMP-0022-01). A schematic overview of the Reindeer WHP and Devil Creek offshore and onshore gas supply pipeline is provided in Figure 3-2.

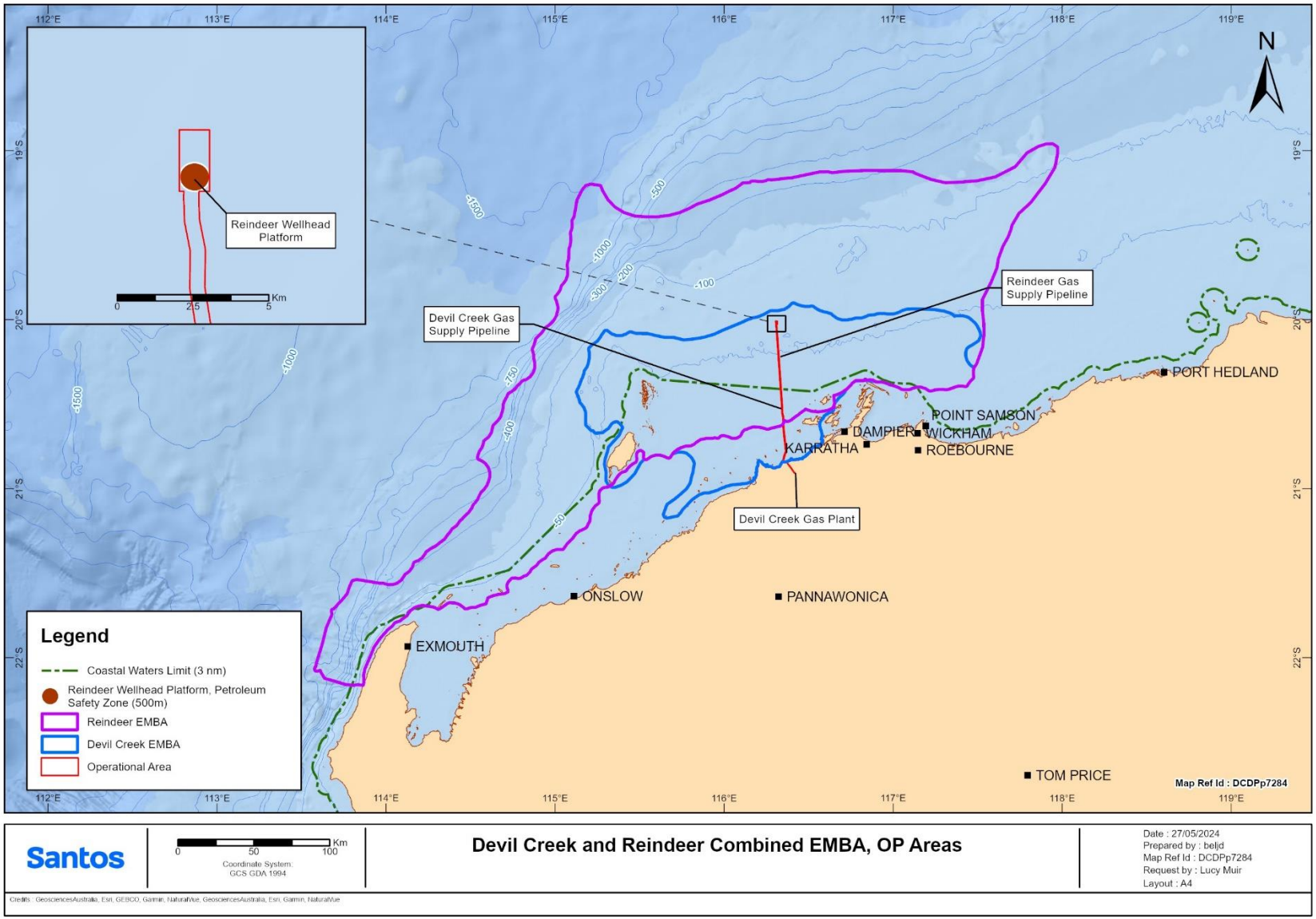

Figure 3-1: Reindeer and Devil Creek Operational Areas

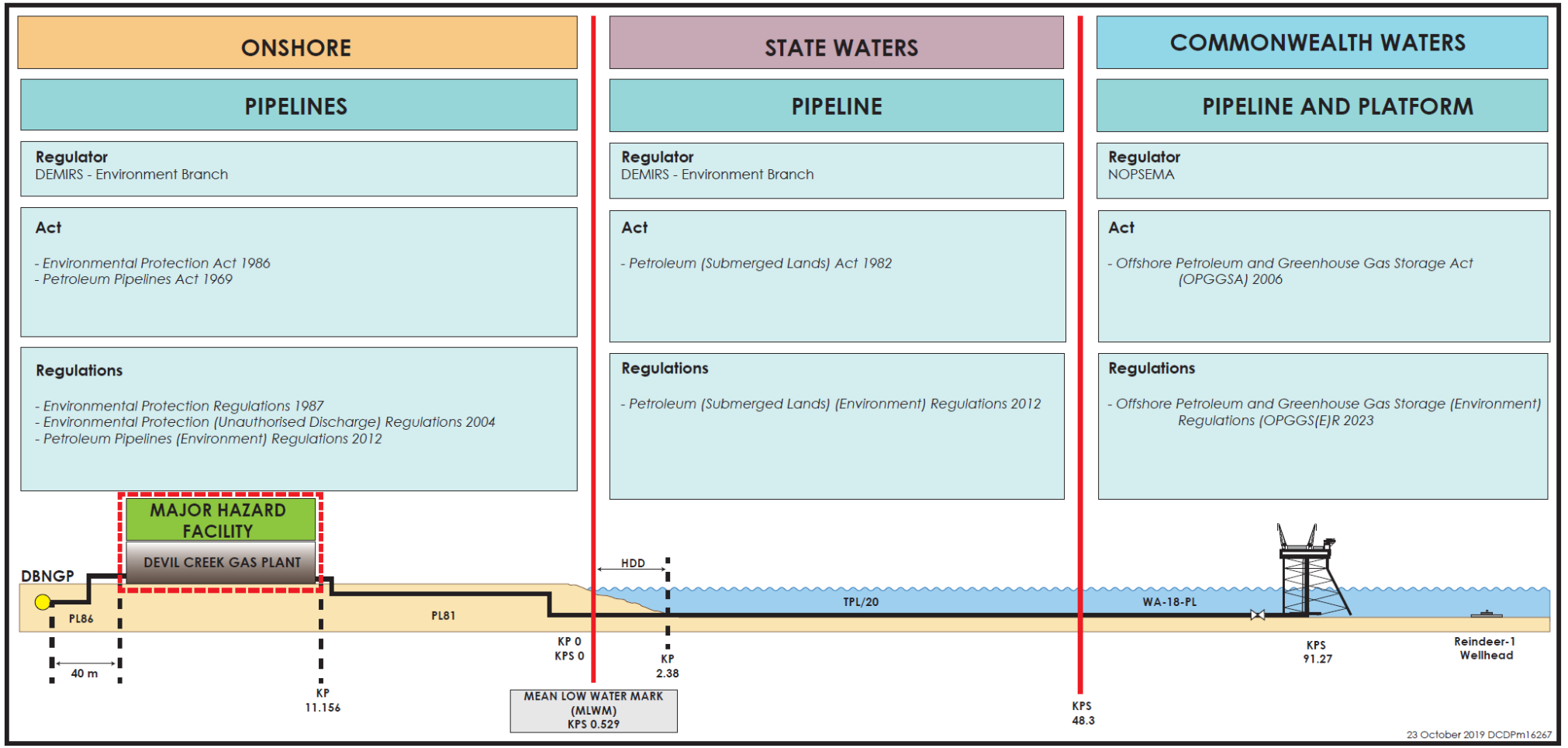

Figure 3-2: Schematic of the Reindeer WHP and Devil Creek Pipeline

3.2 Purpose

This OPEP describes Santos' response to a hydrocarbon spill during any activities associated with the operations, CoP and IMMR occurring at the Reindeer WHP or the DC pipelines stated in the relevant Environment Plans.

This OPEP was developed to meet all relevant requirements of the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 and the WA State Petroleum (Submerged Lands) (Environment) Regulations 2012. It is consistent with the Australian (national) and State (WA) systems for oil pollution preparedness and response, which are detailed in these documents:

- National Plan for Maritime Environmental Emergencies (AMSA 2020) managed by AMSA
- WA State Hazard Plan for Maritime Environmental Emergencies (SHP-MEE) (WA DoT 2024) and WA Incident Management Plan – (WA DoT 2023).

This OPEP is to be read in conjunction with the Reindeer WHP and Offshore Gas Supply Pipeline Operations Environment Plan WA-41-L and WA-18-PL (EP) (7715-650-EMP-0023) and the Devil Creek Gas Supply Pipeline and Sales Gas Pipeline Operations Environment Plan (onshore & State waters) (EP) (7715-650-EMP-0022-01) when considering the existing environment, environmental impacts, risk management, performance standards and the reporting compliance requirements.

This OPEP will apply from acceptance of the EPs and will remain valid for 2.5 years under State legislation and 5 years under Commonwealth legislation.

The response strategies outlined in this OPEP have been developed by Santos using risk assessments to identify credible worst-case hydrocarbon spill scenarios, expected/calculated release rates, known information of hydrocarbon types and behaviour, and expected partitioning of the hydrocarbon within the marine environment with an estimate of the volume of persistent oil. This information has been modelled to give a theoretical zone of dispersion that is used to identify potential sensitive receptors and response strategies required to reduce the consequences of a spill to 'as low as reasonably practicable' (ALARP). The response strategies are identified under a NEBA process so the most effective response strategies with the lowest environmental consequences can be identified, documented, and prepared for.

3.3 Objectives

The aim of this OPEP is to provide detailed guidance to Santos' IMT, so that it will direct its response effort with the aim of preventing long-term significant environmental impacts by safely limiting the adverse environmental effects from an unplanned release of hydrocarbons to the marine environment to a level that is ALARP. This will be achieved by implementing the various strategies and spill response mechanisms presented throughout this OPEP. Through this implementation, Santos will:

- initiate spill response immediately following a spill
- establish source control as soon as reasonably practicable to minimise the amount of oil being spilt into the environment
- assess the spill characteristics and understand its fate so as to make informed and clear response decisions
- monitor the spill to identify the primary marine and coastal resources requiring protection
- remove as much oil as possible from the marine environment while keeping environmental impacts from the removal methods to ALARP
- reduce the impacts of the remaining floating and stranded oil to ALARP
- respond to the spill using efficient response strategies that do not damage the environment
- comply with all relevant environmental legislation when implementing this OPEP
- conduct all responses safely without causing harm to participants
- monitor the impacts from a spill until impacted habitats have returned to baseline conditions
- remain in a state of 'Readiness' at all times for implementing of this OPEP by keeping resources ready for deployment, staff fully trained and completing response exercises as scheduled
- keep stakeholders informed of the status of the hydrocarbon spill response to help reduce social and economic impacts.

3.4 Area of Operation

The Reindeer WHP is located approximately 80 km northwest of the Port of Dampier, Western Australia in Commonwealth waters (Figure 3-1). The DC supply pipeline crosses Commonwealth and State waters and continues onshore as buried pipeline until it reaches the DCGP. The DCGP is located approximately 10 km inland from Gnoorea Point and Forty Mile Beach.

The Reindeer facilities sit within production licence WA-41-L and WA-18-PL. The Commonwealth section of the pipeline sits within Pipeline Licence WA-18-PL, while the State sections of the pipeline sit within Pipeline Licence TPL/20 with an onshore pipeline within Pipeline Licence PL81. Section 3 of the Reindeer WHP and Offshore Gas Supply Pipeline Operations Environment Plan (EP) (7715-650-EMP-0023) and Devil Creek Gas Supply Pipeline and Sales Gas Pipeline Operations Environment Plan (EP) (7715-650-EMP-0022-01) include comprehensive descriptions of the existing environment.

3.5 Interface with internal documents

In addition to this OPEP, several other Santos documents provide guidance and instruction relevant to spill response, including:

- Incident Management Plan – Upstream Offshore (SO-00-ZF-00025)
- Santos Incident Management Handbook
- Santos Crisis Management Plan (SMS-HSS-OS05-PD03)
- Reindeer WHP Operations Environment Plan (EA-14-RI-10002.01)
- Devil Creek Offshore Gas Supply Pipeline Operations Environment Plan (EA-14-RI-10001.01)
- Devil Creek Emergency Response Plan (DC-40-IF-00096)
- Reindeer First Strike Plan
- FES Emergency Response Guide (DC-40-IF-000990)
- Incident Response Telephone Directory (SO-00-ZF-00025.020)
- Environment Incident Notification Guideline and Matrices (QE-91-HF-10003)
- Source Control Planning and Response Guideline (DR-00-OZ-20001)
- Reindeer Well Operations Management Plan (WOMP) (DR-91-ZG-10038)
- 16” Reindeer Pipeline Operational Safety Case and Pipeline Management Plan (RE-14-RF-00036.02)
- Reindeer Schlumberger Report 1-1BAORA3
- Reindeer Source Control Plan Rev0 (28th Sept 2017)
- NWA Waste Management Plan – Oil Spill Response Support (7715-650-ERP-0001)
- Oil Spill Response Health and Safety Management Manual (SO-91-RF-10016)
- Santos Offshore Division Incident and Crisis Management Exercise and Training Plan (SO-92-HG-10001)
- Santos Oiled Wildlife Response Framework Plan (7700-650-PLA-0017)
- Santos North West Shelf Operational and Scientific Monitoring – Bridging Implementation Plan (OSM-BIP) (7715-650-ERP-0002)
- Santos Offshore Division Oil Spill Response Readiness Guideline (7710-650-GDE-0001)
- Santos Offshore - Vessel Requirements for Oil Spill Response (7710-650-ERP-0001)
- Santos Offshore - Oil and Water Sampling Procedures (7710-650-PRO-0008)
- Santos Oil Spill Response - Forward Operating Base Guideline (SO-91-IF-20017).

3.6 Interface with external documents

Information from the following external documents have been used or is referred to in this OPEP:

- AMOSPlan – Australian Industry Cooperative Spill Response Arrangements
  - details the cooperative arrangements for response to oil spills by Australian oil and associated industries.
- Offshore Petroleum Incident Coordination Framework
  - provides overarching guidance on the Australian Government's role and responsibilities in the event of an offshore petroleum incident in Commonwealth waters
- National Plan for Maritime Environmental Emergencies & National Marine Oil Spill Contingency Plan
  - sets out national arrangements, policies and principles for managing maritime environmental emergencies. The Plan provides for a comprehensive response to maritime environmental emergencies regardless of how costs might be attributed or ultimately recovered.
- Western Australia State Hazard Plan: Maritime Environmental Emergencies (SHP-MEE)
  - details the management arrangements for preparing for and responding to maritime environmental emergencies occurring in State waters.
- WA DoT Incident Management Plan – Marine Oil Pollution
  - provides the WA DoT, as the hazard management agency (HMA) for marine oil pollution (MOP), with an incident management plan that outlines the procedures and arrangements for responding to MOP incidents occurring within or impacting WA State waters
  - WA DoT's Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements (go to: DoT's Offshore Petroleum Industry Guidance Note – Marine Oil pollution: Response and Consultation Arrangements).
- Western Australia Oiled Wildlife Response Plan (WAOWRP)
  - establishes the framework for responding to potential or actual wildlife impacts in WA State waters, within the framework of an overall maritime environmental emergency
  - outlines risk reduction strategies, preparedness for, response to and initiation of recovery arrangements for wildlife impacts during a marine oil pollution incident.
- Western Australia Oiled Wildlife Response Manual
  - a companion document to the WAOWRP for Maritime Environmental Emergencies, designed to standardise operating procedures, protocols and processes for wildlife response.
- Joint Industry Operational and Scientific Monitoring Framework
  - provides a standardised approach to oil pollution monitoring, including industry guidance, templates, worked examples and standardised Operational and Scientific Monitoring Plans that titleholders can apply to identify and detail monitoring arrangements and capabilities in their EP and OPEP submissions.
- Shipboard Oil Pollution Emergency Plans (SOPEPs)
  - under MARPOL Annex I requirements, all vessels of over 400 gross tonnage must have a current SOPEP. The SOPEP includes actions to be taken by the crew in the event of an oil spill including steps taken to contain the source with equipment available onboard the vessel.
- Oil Spill Response Limited (OSRL) Associate Agreement
  - defines the activation and mobilisation methods of OSRL spill response personnel and equipment allocated under contract.
- Western Australia State Hazard Plan for Hazardous Materials Emergencies (HAZMAT)
  - details the emergency management arrangements for hazardous materials emergencies throughout the State of Western Australia
- Australian Government Coordination Arrangements for Maritime Environmental Emergencies
  - provides a framework for coordinating of Australian Government departments and agencies in response to maritime environmental emergencies.

- Pilbara Ports Authority Port of Dampier Handbook (Pilbara Ports Authority, 2024) (https://www.pilbaraports.com.au/about-pilbara-ports/publications/forms-and-publications/forms-and-publications/handbook/2024/february/port-of-dampier-handbook)
  - defines the requirements for marine oil pollution reporting within the Port of Dampier limits.
- Pilbara Ports Authority Port of Ashburton Handbook (Pilbara Ports Authority, 2022) (https://www.pilbaraports.com.au/about-ppa/publications/forms-and-publications/forms-publications/handbook/2022/may/port-of-ashburton-port-handbook)
  - defines the requirements for marine oil pollution reporting within the Port of Ashburton limits.
- Port of Varanus Island Port Handbook (Pilbara Port Authority 2021a (https://www.pilbaraports.com.au/about-pilbara-ports/publications/forms-and-publications/forms-and-publications/handbook/2021/july/port-of-varanus-island-handbook)
  - defines the requirements for marine oil pollution reporting within the Port of Varanus Island limits
- Pilbara Ports West Marine Pollution Contingency Plan (MPCP) (Pilbara Ports Authority, 2021b) (https://www.pilbaraports.com.au/about-ppa/publications/forms-and-publications/forms-publications/form/2021/july/pilbara-ports-west-marine-pollution-contingency-pl)
  - provides a source of information for individuals and agencies responsible for developing and managing oil spill response capabilities within Pilbara Ports West port limits.

3.7 Document review

In line with regulatory requirements, this document shall be reviewed, updated and submitted to Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) every 2.5 years from date of acceptance, until the activity is complete. Further, in line with Commonwealth regulatory requirements, this document shall be reviewed, updated and submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) every 5 years from date of acceptance, until the activity is complete.

The document may be reviewed and revised more frequently, if required, in accordance with the Santos Management of Change Procedure (EA-91-IQ-10001). This could include changes required in response to one or more of the following:

- when major changes have occurred that affect oil spill response coordination or capabilities
- changes to the Environment Plan that affect oil spill response coordination or capabilities (e.g. a significant increase in spill risk)
- following routine testing of the OPEP if improvements or corrections are identified
- after a Level 2/3 spill incident.

The extent of changes made to the OPEP and resultant requirements for regulatory resubmission will be informed by the relevant regulations, i.e. the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 and the Petroleum (Submerged Lands) (Environment) Regulations 2012.

3.8 OPEP custodian

The Custodian of the OPEP is the Santos Lead Oil Spill Risk & Planning Coordinator based in the Santos Perth Office.

4. Spill management arrangements

4.1 Response levels and escalation criteria

Santos uses a tiered system of 3 incident response levels consistent with the National Plan for Maritime Environmental Emergencies (AMSA 2020) and the WA SHP-MEE (WA DoT 2024). Spill response levels help identify the severity of an oil spill incident and the level of response required to manage the incident and mitigate environmental impacts. Incident response levels are outlined in the Santos Incident Management Plan – Upstream Offshore (SO-00-ZF-00025) and further detailed in Table 4-1 for hydrocarbon spills.

Table 4-1: Santos oil spill response levels

Level 1	
An incident that will not have an adverse effect on the public or the environment which can be controlled using resources normally available onsite without the need to mobilise the Santos IMT or other external assistance.	
• Spill is contained within the incident site. • Spill occurs within immediate proximity to the site. • Incident can be managed by the Emergency Response Team (ERT) and its resources.	• Source of spill has been contained. • Oil is evaporating quickly and no danger of explosive vapours. • Spill likely to naturally dissipate. • No media interest/no adverse effect on the public.
Level 2	
An incident that cannot be controlled by the use of onsite resources alone and requires external support and resources to combat the situation; or **An incident that can be controlled onsite but which may have an adverse effect on the public or the environment.**	
• Danger of fire or explosion. • Possible continuous release. • Concentrated oil accumulating close to the site or vessel. • Potential to impact other installations.	• Level-1 resources overwhelmed, requiring additional regional resources. • Potential impact to sensitive areas and/or local communities. • Local/national media attention/may adversely affect the public or the environment.
Level 3	
An incident that has a wide ranging impact on Santos and may require the mobilisation of external state, national or international resources to bring the situation under control.	
• Loss of well integrity. • Actual or potentially serious threat to life, property, industry. • Major spill beyond site vicinity. • Significant shoreline environmental impact.	• Level-2 resources overwhelmed, requiring international assistance. • Level- 3 resources to be mobilised. • Significant impact on local communities. • International media attention.

4.2 Jurisdictional authorities and control agencies

The responsibility for an oil spill depends on the spill's location and its origin. The National Plan for Maritime Environmental Emergencies (AMSA 2020) sets out the divisions of responsibility for an oil spill response. Definitions of Control Agency and Jurisdictional Authority are as follows:

- **Control Agency:** the organisation assigned by legislation, administrative arrangements or within the relevant contingency plan, to control response activities to a maritime environmental emergency. Control Agencies have the operational responsibility of response activities but may have arrangements in place with other parties to provide response assistance under their direction.
- **Jurisdictional Authority:** the agency responsible for verifying that an adequate spill response plan is prepared and, in the event of an incident, that a satisfactory response is implemented. The Jurisdictional Authority is also responsible for initiating prosecutions and the recovery of clean-up costs on behalf of all participating agencies.

Table 4-2 provides guidance on the designated Control Agency and Jurisdictional Authority for Commonwealth and State waters and for vessel and petroleum activity spills.

To help determine a vessel versus a petroleum activity spill, the following guidance is adopted:

State waters:

- An offshore petroleum operation includes commissioning, operating or maintaining an offshore petroleum site and constructing, commissioning, operating or maintaining administrative or other support facilities at or in the vicinity of an offshore petroleum site, as defined by Section 4A (4)(b &d) of the *Petroleum (Submerged Lands) Act 1982.*
- An offshore petroleum activity does not include providing supplies to a vessel or structure or otherwise travelling between a vessel or structure and the shore, as defined by Section 5(c) of the *Petroleum (Submerged Lands) Act 1982*.

Commonwealth waters:

- A vessel is a ship at sea to which the Commonwealth *Navigation Act 2012* applies. Defined by Australian Government Coordination Arrangements for Maritime Environmental Emergencies (AMSA 2017a) as a seismic vessel, supply or support vessel, or offtake tanker.
- A petroleum activity includes facilities such as a fixed platform, FPSO/FSO, MODU, subsea infrastructure for the recovery of petroleum, for the processing of petroleum, or for the storage and offloading of petroleum, or for any combination of those activities and for any other purpose related to offshore petroleum operations , as defined by Schedule 3, Part 1, Clause 4 and Volume 2, Part 6.8, Section 640 of the Commonwealth *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGS Act 2006).

Table 4-2: Jurisdictional and control agencies for hydrocarbon spills

Jurisdictional boundary	Spill source	Jurisdictional Authority	Control Agency		Relevant documentation
			Level 1	Level 2/3	
Western Australian (WA) state waters (State waters to three nautical miles and some areas around offshore atolls and islands)	Vessel	WA DoT	WA DoT	WA DoT	• Vessel SOPEP • State Hazard Plan: Maritime Environmental Emergencies (WA DoT 2024) • WA Incident Management Plan Marine Oil Pollution (WA DoT 2023)
	Petroleum activities	WA DoT	Titleholder	WA DoT	• State Hazard Plan: Maritime Environmental Emergencies (WA DoT 2024)
WA State Waters within Pilbara Port Authority Limits[1]	Vessel	WA DoT	Port Authority[2]	Port Authority / DoT[3]	• Port of Varanus Island Port Handbook (Pilbara Port Authority 2021a) • Pilbara Ports West – Marine Pollution Contingency Plan (Pilbara Port Authority 2021b) • Port of Ashburton Port Handbook (Pilbara Port Authority 2022) • State Hazard Plan: Maritime Environmental Emergencies (WA DoT 2024)
	Petroleum activities	WA DoT	Port Authority	DoT	• State Hazard Plan: Maritime Environmental Emergencies (WA DoT 2024)
Commonwealth waters (three to 200 nautical miles from territorial/state sea baseline)	Vessel[4]	AMSA	AMSA		• Vessel SOPEP • National Plan
	Petroleum activities[5]	NOPSEMA	Titleholder		• Devil Creek Pipeline and Reindeer Well Head Platform OPEP

[1] The Varanus Island port limits are defined in section 4 of the Port of Varanus Island Port Handbook (Pilbara Port Authority 2021a).

[2] DoT and the Port Authority may assign, through IMPs/OSCPs/OPEPs, emergency response functions to a Port Operator or Port Facility Operator for spills originating from their activities, however the role of Control Agency will remain with the nominated agency or organisation as per Table 4-2 above (Pilbara Port Authority 2021a).

[3] For any incident originating in Port Authority waters, the relevant Port Authority will be the Controlling Agency, unless for Level 2 and 3 incidents it is deemed by the HMA/SMPC in consultation with the Port Authority that it is more suitable for DoT to be the Controlling Agency (WA DoT, 2024).

[4] Vessels are defined by Australian Government Coordination Arrangements for Maritime Environmental Emergencies (AMSA 2017a) as a seismic vessel, supply or support vessel. Note: this definition does not apply to WA State waters.

[5] A petroleum activity includes facilities such as a fixed platform, FPSO/FSO, MODU, subsea infrastructure for the recovery of petroleum, for the processing of petroleum, or for the storage and offloading of petroleum, or for any combination of those activities and for any other purpose related to offshore petroleum operations, as defined by Schedule 3, Part 1, Clause 4 and Volume 2, Part 6.8, Section 640 of the OPGGS Act 2006.

4.3 Petroleum activity spill in State Waters

If a Marine Oil Pollution Incident occurs within State waters, the DoT is the Hazard Management Agency (HMA) (DoT Chief Executive Officer or proxy). The Director Maritime Environmental Emergency Response (MEER) & Ports has been nominated by the HMA to perform the role of State Marine Pollution Coordinator (SMPC) (as prescribed in Section 1.3 of the SHP – MEE (WA DoT 2024). Under the SHP-MEE, the Control Agency for Level 1 Petroleum Activity spills in State waters is the Petroleum Titleholder (Santos) with the Control Agency for Level 2/3 spills nominated as DoT. During a MEE incident within State and Port Waters, the role of the SMPC provides strategic management of the incident response on behalf of the HMA.

Whilst Santos is not the Control Agency for Level 2/3 Petroleum Activity spills in State waters, Santos is required to have adequate plans and resources available to respond to a worst-case spill originating in State waters under the following State petroleum legislation administered by DEMIRS:

- *Petroleum (Submerged Lands) Act 1982* and Petroleum (Submerged Lands) (Environment) Regulations 2012
- *Petroleum Pipelines Act 1969* and Petroleum Pipelines (Environment) Regulations 2012

Where DoT has assumed the role of Control Agency, Santos will provide all necessary resources to assist DoT. The framework under which Santos will provide support to DoT for an oil spill response within State waters is detailed in Section 4.7.1.

4.4 Petroleum activity spill in Commonwealth Waters

For an offshore petroleum activity spill, the Jurisdictional Authority is NOPSEMA, which is responsible for overseeing response actions to pollution events from offshore petroleum activities in areas under Commonwealth jurisdiction. During a spill incident, NOPSEMA's role will be to implement regulatory processes to monitor and secure compliance with the OPGGS Act 2006 and OPGGS (E) Regulations, including the issuing of directions as required, and investigate accidents, occurrences and circumstances involving deficiencies in environmental management.

Under the OPGGS Act 2006 and OPGGS (E) Regulations, the petroleum titleholder (i.e. Santos) is responsible for responding to an oil spill incident as the Control Agency in Commonwealth waters, in accordance with its OPEP.

4.5 Vessel spills

In all circumstances, the Vessel Master is responsible for implementing source control arrangements detailed in the vessel-specific SOPEP.

Once initial notifications to the Control Agency are made, Santos shall maintain direct contact with the Control Agency and act as a supporting agency throughout the response. This includes providing essential services, personnel, materials or advice in support of the Control Agency. In addition, Santos will be required to implement monitoring activities as outlined in the Monitor and Evaluate Plan (Section 10) and Operational and Scientific Monitoring (Section 16).

4.5.1 Commonwealth Waters

For a vessel incident originating in Commonwealth Waters the Jurisdictional Authority and Control Agency is AMSA. AMSA is the national shipping and maritime industry regulator and was established under the *Australian Maritime Safety Authority Act 1990*. AMSA manages the National Plan on behalf of the Australian Government, working with State and the Northern Territory governments, emergency services and private industry to maximise Australia's marine pollution response capability.

As with petroleum activity spills, Santos is required to have adequate preparedness arrangements for spills from vessels undertaking Petroleum Activities within Commonwealth waters under OPGGS Act 2006 and OPGGS (E) Regulations.

Santos will be responsible for coordinating a first-strike response to a vessel-based spill in Commonwealth waters until AMSA takes over the role as Control Agency, at which time Santos would provide all available resources as a Supporting Agency.

4.5.2 State Waters

For a vessel incident originating in State Waters the Jurisdictional Authority/ Hazard Management Agency is DoT. DoT is also the Control Agency for Level 2/3 vessel spills in State waters under SHP-MEE arrangements.

As with petroleum activity spills, Santos is required to have adequate preparedness arrangements for spills from vessels undertaking petroleum activities within State Petroleum legislation administered by DEMIRS.

Santos will be responsible for coordinating a first-strike response to all vessel-based spills until DoT takes over the role as Control Agency, in the event of a Level 2/3 spill, at which time Santos would provide all necessary resources (including personnel and equipment) as a Supporting Agency.

4.6 Cross-jurisdictional spills

4.6.1 Cross-jurisdictional petroleum activity spills

For a Level 2/3 Petroleum Activity spill, there is the possibility of the spill crossing jurisdictions between Commonwealth and State waters. In these instances, the Jurisdictional Authority remains true to the source of the spill (i.e. NOPSEMA for Commonwealth waters and DoT for State waters). Where a Level 2/3 spill originating in Commonwealth waters moves into State waters two Control Agencies will exist: DoT and the Petroleum Titleholder (Santos), each with its own Incident Management Team (IMT) and Lead IMT responsibilities.

The arrangements between DoT and Santos for sharing resources and coordinating a response across both Commonwealth and State waters are further detailed in Section 4.7.

4.6.2 Cross-jurisdictional vessel spills

For a large vessels spill (Level 2/3) that crosses Jurisdictions between Commonwealth and State waters two Jurisdictional Authorities exist; AMSA for Commonwealth waters and DoT for State waters. Coordination of Control Agency responsibilities will be determined by DoT and AMSA, based on incident specifics with Santos providing all necessary resources (including personnel and equipment) as a supporting agency, as detailed in Section 4.7.

AMSA may request that DoT manage a vessel incident in Australian Commonwealth waters (WA DoT 2024).

4.6.3 Onshore spills

In the event of a hydrocarbon spill along the onshore section of Santos's Devil Creek Pipeline, the Jurisdictional Authority and Hazard Management Agency (HMA) for incident response is the Department of Fire and Emergency Services (DFES). The DFES is the prescribed HMA for response under the Emergency Management Regulations 2006 for all emergencies in which there is an "actual or impending spillage, release or escape of oil or an oily mixture that is capable of causing loss of life, injury to a person or damage to the health of a person, property or the environment".

The DFES will respond as Control Agency in accordance with the State Hazard Plan: Hazardous Materials Emergencies (HAZMAT), which includes emergencies at or involving onshore pipelines licensed pursuant to the *Petroleum Pipelines Act 1969* (Section 1.2.2 (c)).

Notwithstanding this, Santos is required to have adequate plans and resources available to effectively respond to a worst-case spill originating from its pipelines as per the *Petroleum Pipelines Act 1969* and Petroleum Pipelines (Environment) Regulations 2012. Santos will provide first strike response until such time as DFES assumes control.

As stated in the HAZMAT on-site recovery and clean-up of hazardous materials is the responsibility of the owner and as such, Santos will ensure clean-up and remediation of any onshore spill is completed to the satisfaction of the Department of Water and Environmental Regulation (DWER) as the relevant Jurisdictional Authority for the clean-up of onshore oil spill pollution and management of contaminated sites.

4.7 Integration with government organisations

4.7.1 Western Australia – Department of Transport

For Level 2/3 spills entering or within WA State waters/shorelines, DoT as the Control Agency is the ultimate decision maker regarding identification and selection of protection priorities. DoT will utilise their internal processes which typically includes the following:

- evaluation of situational awareness information, including all surveillance, monitoring and visualisation data provided by the Titleholder
- evaluation of resources at risk including use of the WA Oil Spill Response Atlas and any other relevant WA/Commonwealth government databases or other information sources
- evaluation of shoreline types, habitat types and seasonality of environmental, socio-economic and cultural values and sensitivities

- consultation with the State Environmental Scientific Coordinator and other relevant State and Federal government departments with environmental responsibilities
- consultation with other relevant oil spill agencies, including the AMSA Environment, Science and Technology network or any other experts as necessary
- all information is utilised in a NEBA/ Spill Impact Mitigation Assessment (SIMA) type process, to determine protection priorities and response strategies.

DoT will adjust/amend their internal processes to suit the spill situation at the time.

Santos will notify the DoT Maritime Environmental Emergency Response (MEER) unit as soon as reasonably practicable (within 2 hours of spill occurring) if an actual or impending spill occurs within or may impact WA State waters. On notification, the SMPC will activate their MEECC and the DoT IMT. Titleholders will work in partnership with DoT during such instances, as outlined within the DoT's Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements (WA DoT 2020).

Santos will conduct initial response actions in State waters as necessary in accordance with its OSCP and continue to manage those operations until formal handover of incident control in State Waters is completed. Appendix 1 in DoT's Offshore Petroleum Industry Guidance Note (WA DoT 2020) provides a checklist for formal handover. Beyond formal handover, Santos will continue to provide all necessary resources, including personnel and equipment, to assist the DoT in performing duties as the Control Agency for State Waters.

For a cross-jurisdictional response, there will be a Lead IMT (DoT or Santos) for each spill response activity, noting that DoT only has jurisdictional/control agency authority within State waters.

Appendix 2 in DoT's Offshore Petroleum Industry Guidance Note (WA DoT 2020) provides guidance on the allocation of a Lead IMT to response activities for a cross-jurisdictional spill.

To facilitate coordination between DoT and Santos during a cross-jurisdictional response, a Joint Strategic Coordination Committee will be established. The Joint Strategic Coordination Committee will be jointly chaired between the SMPC and a nominated senior representative of Santos and will ensure alignment of objectives and provide a mechanism for de-conflicting priorities and resourcing requests.

For a cross-jurisdictional response Santos will be responsible for ensuring adequate resources are provided to DoT as Control Agency, initially 11 personnel to fill roles in the DoT IMT or Forward Operating Bases (FOB) (refer to Section 5.2) and operational personnel to assist with those response strategies where DoT is the Lead IMT. Concurrently DoT will also provide two of their personnel to the Santos IMT as described in Table 5-2. Santos' CMT Liaison Officer and the Deputy Incident Controller are to attend the DoT Fremantle Incident Control Centre (ICC) as soon as possible after the formal request has been made by the SMPC. It is an expectation that the remaining initial cohort will attend the DoT Fremantle ICC no later than 8am on the day following the request being formally made to Santos by the SMPC. Santos personnel designated to serve in DoT's FOB will arrive no later than 24 hours after receipt of formal request from the SMPC.

Figure 4-1 shows the organisational structure of Santos incident management personnel within Santos IMT and embedded within DoT's MEECC/ IMT.

Figure 4-2 shows the overall cross-jurisdictional organisational structure referenced from the SHP-MEE.

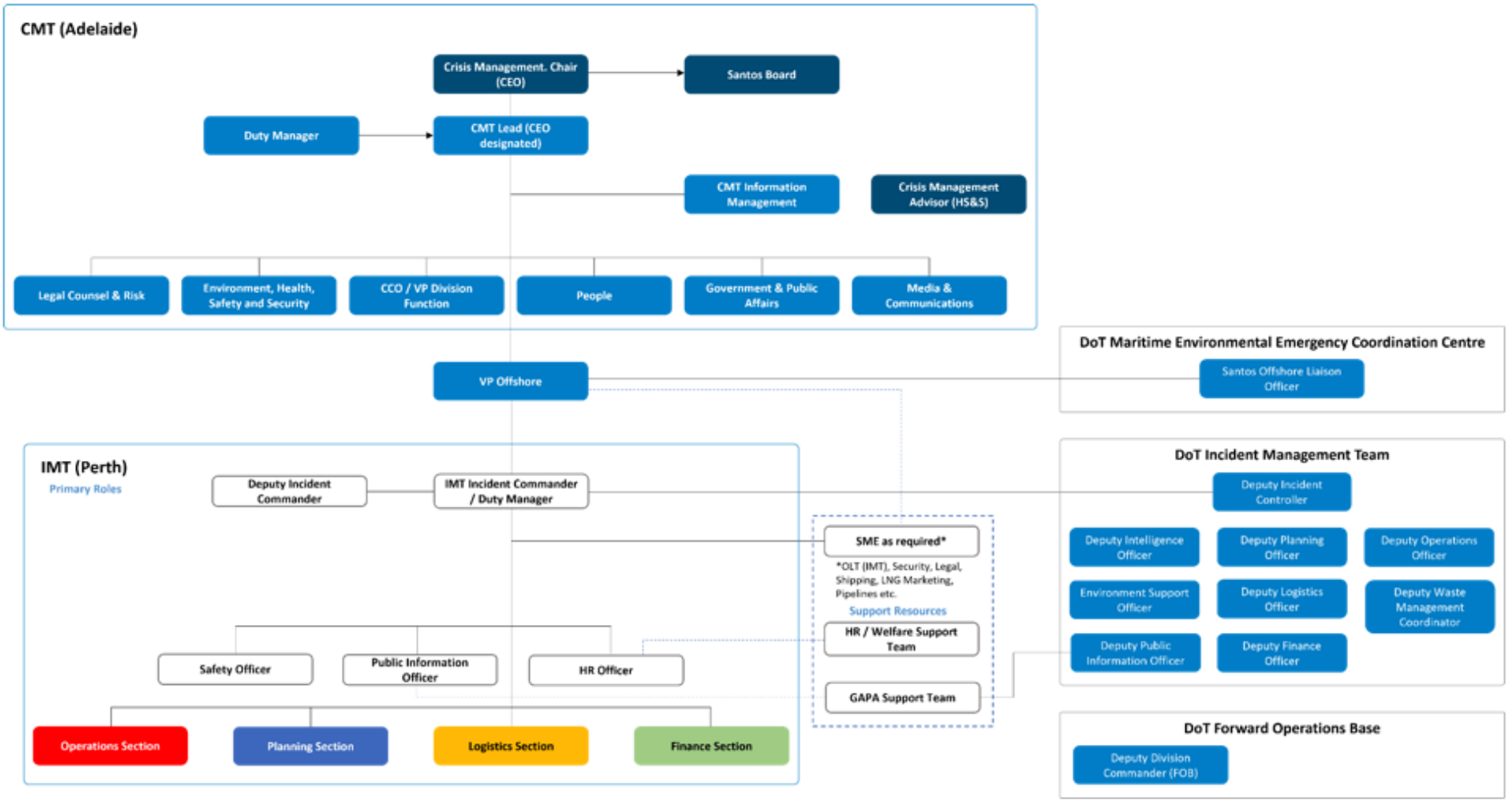

Figure 4-1: Santos cross-jurisdictional incident management structure for a Level 2/3 facility oil pollution incident originating within or entering WA State waters

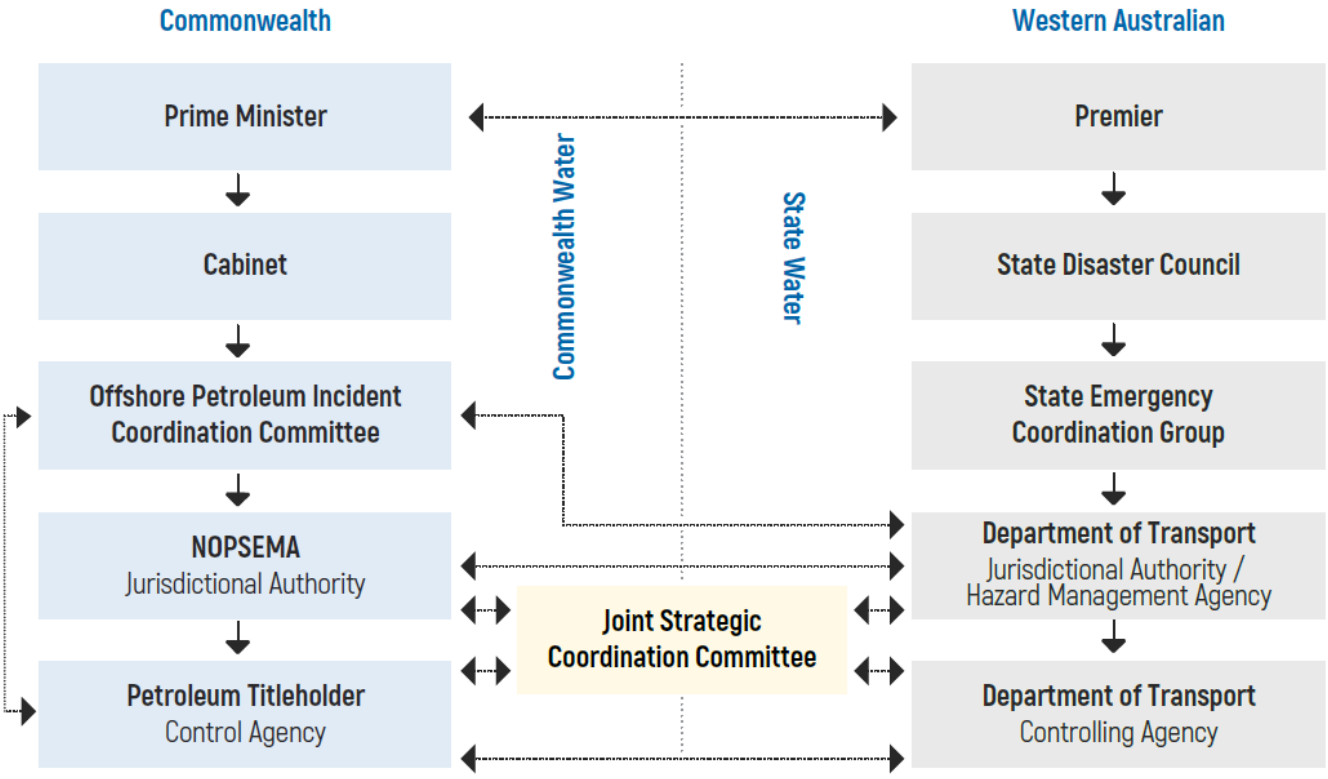

Figure 4-2: Overall control and coordination structure for offshore petroleum cross-jurisdiction incident

Source: WA DoT 2024

4.7.2 Australian Maritime Safety Authority

Although DoT and Santos would be Control Agencies initially for any spill in State waters (as outlined in Section 4.2), AMSA is the designated Control Agency for vessel spills in Commonwealth waters. Therefore, should a vessel spill enter Commonwealth waters, AMSA may also become a (or the) Control Agency. Arrangements for coordination and potential transfer of Control Agency status are outlined in AMSA Guidance Note NP-GUI-023: Coordination of Cross-Border Incidents (AMSA 2017b).

AMSA is to be notified immediately of all ship-source incidents through the AMSA Rescue Coordination Centre (RCC) Australia (Santos Incident Response Telephone Directory [SO 00 ZF 00025.020]).

AMSA manages the National Plan, Australia's key maritime emergency contingency and response plan (AMSA 2020). AMSA fulfils its obligations under the National Plan for non-ship source pollution incidents on the formal request from the respective Offshore Petroleum Incident Controller/s (AMSA 2021). AMSA also has a range of National Plan supporting documents containing related policies, guidance and advisory information.

For any oil pollution event, Santos agrees to notify AMSA immediately in the interests of facilitating the most efficient and effective response to the incident.

4.7.3 Western Australian Department of Biodiversity, Conservation and Attractions

The Western Australian Department of Biodiversity, Conservation and Attractions (DBCA) has responsibilities associated with wildlife and activities in national parks, reserves and State marine parks. The *Biodiversity Conservation Act 2016* (WA) is the legislation that provides DBCA with the responsibility and Statutory Authority to treat, protect, and destroy wildlife. In State waters, DBCA is the Jurisdictional Authority for Oiled Wildlife Response (OWR), providing advice to the Control Agency (DoT). The role of DBCA in an OWR is outlined in the Western Australian Oiled Wildlife Response Plan (WAOWRP) (DBCA 2022a).

For a Level 2/3 petroleum spill that originates within or moves into State waters, DoT will be the Control Agency responsible for overall command of an oiled wildlife response. Santos will provide all necessary resources (equipment and personnel primarily through AMOSC membership) to DoT to facilitate this response.

Any deterrence, displacement or rescue activity involving wildlife in WA (living or dead) constitutes "disturbance" or "taking" of wildlife under the *Biodiversity Conservation Act 2016* and will require authorisation through DBCA unless undertaken by licensed personnel. The DBCA Oiled Wildlife Advisor (OWA) will expedite the process of granting

interim licences or other authorities to undertake approved activities. No action specifically targeted at wildlife should occur without this authority. Deceased animals' disposal will be managed in accordance with the DBCA's WAOWRP which describes the process for disposal of dead animals/carcasses. Initially, the granting of authority to take deceased wildlife is likely to be via a direction from a DBCA wildlife officer while the appropriate licences or licence holder/s that the animals can be held by are identified and organised.

For matters relating to environmental sensitivities and scientific advice in State waters DBCA may provide an Environmental Scientific Coordinator (ESC) to support the SMPC and/or DoT Incident Controller.

This may include advice on priorities for environmental protection, appropriateness of proposed response strategies and the planning and coordination of operational monitoring for response effectiveness evaluation, and planning scientific monitoring for impact and recovery assessment.

4.7.4 Department of Industry, Science and Resources

The Department of Industry, Science and Resources (DISR) will be the lead Commonwealth Agency for the provision of strategic oversight and Commonwealth government support to a "Significant" offshore petroleum incident (including oil spill incidents). DISR will be notified by NOPSEMA of a significant oil pollution incident and under the Offshore Petroleum Incident Coordination Framework will stand up the Offshore Petroleum Coordination Committee as the mechanism to provide Commonwealth strategic advice and support to the incident. To facilitate information between the petroleum titleholder IMT and Offshore Petroleum Incident Coordination Committee, Liaison Officer/s will be deployed from DISR to the petroleum titleholder IMT.

For incidents that are classified at a greater level than "Significant" (i.e. crisis level), a whole of government crisis committee will be formed under the Australian Government Crisis Management Framework to provide strategic advice and support and the Offshore Petroleum Incident Coordination Committee will not be convened, although DISR will remain as the lead agency.

4.7.5 WA Department of Fire and Emergency Services (DFES)

In the event of a release of hydrocarbon (gas/condensate) from the Devil Creek pipeline onshore section, DFES will be engaged as per the Devil Creek Emergency Response Plan (DC-40-IF-00096) and may assume responsibilities, including the nomination of an Incident Controller, as a Combat Agency under Emergency Management Regulations 2006 and as outlined within the HAZMAT. DFES will then notify or activate the State HAZMAT Emergency Advisory Team (HEAT) to provide advice to the Incident Controller on appropriate response strategies for the hazardous material.

DFES will advise once control of the emergency situation and hazardous material has been established and when the site is safe for recovery by non-emergency services. At this point in time Santos will take control of the site recovery under the supervision of DWER.

4.7.6 Department of Water and Environmental Regulation (DWER)

For an onshore spill, the direct on-site recovery and clean-up of the hydrocarbon pollution is the responsibility of the owner of the hazardous material (Santos). DWER have responsibilities under the *Environmental Protection Act 1986* to ensure that the pollution is cleaned up by the owner. DWER administers the *Contaminated Sites Act 2003* and may declare and supervise the clean-up of, a Contaminated Site, as a result of oil pollution.

4.8 Interface with external organisations

Santos has contracts in place enabling access to Oil Spill Response Organisations (OSROs). OSROs have put specific measures in place to ensure that they are able to continue to meet their commitments to members. This support can be provided directly or remotely to aid the IMT and/or ERT.

4.8.1 Australian Marine Oil Spill Centre

Santos is a Participating Company of AMOSC and as such has access to AMOSC equipment and personnel as outlined in the AMOSPlan (AMOSC 2021).

AMOSC has contracts with all its member companies to enable the immediate release of Core Group personnel to be made available for any Santos requirements, as outlined in Santos' *Master Service Contract* and *Principle and Agency Agreement* with AMOSC.

The mutual aid arrangements that AMOSC operates under are collaborated under the AMOSPlan. This provides the mechanism for members of AMOSC to access oil spill response capability of other members. To further enhance the mutual aid arrangements, Santos, Chevron, Woodside and Jadestone have signed a Memorandum of Understanding (MoU) that defines the group's mutual aid arrangements. Under this MoU, Santos, Chevron,

Woodside and Jadestone have agreed to use their reasonable endeavours to assist in the provision of emergency response services, personnel, consumables and equipment.

4.8.2 Oil Spill Response Limited

Through an associate membership, Santos has access to spill response services from OSRL with offices in Perth, Singapore, UK and at other various locations around the globe. In the event of a Level 2/3 response, Santos could access OSRL's international personnel, equipment and dispersants to supplement resources available within Australia. Santos may also call on OSRL for technical services to support its IMT.

Under the OSRL Associate membership Service Level Agreement (SLA), Santos has access to response personnel (18 personnel per incident) and 50% of the global response equipment stockpile. In addition to this, Santos is also a member of OSRL's Global Dispersant Stockpile (GDS) and Operational and Scientific Monitoring (OSM) Services Supplementary Agreement.

The GDS Supplementary Agreement provides Santos with access to 5,000 m^3 of dispersant stockpile in addition to the dispersant stockpile available under the Associate membership SLA. The OSM Services Supplementary Agreement provides Santos with access to OSM services. Additional information on OSM services and capability is provided in Section 16 and in the Santos North West Shelf OSM-BIP (7715-650-ERP-0002).

4.8.3 Pilbara Ports Authority

Pilbara Ports Authority has established an overarching Marine Pollution Contingency Plan (MPCP) for Pilbara Ports (Pilbara Ports Authority, 2021), which covers all Pilbara Ports West waters. The MPCP is a source of information for those individuals and agencies that are responsible for developing and managing oil spill response capabilities within Pilbara Ports West port limits, which includes the Port of Varanus Island, Port of Dampier and the Port of Ashburton.

In late 2023 WA DoT has developed a guidance note for WA ports on response and collaboration arrangements during maritime environmental emergencies including oil spills that impact port waters. This Guidance Note outlines the roles and responsibilities of the Department of Transport (DoT), and Port Authorities or Port Operators under those arrangements and seeks to promote consistency between Port Authority and Port Operator provisions for the management of Marine Oil Pollution (MOP) or Marine Transport Emergency (MTE) incidents within Port waters, and the overarching arrangements for WA as outlined in the State Hazard Plan – Maritime Environmental Emergencies (SHP-MEE) (WA DoT 2024), the National Plan for Maritime Environmental Emergencies (National Plan), and the State Emergency Management Framework.

Port of Ashburton / Port of Dampier

Any marine oil pollution incident (irrespective of quantity) within either the Port of Dampier or Port of Ashburton port limits should be verbally reported immediately to Dampier or Ashburton vessel traffic services (VTS) via VHF or telephone. A POLREP is also to be submitted to WA DoT (Pilbara Ports Authority, 2023a; 2023b). A call to The Emergency Tower mobile should also be made. Pollution reporting requirements are provided in Table 7-1..

Port of Varanus Island

The Port of Varanus Island (VI) transitioned to Pilbara Ports Authority on 1 July 2021. The VI Port limits are defined in Section 4 of the Port of VI Handbook. Santos is the port operator of the Port of VI and provides the necessary services required to conduct safe operation of the facilities under Santos control. The Port of VI is governed by Pilbara Ports Authority under the WA Port Authorities Act 1999 (Pilbara Ports Authority 2021a).

Any marine oil pollution incident (irrespective of quantity) that has a risk of traversing within the Port limits should be verbally reported within 4 hours to the Harbour Master via VI Port Control. A follow up report must be made within 48 hours through the Pilbara Ports Authority Hazard and Incident Reporting Form (refer to Table 7-1). Pilbara Ports Authority also expects a POLREP to be submitted to WA DoT (refer to Appendix C) (Pilbara Ports Authority 2021a).

4.8.4 Wild Well Control

Santos maintains a contract with Wild Well Control Inc. (WWCI) for well control specialist services including relief well drilling and capping stack deployment. WWCI maintains well control response teams on standby at all times to ensure a rapid response to a well control event anywhere in the world. WWCI maintains an inventory of well control, firefighting, and specialist services equipment at its Houston headquarters and at other locations in the US and internationally.

4.8.5 The Response Group

The Response Group (TRG) is an international provider of crisis management and emergency response services including oil spill response. TRG are available to Santos 24/7 and can provide personnel for emergency response support.

5. Santos incident management arrangements

5.1 Incident management structure

The Santos Incident Management Team (IMT) (Perth) and Crisis Management Team (CMT) will be activated in the event of a Level 2/3 hydrocarbon spill regardless of the type of spill or jurisdiction. Santos maintains internal resources (trained personnel and equipment) across its activities that provide first strike response capability and to also support an ongoing response. Should an incident occur, the IMT Duty Manager would be notified immediately. This rostered role is on-call, filled by trained Incident Commanders and available 24 hours/day and 7 days/week. The IMT Duty Manager would then activate the IMT via an automated call-out system. Documentation required in a response is accessed via the Santos Emergency Response (ER) intranet site.

As outlined in Section 3.8, control of the response may be taken over by the relevant Control Agency as the incident progresses. The Santos response structure to a major emergency incident is detailed in the Incident Management Plan – Upstream Offshore (SO-00-ZF-00025) and the Santos Incident Management Handbook. The Incident Management Plan – Upstream Offshore and Santos Incident Management Handbook describe response planning and incident management that would operate under emergency conditions – describing how the Santos IMT operates and interfaces with the CMT and external parties.

The first priority of an escalating oil spill response to a Level 2/3 spill is the formation of an IMT and establishment of an incident coordination centre (ICC)[6]. The ongoing involvement of the IMT and CMT will be dependent on the severity and type of spill and the obligations of Santos and other agencies/authorities in the coordinated spill response.

Santos's incident response structure relevant to a Devil Creek/Reindeer incident includes:

- Devil Creek Emergency Response Team (ERT) – Onshore pipeline spills;
- Varanus Island Emergency Response Team (ERT) – Offshore spills, including Reindeer WHP;
- Santos Incident Management Team (IMT) – Perth based ICC to coordinate and execute responses to an oil spill incident;
- Santos Crisis Management Team (CMT) - to coordinate and manage threats to the company's reputation and to handle Santos's corporate requirements in conjunction with the Perth based Santos – Vice President Offshore Upstream WA;
- Other field-based command, response and monitoring teams for implementing strategies outlined within the OPEP.

The Santos incident response organisational structure is defined in the *Incident Management Plan – Upstream Offshore* (SO-00-ZF-00025) and the Santos Incident Management Handbook, and in Figure 5-1. The Santos IMT roles and field-based teams are scalable; roles can be activated and mobilised according to the nature and scale of the incident response.

If the incident involves a loss of well control (LOWC), the Santos Source Control Branch would also be included in the incident response structure (Figure 5-1). This team would be comprised of the following sub-teams, according to the applicable source control strategies:

- Relief well team
- Well intervention team

The Santos Source Control Branch would report directly to the Operations Section Chief and would be responsible for:

- coordinating engineering safety and operational activities;
- managing source control technical personnel from third parties (e.g. Wild Well Control);
- developing task-specific plans and procedures;
- identifying and sourcing required tools and equipment; and

[6] *The Santos ICC is located in the Santos WA Perth office.*

- approving source control components of IAPs.

In the event of a Level 2 or 3 spill event, Santos will review the relevant persons identification process described in Section 4.2 of the Devil Creek Gas Supply Pipeline and Sales Gas Pipeline Operations EP (Onshore & State Waters) (7715-650-EMP-0022-01), and in Section 4.2 of the Reindeer WHP and Offshore Gas Supply Pipeline Operations EP for Commonwealth Waters WA-41-L and WA-18-L (7715-650-EMP-0023). Relevant Persons, whose functions, interests or activities that may be affected by the spill event or response arrangements will be identified and engaged in accordance with the Santos incident management process, noting notification and communications requests made by Relevant Persons during EP consultation with respect to emergency situations.

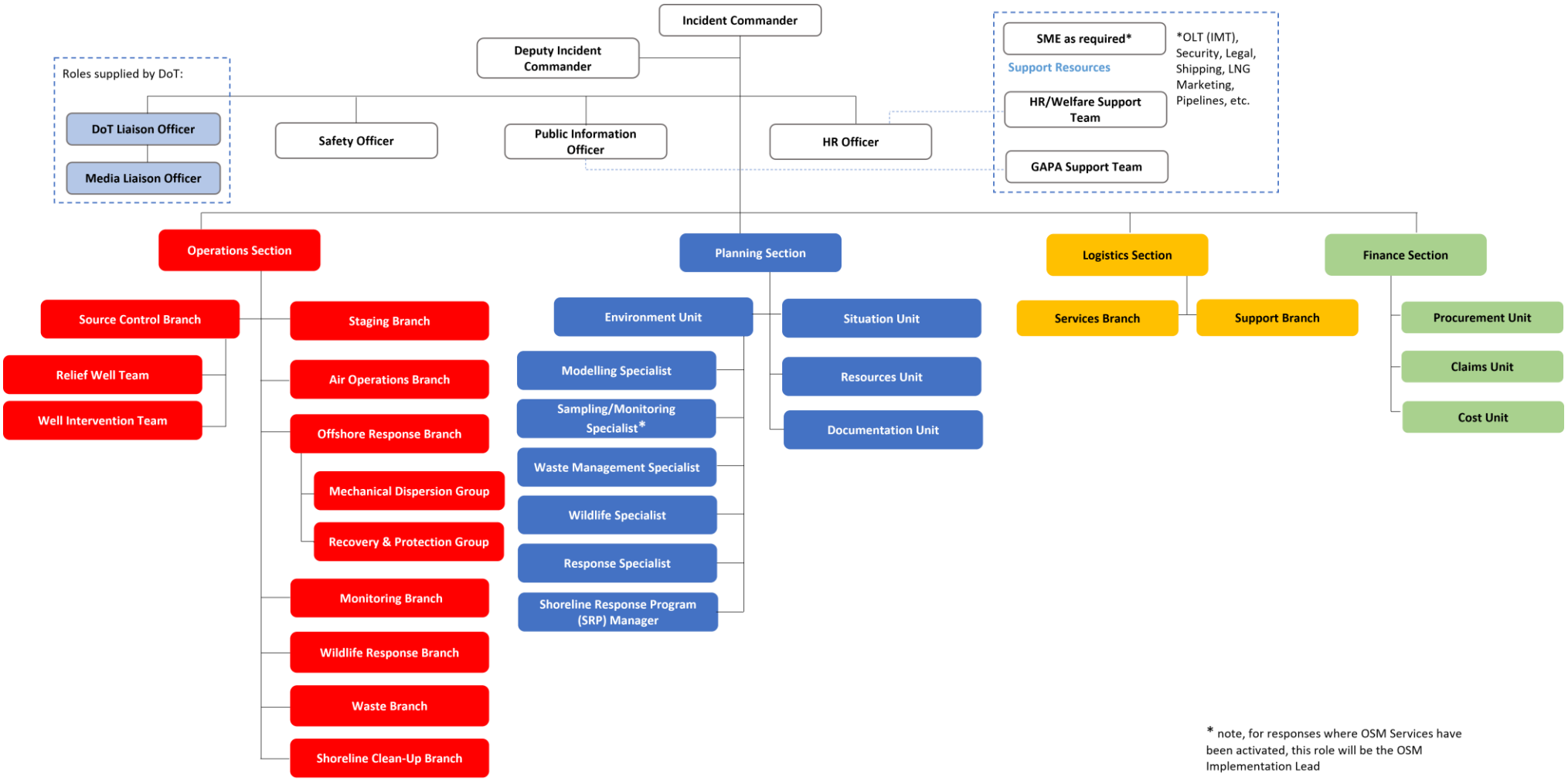

Figure 5-1: Santos incident management team organisational structure

Note: For a Level 2/3 petroleum activity spill whereby DoT is the Control Agency, either within a single jurisdiction (State water only spills) or cross-jurisdictional (spills from Commonwealth to State waters), Santos will work in coordination with DoT in providing spill response capability. Santos' expanded organisational structure for these situations is detailed in Section 4.6.

5.2 Roles and responsibilities

The following tables provide an overview of the responsibilities of the CMT and IMT:

- Santos CMT (Table 5-1)
- Santos IMT (Table 5-2)
- Field-based response team members (
- Table 5-3)
- DoT roles embedded within Santos CMT / IMT (Table 5-4)
- Santos roles embedded within the WA State MEECC / DoT IMT and FOBs (
- Table 5-5).

Not all of the roles listed are shown in Figure 5-1, as some of the roles in Table 5-2 are support roles or are specific to a particular response strategy. The IMT and field-based teams are scalable to the nature and scale of the response i.e. one person can take on multiple roles or one role can be filled by multiple people, where circumstances permit.

As per DoT's Offshore Petroleum Industry Guidance Note – Marine Oil pollution: Response and Consultation Arrangements, where DoT is the Control Agency for spill response Santos will provide personnel to work within DoT's organisational structure. DoT will also provide a Liaison Officer / Duty Incident Commander to the Santos IMT in a coordinated response.

Table 5-1: Roles and responsibilities in the Santos Crisis Management Team (CMT)

Santos CMT Role	Main Responsibilities
Crisis Management Chair (CEO)	The CM Chair (Santos Chief Executive Officer) is responsible for the following: • Leads crisis management direction. • Provides governance and oversight of CMT operations. • Provides enterprise and strategic direction to the CMT for the resolution of the crisis event. • Delegates the CM Lead role and accountability to the appropriate ExCom designee. • Engage with the CM Lead to endorse the crisis resolution plan. • Liaise with the Santos Board and strategic stakeholders. • Provide the full extent of the company's resources to bring about a resolution and recovery from the crisis impact.
CMT Lead/ Duty Manager	The CM Lead is responsible for: • Determine the need for establishing a Level 3 response and for activating the CMT. • Determine which / if any Crisis Management Support Teams (CMST) are mobilised. • Leading the crisis resolution process. • Ensures internal and external notifications to key stakeholders. • Uses the crisis resolution process to determine enterprise level impacts (potential or actual) and strategic objectives. • Ensures a crisis resolution plan is developed and direct the CMT functions to implement strategies, action plans and tasks. • Determines when it is appropriate to conclude the crisis response and stand down all or a portion of the CMT.
CMT Information Management	The CMT Information Managers directly support the CMT as follows: • Support the CMT during crisis management operations. • Sets up the crisis management room, assist with set-up of communications, video conferences and information transfer within the CMT. • Advises on CMT operating processes and available resources. • Assisting with reserving break out rooms for the CMT functions and CMSTs. • Ensuring CMT crisis resolution forms are used and displayed on the monitors. • Provides incident action plan information when an IMT is established. • Monitoring and managing the welfare needs of the CMT.

Santos CMT Role	Main Responsibilities
Crisis Management Advisor	The CMT Management Advisor is responsible for the following: • Provides CMT process guidance and advice to CMT Lead, Function Leaders, and CMST. • Supports and facilitates the crisis resolution planning process. • Acts as the liaison between the CMT and IMT. • Work with CMT Information Managers to manage roster and handovers for extended CMT operations. • Schedules and facilitates post crisis debriefs and after-action reviews. The Crisis Management Advisor will support the CMT Lead as follows: • Facilitates CMT activation requirements with the CMT Lead. • Assists the CMT Lead in maintaining an ongoing assessment of incident potential and analysis of stakeholder impacts. • Advises the CMT Lead on CMT structure and requirements for CMST engagement. • Coordinates tasks delegated by CMT Lead. • Provide tools to the CMT Lead for review and crisis assessment meetings.
CMT Function Leads	CMT Function Leads include Leaders for the following areas: • Legal Counsel and Risk • Environment Health Safety and Security • Operating Unit VP • People • Government and Public Affairs (GAPA) • Media and Communications The CMT Function Leads are responsible for the following: • Participate and contribute to the crisis resolution planning process. • Each Function Leader shall determine critical communications pertaining to their area. • Mobilise and coordinate activities of the function CMST. • Advise the CMT Lead on strategic impacts, threats and mitigation created by the crisis event. • Develop and execute strategies to meet objectives endorsed by the CM Chair. • Provide support and resources via the CMST to divisional IMTs. • Ensures critical actions, decisions or points of strategic criticality are included in the CMT log. • Participates in the crisis management debrief and after-action reviews.

Table 5-2: Roles and responsibilities in the Santos Incident Management Team (IMT)

Santos Management/ IMT Role	Main Responsibilities
Vice President Offshore (VPO) Upstream WA	• Depending on the level of the incident, the VPO (and/or their delegate) will act as the primary liaison to the CMT Duty Manager. • On the activation of the IMT, the VPO is advised by the IMT Duty Manager.
Incident Commander/ Deputy Incident Commander	• Incident Commander is responsible for the overall management of the incident. Will set response objectives and strategic directions and oversee the development and implementation of Incident Action Plans
Safety Officer	• Safety Officer is responsible to develop and recommend measure for assuring personnel safety and to assess and/or anticipate hazardous and unsafe situations. Safety Officer may have specialists as necessary.
Public Information Officer	• Public Information Officer is responsible for developing and releasing information about the incident to media, incident personnel and to appropriate agencies and organisations
Human Resources Officer	• Human Resource (HR) Officer is responsible for advising and assisting the Incident Commander, Command Staff and Section Chiefs on any HR related aspects of an incident.
Operations Section Chief	• The Operation Section Chief leads the Operations Section within the IMT and is responsible for the management of all tactical operations directly applicable to the primary assignments. The Operations Section Chief activates and supervises operational elements in accordance with the IAP and directs its execution.
Division Commander[7]	• Command an FOB for the coordination of resources mobilised to site. • Coordinate the field response as outlined in the Incident Action Plans for each operational period developed by the IMT. • Establish and maintain effective operation of the Forward Operating Base (FOB), Divisional Staging Area (DSA) and any secondary staging areas. • Provide advice and input into the formulation of the incident action plan for the next operational period.
Source Control Branch Director	• The Source Control Branch Director will be responsible for the implementation of the Source Control Plan (Source Control Planning and Response Guideline - DR-00-OZ-20001). The Source Control Branch Director will activate and supervise source control elements in accordance with the Incident Action Plan and direct its execution.
Relief Well Team Leader	• The Relief Well Team Leader is responsible for the management and coordination of relief well design and operations. The Relief Well Team Leader coordinates the development of the drilling plans and procedures, secures resources and manages relief well operations to ensure the relief well reaches its target. • Create groups as required to acquire relief well MODU, equipment and services and perform detailed relief well planning
Well Intervention Team Leader	• The Well Intervention Team Leader is responsible for intervention activities including initial site survey and debris clearance.
Staging Branch Director	• The Staging Branch Director is responsible for supervising the Staging Area Managers as well as coordinating their activities including assigning Staging Area Managers, receiving, maintaining, checking in/out, storing and distributing resources.
Air Operations Branch Director	• The Air Operations Branch Director is ground-based and is primarily responsible for the coordination of the air operations section (ICS 220) of the IAP and for providing logistical support to incident aircraft
Offshore Response Branch Director	• The Offshore Response Branch Director is responsible for leading the offshore response activities including protection and containment and recovery activities on water. Depending on the size and nature of the incident, various, groups, teams and task forces will be implemented including Recovery & Protection Group etc. • The Recovery & Protection Group is responsible for the deployment of containment and diversion/protection booming and managing on water recovery operations in the designated locations in compliance with the IAP.
Monitoring Branch Director	• Working closely with the Environmental Unit, the Monitoring Branch Director will be responsible for implementing the OSM plans required based on the nature and scale of the incident.

[7] *This role is only appointed when an FOB in Dampier assumes control of response operations.*

Santos Management/ IMT Role	Main Responsibilities
Oiled Wildlife Response Branch Director	• Working with relevant state authorities, the Oiled Wildlife Response Branch Director will be responsible for implementing the OWR plan for the incident including the deployment of equipment and personnel required.
Shoreline Clean-up Branch Director	• The Shoreline Clean-up Branch Director is responsible for leading all shoreline response activities working closely with the Shoreline Response Program Manager and shoreline clean-up supervisors and various locations
Waste Branch Director	• The Waste Branch Director is responsible for coordinating the on-site activities of personnel engaged in collecting, storing, transporting, and disposing of waste materials, in compliance with the IAP.
Planning Section Chief	• Planning Section Chief will lead the Planning Section within the IMT and is responsible for the collection, evaluation, dissemination and use of incident information and maintaining status of assigned resources.
Situation Unit Lead	• The Situation Unit Leader is responsible for collecting, processing, and organizing incident information relating to escalation, mitigation or intelligence activities taking place in an incident. The Situation Unit will be responsible for preparing future projections of incident growth, maps, and intelligence information.
Resources Unit Lead	• The Resource Unit Leader is responsible for maintaining the status of all assigned tactical resources and personnel at an incident. The Resource Unit will oversee the check-in of all tactical resources and personnel, maintaining a status-keeping system indicating current location and status of all the resources.
Documentation Unit Lead	• The Documentation Unit Lead us responsible for maintenance of accurate, up-to-date incident files including Incident Action Plans. Incident reports, communication logs, situation status reports etc.
Environment Unit Lead	• The Environment Unit Leader is responsible for environmental matters associated with the response, including strategic assessment, modelling, surveillance and environmental monitoring and permitting.
Technical Specialists	• Certain incidents may require the use of Technical Specialists who have specialized knowledge or expertise. Technical Specialists may function within the Planning Section or be assigned wherever their services are required. Santos will activate Technical Specialists, based on the requirements of the incident, through a range of arrangements and this may include, Modelling Specialist, Operational/Scientific Monitoring Specialist, Response Technology Specialist, Waste Management Specialist etc.
Shoreline Response Programme (SRP) Manager	• The SRP Manager reports to the Environment Unit Leader and is responsible for managing shoreline response. • Provides input to Planning and Operations Section Chiefs on shoreline response program to minimize shoreline impacts and Shoreline Clean-up Assessment Technique (SCAT) program.
SCAT Programme Coordinator	• SCAT Program Coordinator is the primary point of contact, through SRP Manager, within the IMT for all SCAT activities • SCAT Program Coordinator act as the project manager for SCAT program and will design and direct the SCAT program for any incidents • SCAT Program Coordinator will implement and manage the day-today activities for the SCAT program including establishing good management practices and safety protocols for the field teams, chairing SCAT Field Survey Team briefings and debriefings and producing daily and weekly summaries of field reports
SCAT Field Coordinator	• SCAT Field Coordinator works with SCAT Program Coordinator to develop daily missions and rolling strategy for the field teams and to provide the necessary logistics and equipment support as required
SCAT Data Manager	• SCAT Data Manager reports to the SCAT Program Coordinator and is responsible for processing field data, quality assurance, data storage and dissemination within the IMT, and for providing the SCAT Field Survey Teams with the maps and data required to conduct their missions.

Santos Management/ IMT Role	Main Responsibilities
Shoreline Treatment Recommendations (STR) Manager	• The STR Manager is responsible for the preparation of the Shoreline Treatment Recommendations (STRs) • STR Manager will work with the Environment Unit to obtain reconnaissance information to assess priority areas for initial SCAT surveys and gain approval for land access where appropriate • STR Manager ensures all approvals are obtained (e.g. concerning any endangered species, cultural, historical resources etc.) prior to undertaking shoreline activities • STR Manager will work with the Environment Unit's Technical Specialists, subject matter experts and stakeholders to ensure that their requirements and constraints are incorporated into shoreline treatment recommendations • STR Manager will work with the Operations Section to obtain advice on the feasibility, practicality and effectiveness of potential treatment strategies and tactics • STR Manager will track the progress of approved STRs to generate and update progress reports
Logistics Section Chief	• Logistics Section Chief is responsible for providing facilities, services and materials in support of the incident. The Logistics Section Chief participates in the development and implementation of the Logistics Section of the IAP.
Services Branch Director	• Service Branch Director, when activated is under the supervision of the Logistics Section Chief and is responsible for the management of all service activities for the incident including the operations of the Communications, Medical and Food Units
Support Branch Director	• Support Branch Director, when activated, is under the supervision of Logistics Section Chief and is responsible for the development and implementation of logistics plan in support of the IAP. The Support Branch supervises the operations of the Supply, Facilities, Ground Support and Vessel Support Units.
Finance Section Chief	• Finance Section Chief is responsible for all the financial, administrative and cost analysis aspects of the incident and for supervising members of the Finance Section
Procurement Unit Lead	• Procurement Unit Leader us responsible for administering all financial matters pertaining to vendor contracts and leases. The Procurement Unit Leader will execute all procurements in accordance with the policies and procedures of Santos
Claims Unit Lead	• The Claims Unit Leader is responsible for the management and direction of all administrative matters pertaining to compensation and claims related matters for any incident
Cost Unit Lead	• The Cost Unit Leader is responsible for collecting all cost data and providing cost estimated and any cost saving recommendations for the incident

Table 5-3: Roles and responsibilities in the field-based response team (ERT)

Field-Based Position	Main Responsibilities
Emergency Commander (Facility OIM)	• Assess facility-based situations/ incident and respond accordingly. • Single point of communications between the ERT and IMT. • Directs emergency response activities in accordance with the Santos ER principles and philosophy • Communicates the incident response actions and delegates actions to the Incident Commander. • Manage the spill incident in accordance with Facility Emergency Response Plan, Third Party Incident Response Plan, and/or activity specific Oil Spill Contingency Plan or Oil Pollution Emergency Plan (this document) • Coordinates medical evacuations as required. • Liaises with the Perth IMT Operations Section Chief if/when the IMT is established *Refer to the facility Emergency Response Plan for further description of roles and responsibilities*
Emergency Coordinator	• Establishes and maintains contact with the incident scene • Ensures information is passed to and from the On-Scene Commander, including relevant emergency information from the Command Team time-outs (e.g. source of the spill, if the spill is ongoing or contained, number of personnel responding); also advises On-Scene Commander when the next Command Team time-out will be • Ensures accurate transfer of information from On-Scene Commander to Status Board log person • Communicates with outside assistance (e.g. vessels, aircraft) • If instructed, coordinates activities such as spill control/response strategies • If instructed, liaises with onshore technical authorities and onshore IMT • Informs Emergency Commander of incident and vessel status. *Refer to the facility Emergency Response Plan for further description of roles and responsibilities*
On-Scene Commander (OSC) (ERT Field Team Leader) [8]	• Undertakes command and leads field response as directed by the Emergency Coordinator, where safe to do so. • Establishes, when appropriate, a Forward Control Point. • Maintains spill responder safety in accordance with the Santos response philosophy. • Assures all field and affected area personnel are accounted for. • Deploys and implements spill control/response strategy resources to contain and control the spill incident, as per advice from the Emergency Coordinator / Incident Commander / Division Commander. *Refer to the facility Emergency Response Plan for detailed descriptions of roles and responsibilities*
Medical Evacuation Team	• Manages all medical and transportation requirements related to injured personnel to an appropriate medical facility. *Refer to the Medical Evacuation Procedure (SO-91-IF-00020) for detailed descriptions of roles and responsibilities within the Medical Evacuation Team*
Source Control Branch	• Responds to incidents involving well loss of containment to stop the flow of oil to sea *Refer to the Source Control Planning and Response Guideline (DR-00-OZ-20001) for detailed descriptions of roles and responsibilities within the Source Control Branch*
Wildlife Response Branch	• Responds to oiled wildlife incidents to minimise the impacts to wildlife *Refer to the Santos Oiled Wildlife Response Framework Plan (7700-650-PLA-0017) for a description of the wildlife response branch and the Santos Incident Management Handbook for detailed descriptions of roles and responsibilities within the Oiled Wildlife Response Branch*
Monitoring Branch	• Monitors the effectiveness of response strategies • Monitors impacts to sensitive receptors (and their recovery) from an oil spill and associated response actions *Refer to the North West Shelf OSM-BIP (7715-650-ERP-0002) for detail on Operational and Scientific Monitoring Team roles and responsibilities.*

[8] *The On-scene Commander (OSC) is either the Santos Company Site Representative (if present) or Vessel Master for vessel-based incidents; or the OIM if the spill is related to the MODU. The OSC will be determined during the initial activation stages of the activity.*

Table 5-4: Department of Transport Roles Embedded within Santos's CMT/IMT

DoT roles embedded within Santos' CMT/IMT	Main Responsibilities
DoT Liaison Officer (prior to DoT assuming role of Control agency) Deputy Incident Controller – State Waters (after DoT assumes role of Control agency)	• Provide a direct liaison between the Santos IMT and the State MEECC. • Facilitate effective communications between DoT's State Marine Pollution Coordinator (SMPC) the Incident Controller and Santos' appointed CMT Lead/Incident Commander. • Provide enhanced situational awareness to DoT of the incident and the potential impact on State waters. • Assist in the provision of support from DoT to Santos. • Facilitate the provision of technical advice from DoT to Santos' Incident Commander as required.
Media Liaison Officer	• Provide a direct liaison between the Santos Media team and DoT IMT Media team. • Facilitate effective communications and coordination between the Santos and DoT media teams. • Assist in the release of joint media statements and conduct of joint media briefings. • Assist in the release of joint information and warnings through the DoT Information & Warnings team. • Offer advice to the Santos Media Coordinator on matters pertaining to DoT and wider Government media policies and procedures.

Table 5-5: Santos Personnel Roles Embedded within the State Maritime Environmental Emergency Coordination Centre (MEECC)/ Department of Transport (DOT) IMT/ Forward Operations Base

Santos roles embedded within the State MEECC/ DoT IMT	Main Responsibilities
CMT Liaison Officer[9]	• Provide a direct liaison between the Santos CMT and the State MEECC. • Facilitate effective communications and coordination between the Santos CMT Lead and the SMPC. • Offer advice to SMPC on matters pertaining to Santos crisis management policies and procedures
Deputy Incident Controller	• Provide a direct liaison between the DoT IMT and the Santos IMT. • Facilitate effective communications and coordination between the Santos Incident Commander and the DoT Incident Controller. • Offer advice to the DoT Incident Controller on matters pertaining to the Santos incident response policies and procedures. • Offer advice to the Safety Coordinator on matters pertaining to Santos safety policies and procedures particularly as they relate to Santos employees or contractors operating under the control of the DoT IMT.
Deputy Intelligence Officer	• As part of the DoT Intelligence Team, assist the Intelligence Officer in the performance of their duties in relation to situation and awareness. • Facilitate the provision of relevant modelling and predications from the Santos IMT. • Assist in the interpretation of modelling and predictions originating from the Santos IMT. • Facilitate the provision of relevant situation and awareness information originating from the DoT IMT to the Santos IMT. • Facilitate the provision of relevant mapping from the Santos IMT. • Assist in the interpretation of mapping originating from the Santos IMT. • Facilitate the provision of relevant mapping originating from the Santos IMT.
Deputy Planning Officer	• As part of the DoT Planning Team, assist the Planning Officer in the performance of their duties in relation to the interpretation of existing response plans and the development of incident action plans and related sub-plans • Facilitate the provision of relevant IAP and sub-plans from the Santos IMT.

[9] *The role described as the Santos Offshore Liaison Officer in Figure 4-1.*

Santos roles embedded within the State MEECC/ DoT IMT	Main Responsibilities
	• Assist in the interpretation of the Santos OPEP from Santos. • Assist in the interpretation of the Santos IAP and sub-plans from the Santos IMT. • Facilitate the provision of relevant IAP and sub-plans originating from the DoT IMT to the Santos IMT. • Assist in the interpretation of Santos' existing resource plans. • Facilitate the provision of relevant components of the resource sub-plan originating from the DoT IMT to the Santos IMT. • (Note this individual must have intimate knowledge of the relevant Santos OPEP and planning processes).
Environment Support Officer	• As part of the Intelligence Team, assist the Environment Coordinator in the performance of their duties in relation to the provision of environmental support into the planning process • Assist in the interpretation of the Santos OPEP and relevant Tactical Response Plan (TRPs). • Facilitate in requesting, obtaining and interpreting environmental monitoring data originating from the Santos IMT. • Facilitate the provision of relevant environmental information and advice originating from the DoT IMT to the Santos IMT.
Deputy Public Information Officer[10]	• As part of the Public Information Team, provide a direct liaison between the Santos Media team and DoT IMT Media team. • Facilitate effective communications and coordination between Santos and DoT media teams[11]. • Assist in the release of joint media statements and conduct of joint media briefings. • Assist in the release of joint information and warnings through the DoT Information & Warnings team. • Offer advice to the DoT Media Coordinator on matters pertaining to Santos media policies and procedures. • Facilitate effective communications and coordination between Santos and DoT Community Liaison teams. • Assist in the conduct of joint community briefings and events. • Offer advice to the DoT Community Liaison Coordinator on matters pertaining to Santos community liaison policies and procedures. • Facilitate the effective transfer of relevant information obtained from the Contact Centre to the Santos IMT.
Deputy Logistics Officer	• As part of the Logistics Team, assist the Logistics Officer in the performance of their duties in relation to the provision of supplies to sustain the response effort. • Facilitate the acquisition of appropriate supplies through Santos' existing OSRL, AMOSC and private contract arrangements. • Collects Request Forms from DoT to action via the Santos IMT. • (Note this individual must have intimate knowledge of the relevant Santos logistics processes and contracts).
Deputy Waste Management Coordinator	• As part of the Operations Team, assist the Waste Management Coordinator in the performance of their duties in relation to the provision of the management and disposal of waste collected in State waters. • Facilitate the acquisition of appropriate services and supplies through Santos' existing private contract arrangements related to waste management; and Collects Waste Collection Request Forms from DoT to action via the Santos IMT.

[10] In the event of an incident, Santos can provide the DoT IMT with a list of agencies, organisations, representative bodies, and other stakeholders that were consulted in the development of the Environment Plan to assist DoT with the management and provision of public information.

[11] In the event DoT assumes the role of Control Agency in State Waters, Santos acknowledges that the DoT IMT will be the lead IMT for public information and warnings and community liaison. In such circumstances, Santos retains the right to manage its own media interests, but acknowledges the strong preference for DoT and Santos to issue joint media statements and conduct joint media conferences and the importance of close liaison between the respective Media Teams.

Santos roles embedded within the State MEECC/ DoT IMT	Main Responsibilities
Deputy Finance Officer	• As part of the Finance Team, assist the Finance Officer in the performance of their duties in relation to the setting up and payment of accounts for those services acquired through Santos' existing OSRL, AMOSC and private contract arrangements. • Facilitate the communication of financial monitoring information to Santos to allow them to track the overall cost of the response. • Assist the Finance Officer in the tracking of financial commitments through the response, including the supply contracts commissioned directly by DoT and to be charged back to Santos.
Deputy Operations Officer	• As part of the Operations Team, assist the Operations Officer in the performance of their duties in relation to the implementation and management of operational activities undertaken to resolve an incident. • Facilitate effective communications and coordination between the Santos Operations Section and the DoT Operations Section. • Offer advice to the DoT Operations Officer on matters pertaining to Santos incident response procedures and requirements. • Identify efficiencies and assist to resolve potential conflicts around resource allocation and simultaneous operations of Santos and DoT response efforts.
Deputy Division Commander (FOB)	• As part of the Field Operations Team, assist the Division Commander in the performance of their duties in relation to the oversight and coordination of field operational activities undertaken in line with the IMT Operations Section's direction. • Provide a direct liaison between Santos' Forward Operations Base/s (FOB/s) and the DoT FOB. • Facilitate effective communications and coordination between Santos FOB Operations Commander and the DoT FOB Operations Commander. • Offer advice to the DoT FOB Operations Commander on matters pertaining to Santos incident response policies and procedures. • Assist the Safety Coordinator deployed in the FOB in the performance of their duties, particularly as they relate to Santos employees or contractors. • Offer advice to the Senior Safety Officer deployed in the FOB on matters pertaining to Santos safety policies and procedures.

5.3 Cost Recovery

Santos has financial assurances in place to cover any costs, expenses and liabilities arising from carrying out its petroleum activities, including major oil spills. This includes costs incurred by relevant Control Agencies (e.g. DoT) and third-party spill response service providers.

5.4 Training and Exercises

In order to refresh IMT roles and responsibilities and provide familiarisation with OPEP processes and arrangements, IMT workshops are conducted as per the Santos Offshore Division Incident and Crisis Management Training and Exercise Plan (SO-92-HG-10001).

To familiarise the IMT with functions and processes, an OPEP Desktop and Activation Exercise is undertaken as per the Santos Offshore Division Incident and Crisis Management Training and Exercise Plan (SO-92-HG-10001). Exercise planning takes into consideration virtual/remote access requirements and government mandate border restrictions (e.g. Covid-19).

All workshops and exercises undertaken are recorded in the Santos EHS Toolbox, with the key recommendations recorded and tracked.

5.4.1 Incident management team training and exercises

Santos provides training to its personnel to fill all required IMT positions.

Competency is maintained through participation in regular response exercises and workshops. Exercise and training requirements for Santos' IMT members are summarised in Table 5-6.

Table 5-6: Training and exercise requirements for incident management team positions

IMT Role	Exercise	Training
Incident Commander	One Level 3 exercise annually or two Level 2 exercises annually[12]	• PMAOMIR418 Co-ordinate Incident Response • AMOSC – IMO3 equiv. Oil Spill Response Command & Control
Operations Section Chief/ Source Control Branch Director		• PMAOMIR322 Manage Incident Response Information • AMOSC – IMO3 equiv. Oil Spill Response Command & Control
Planning Section Chief Logistics Section Chief Environment Unit Leader		• PMAOMIR322 Manage Incident Response Information • AMOSC – IMO2 equiv. Oil Spill Response Management
Safety Officer Supply Unit Leader Geographic Information System (GIS) Team Leader Data Manager[13] HR Officer Situation Unit Leader Documentation Unit Leader IMT Log and Situation Unit Leader		• PMAOMIR322 Manage Incident Response Information • AMOSC – Oil Spill Response Familiarisation Training
Relief Well Team Leader Well Intervention Team Leader		• Drilling Well Control accredited training through International Well Control Forum (IWCF) • Level 4 (Well Site Supervisor Training)

5.4.2 Oil spill responder training

Santos has an internal capability of trained oil spill responders that can be deployed into the field in a spill response and has access to external trained spill responder resources (Table 5-7).

Table 5-7: Spill responder personnel resources

Responder	Role	Training	Available Number
Santos AMOSC Core Group Responders	Santos personnel trained and competency assessed by AMOSC as the AMOSC Core Group. Deployed by IMT for spill response operations	AMOSC Core Group Workshop (refresher training undertaken every 2 years). AMOSC – IMO1 equiv. Oil Spill Response Operations	16
Santos Facility Emergency Response Teams	Present at Devil Creek, Varanus Island Facilities for first strike response to incidents	Internal Santos training and exercises as defined in each facility's Emergency Response Plan Emergency Commander to have AMOSC – Oil Spill Response Familiarisation Training.	One Incident Response (IR) team per operational facility per shift.

[12] *All IMT members are required to participate in at least one Level 3 exercise every two years*

[13] *Data Manager is an administrative support role, not an IMT role, but is included here for completeness*

Responder	Role	Training	Available Number
Santos Aerial Observers	Undertake aerial surveillance of spill. Deployed by IMT in the aerial surveillance aircrafts.	AMOSC – Aerial Surveillance Course (refresher training undertaken triennially).	7
Santos Oil Spill Response Team	Provides a pool of Santos employees trained to perform leadership roles in an IMT or in the field during an oil spill response.	As per the Santos OSR training matrix	140
AMOSC Core Group Oil Spill Responders	Industry personnel as the AMOSC Core Group, available to Santos under the AMOSPlan. For providing incident management (IMT) and operations (field response) assistance.	AMOSC Core Group Workshop (refresher training undertaken every two years). AMOSC – IMO1 equiv. Oil Spill Response Operations and/or IMO2 equiv. Oil Spill Response Management	As defined in Core Group Member Reports[14] Target of 100 members (minimum 84, maximum 140). Refer to AMOSC Core Group Program and Policies V2.0 (AMOSC, 2024)
OSRL Oil Spill Response Personnel	Oil Spill Response Ltd professionals, providing technical, incident management and operational advice and assistance available under Santos-OSRL contract.	As per OSRL training and competency matrix	18 responders guaranteed 80 dedicated responders available, may be approved under best endeavours
AMOSC Staff	Professionals, providing technical, incident management and operational advice and assistance available under Santos-AMOSC contract.	As per AMOSC training and competency matrix	16[15]
Santos Source Control Personnel	Management and coordination of source control strategies including relief well drilling and subsea intervention	Internal Santos training and exercises. IWCF Level 4 certification	60[16]
Oiled Wildlife Response Roles	Refer Section 15		
OSM Services Provider	Refer to Section 16 and Santos North West Shelf OSM-BIP (7715-650-ERP-0002) Section 9.1		
Level 1 Oiled Wildlife Responders (Workforce Hire)	Provide oiled wildlife support activities under supervision.	No previous training required; on the job training provided.	Nominally over 1,000.
Shoreline clean-up personnel (Workforce Hire)	Manual clean-up activities under supervision.		

[14] *A total of 100 personnel as of July 2024 (AMOSC Member's website).*

[15] *AMOSC has a permanent staff of 16 available on a 24/7 basis (AMOSC Plan, 2021),12 of which are available for field response, and 4 for administrative/management support roles.*

[16] *Made up of D&C staff that are members of the Santos OSR Team, and other D&C staff.*

In addition to Table 5-7, these resources are available for spill response and may be activated by the relevant Control Agency:

- National Plan: National Response Team (NRT) – Trained oil spill response specialists including aerial observers, containment and recovery crews and shoreline clean-up personnel deployed under the direction of AMSA and the IMT in a response. The NRT is trained and managed in accordance with the National Response Team Policy, approved by the National Plan Strategic Coordination Committee (AMSA, 2024)
- WA SHP-MEE: State Response Team (SRT) – Oil pollution response team available to assist under the jurisdiction of the DoT in State waters. SRT members remain trained and accredited in line with the SHP-MEE requirements (WA DoT 2024).

In the event of a spill, the trained spill responders outlined in Table 5-7 would be required to undertake various roles in key spill response operations, including monitor and evaluate, shoreline protection, shoreline clean-up and OWR.

In the event of a spill, Team Leader roles for protection and deflection and for shoreline clean-up would be filled through Santos AMOSC Core Group Responders and then industry Core Group Responders.

5.5 Response testing arrangements and audits

Santos has oil spill response testing arrangements in place in accordance with the Santos Offshore Oil Spill Response Readiness Guideline (7710-650-GDE-0001) which provides a process for continually monitoring of OSRO capability. This also includes regular oil spill response equipment inventory checks from the various sources. Testing of key response provider arrangements may be done as part of larger exercises or as standalone tests where the capability and availability of resources through the response provider are assessed against the performance requirement.

5.5.1 Testing arrangements

Not all spill preparedness and response arrangements will be tested simultaneously. The frequency of testing will relate to the potential spill level, spill risk and complexity of response.

Santos uses a range of tests to ensure that the various response arrangements function as required, including:

- contract/plan review
- audit
- notification/communication check
- deployment exercise
- desktop exercise
- Level 2/3 IMT Exercise

These tests and the testing schedule are detailed in full in the Santos Offshore Oil Spill Response Readiness Guideline (7710-650-GDE-0001); an excerpt of the testing arrangements plan is shown in Figure 5-2. Objectives are set for the various tests identified for each of the response arrangements. The effectiveness of response arrangements against these objectives are assessed using pre-identified Key Performance Indicators (KPIs).

#	Response arrangements and critical components	Type of test	Schedule	Objectives	KPIs
2.	Monitor and Evaluate				
	Monitor and Evaluate - Vessel Surveillance a) Access to vessels	Review – Contract / Agreement	Annually	To confirm access to vessels for surveillance	Review to confirm Master Service Agreements (MSAs) with vessel providers to gain access to vessels
	Monitor and Evaluate - Aerial Surveillance a) Access to aircrafts	Review – Contract / Agreement	Annually	To confirm access to aircrafts for surveillance	Review to confirm Master Service Agreements (MSAs) with aircraft providers to gain access to aircrafts for surveillance
	Monitor and Evaluate - Aerial Surveillance b) Access to trained aerial observers	Review – Contract / Agreement	Annually	To confirm access to trained aerial observers	Review to confirm access to trained aerial observers through; • Trained Santos personnel or • AMOSC Participant Member Contract or • OSRL Associate Member Contract
	Monitor and Evaluate - Unmanned Aerial Vehicles (UAV) a) Access to UAV providers	Review – Contract / Agreement	Annually	To confirm access to UAV providers	Review to confirm access to UAV providers through; • AMOSC Participant Member Contract or • OSRL Associate Member Contract
	Monitor and Evaluate - Fauna observations a) Maintain a list of air charter companies that could provide fauna observation services	Review – List of air charter companies for fauna observations	Annually	To confirm that a list of air charter companies that could provide fauna observation services is maintained	Review to confirm that a list of air charter companies that could provide fauna observation services is maintained
	Monitor and Evaluate – Tracking Buoys a) Access to Tracking Buoys	Review – Contract / Agreement	Prior to activity commencement	To confirm access to tracking buoys	Review to confirm access to Santos owned Tracking Buoys
	Monitor and Evaluate - Tracking Buoys b) Response readiness	Communication/Tracking software Test	6-monthly	To confirm response readiness for Tracking buoys	Tracking Buoys pass functional test as per operational instructions
	Monitor and Evaluate - Oil Spill Modelling a) Access to oil spill modelling service provider	Review – Contract / Agreement	Annually	To confirm access to emergency response oil spill modelling services	Review to confirm access to emergency oil spill modelling services through maintenance of service provision contract

Figure 5-2: Excerpt of testing arrangements plan

Source: Taken from Santos Offshore Oil Spill Response Readiness Guideline (7710-650-GDE-0001)

All testing activities are documented, and all reports generated will be saved in Santos's EHS Toolbox system. Once completed, records of testing arrangements are entered into the Santos EHS Toolbox and any actions, recommendations or corrective actions identified are assigned a responsible party for completion and tracked to closure. The status of completion is tracked through the 'Action module' in the EHS Toolbox and communicated widely through monthly EHS KPI reporting.

Source control testing arrangements have been formulated with reference to industry guidelines including the Australian Petroleum Production & Exploration Association (APPEA) Offshore Titleholders Source Control Guideline (June 2021) and the NOPSEMA Information Paper: Source Control Planning and Procedures IP1979 (June 2021).

Source control objectives and KPIs are developed in order to test the response arrangements specified in this OPEP and the Source Control Planning and Response Guideline (DR-00-OZ-20001). In addition to objectives and KPIs, test frequency and type of test are also detailed in the Santos Offshore Oil Spill Response Readiness Guideline (SO-91-OI-20001).

For each source control exercise, a copy of the exercise materials is recorded in the EHS toolbox. Action items identified are tracked in EHS toolbox to completion. Lessons learnt are incorporated into Santos guidelines and procedures as part of a process of continual improvement.

5.5.2 Audits

Oil spill response audits will follow the Santos Assurance Management Standard (SMS-MS15.1) and are scheduled as per Santos' annual Assurance Schedule. Audits help identify and address any deficiencies in systems and procedures. At the conclusion of the audit, any opportunities for improvement and corrective actions (non-conformances) will be formally noted and discussed, with corrective actions developed and accepted. In some cases, audits may conclude with potential amendments to the OSCP.

Multiple oil spill response organisations are engaged by Santos. These organisations are responsible for auditing and maintaining their own capacity. The Santos Emergency Response Coordinator (Oil Spill) oversees the audit and maintenance programs of its service providers through regular reporting requirements and any third-party assurance activities, including:

- The deployment readiness and capability of AMOSC's oil spill response equipment and resources in Geelong, Fremantle, Exmouth and Broome is audited every two years under the direction of AMOSC's participating members. The intent is to assure to Santos and associated members about AMOSC's ability to respond to an oil spill incident as per the methods and responsibilities defined in OSCPs and AMOSC's Service Level Statement.
- The deployment readiness and capability of OSRL's oil spill response equipment and personnel is audited every two years by the Oil Spill Response Coordinator. The intent is to assure Santos of OSRL's ability to respond to an oil spill incident as per the methods and responsibilities defined in Santos' OSCPs and OSRL's SLA.

6. Response strategy selection

6.1 Spill scenarios

Environmental impacts and risk assessments for the operational activities of the Devil Creek pipeline (offshore and onshore) and the Reindeer WHP have been undertaken in the Devil Creek Gas Supply and Sales Gas Pipeline Operations Environment Plan (Devil Creek EP; 7715-650-EMP-0022-01) and the Reindeer WHP and Offshore Gas Supply Pipeline Operations Environment Plan (Reindeer EP; 7715-650-EMP-0023), respectively.

The worst case credible scenarios for the activity are presented for Commonwealth and State waters (Table 6-1 and Table 6-2) and for onshore releases (Table 6-3). All other spill scenarios are of a lesser scale and extent. By demonstrating capability to manage the response to the worst-case scenarios, Santos assumes other scenarios that are smaller in nature and scale can also be managed by the same capability. Response performance measures have been defined based on a response to these worst-case scenarios.

The worst-case credible spill scenarios selected to inform this OPEP are presented below. The Reindeer WHP and Offshore Gas Supply Pipeline Operations Environment Plan WA-41-L and WA-18-PL (Reindeer EP;7715-650-EMP-0023) and Devil Creek Gas Supply and Sales Gas Pipeline Operations Environment Plan (onshore & State waters) (Devil Creek EP; 7715-650-EMP-0022-01) (Section 7.5.2 & Section 7.6.2 respectively) detail the derivation of these maximum credible spills.

Appendix A describes the characteristics and behaviour associated with hydrocarbons that may unintentionally be released.

Table 6-1: Maximum credible spill scenarios for Commonwealth Waters

Worst case credible spill scenario	Hydrocarbon type	Maximum credible volume released (m^3)
Scenario 1: Complete loss of well control at surface at the Reindeer WHP (100% full bore flow rate release).	Reindeer condensate	4,029 m^3 over 70 days
Scenario 2: Condensate spill from a subsea pipeline leak near the Commonwealth/State Boundary (CSB)	Reindeer condensate	121.4 m^3 over 3.71 hours
Scenario 4: Surface release of marine diesel oil (MDO) following a vessel collision at the WHP	Marine Diesel Oil (MDO)	325 m^3 over 1 hour
Scenario 5: Surface release of marine diesel oil (MDO) following a vessel collision at the CSB	MDO	325 m^3 over 1 hour

Table 6-2: Maximum credible spill scenarios for State Waters

Worst case credible spill scenario	Hydrocarbon type	Maximum credible volume released (m^3)
Scenario 3: Condensate spill from a subsea pipeline leak near the horizontal directional drilling (HDD) break through location (the shoreline crossing)	Reindeer condensate	121.4 m^3 over 3.75 hours
Scenario 6: Surface release of MDO following a vessel collision at the HDD crossing	MDO	325 m^3 over a 1-hour period

Table 6-3: Maximum credible onshore spill scenario

Worst case credible spill scenario	Hydrocarbon type	Maximum credible volume released (m^3)
Land-based spill – release from supply gas onshore pipeline due to a major rupture [17]	Reindeer condensate	121.4 m^3 over a 0–24 hour period

[17] *A rupture of the onshore buried pipeline is of low credibility due to its buried position. A slow leak is a more likely release mechanism. The worst-case credible spill is a release of 121.4 m^3 of Reindeer condensate. This represents the entire pipeline inventory and is considered a conservative volume given the significant length of pipeline grading away from the buried shoreline section to the WHP.*

6.2 Response planning thresholds

Environmental impact assessment thresholds are addressed in Section 7.1.4 of the EP. In addition to the environmental impact assessment thresholds, response thresholds have been developed for response planning to determine the conditions that response strategies would be effective. These thresholds are provided as a guide for response planning based on case studies that have demonstrated some response strategies require certain oil spill thicknesses and conditions to be effective. These are shown in Table 6-4.

Table 6-4: Hydrocarbon thresholds for response planning

Floating Hydrocarbon concentration (g/m²)	Description
≥1	Used (in part) for operational and scientific monitoring planning, as described in the North West Shelf OSM-BIP (7715-650-ERP-0002) Section 2.1
≥50	Estimated minimum floating hydrocarbon threshold for containment and recovery and surface dispersant application
≥100	Estimated floating hydrocarbon threshold for effective containment and recovery and surface dispersant application Estimated minimum shoreline accumulation threshold for shoreline clean-up

6.3 Spill modelling results (State and Commonwealth waters)

The Commonwealth EP (7715-650-EMP-0023) and State EP (7715-650-EMP-0022-01) provide information on the Environment that may be affected (EMBA) for worst case hydrocarbon spills as well as the hydrocarbon impact assessments. This considers modelling results for subsea oil (i.e. entrained oil and dissolved aromatic hydrocarbons) as well as floating/shoreline accumulated oil. While spill response operations outlined in this OPEP would focus on Priority Protection Areas, not the entire EMBA, the EMBA area is relevant for informing the area in which oil spill scientific monitoring could be required as the thresholds for defining the EMBA are the same as those which would trigger scientific monitoring (Section 16).

6.3.1 Stochastic modelling results

The selected worst-case spill scenarios were modelled for Reindeer and DC activities using a stochastic approach.

A total of 100 spill trajectories were simulated for each season (i.e. 300 in total) using a number of unique environmental conditions sampled from historical metocean data.

For the purpose of spill response preparedness, outputs relating to floating oil and oil accumulated on the shoreline are most relevant (i.e. oil that can be diverted, contained, collected or dispersed through the use of spill response strategies) for the allocation and mobilisation of spill response resources. Therefore, these are the results presented in this OPEP for primary consideration.

The receptors predicted to receive floating oil or shoreline loading above the response planning thresholds outlined in Table 6-4 for pipeline leak and vessel collision scenarios are presented in Table 6-5, Table 6-6 and Table 6-7. For each scenario the shoreline loading results represent the worst simulation results from all stochastic modelling runs across all seasons. Note that there was no predicted floating or shoreline concentrations above response planning thresholds for scenario 1 (LOWC) and scenario 2 (pipeline leak from CSB)..

Modelling results for dissolved and entrained oil for the worst-case scenarios have not been included in this OPEP given there are limited response strategies that will reduce subsurface impacts. However, Santos will use these results in the assessment of locations requiring a baseline data review for scientific monitoring (Appendix N).

Refer to Section 7.6 of the State EP (7715-650-EMP-0022-01) for dissolved and entrained thresholds and Section 7.7 and Section 7.8 for potential impacts to receptors from the pipeline rupture and vessel collision spill scenarios respectively. Refer to Section 7.5 of the Commonwealth EP (7715-650-EMP-0023) for dissolved and entrained thresholds and Section 7.6 to Section 7.8 for potential impacts to receptors from the LOWC, pipeline rupture and vessel collision spill scenarios.

Table 6-5: Summary of oil exposure above response planning thresholds for a subsea pipeline leak of Reindeer condensate near the HDD crossing (Scenario 3)

Receptor contact	Probability (%) of floating oil at concentrations ≥1 g/m²	Min. time for floating oil at concentrations ≥1 g/m² (hours)	Probability (%) of shoreline accumulation at concentrations ≥10 g/m²	Min. time for shoreline accumulation at concentrations ≥10 g/m² (hours)	Probability (%) of shoreline accumulation at concentrations ≥100 g/m²	Min. time for shoreline accumulation at concentrations ≥100 g/m² (hours)	Max. accumulated volume (m³) along this shoreline with concentrations ≥100 g/m² for the worst simulation	Max. length of oiled shoreline (km) at concentrations ≥100 g/m² for the worst simulation
Northern Islands Coast	No exposure modelling results were provided for the Northern Islands Coast Environmental Value Area (EVA) as the release location is within the receptor.	N/A	28.33	2	11	3	8	3

NC = No Contact

Source: RPS (2024)

Table 6-6: Summary of oil exposure above response planning thresholds for a MDO spill resulting from a vessel collision at the WHP (Scenario 4)

Receptor contact	Probability (%) of floating oil at concentrations ≥1 g/m²	Min. time for floating oil at concentrations ≥1 g/m² (hours)	Probability (%) of shoreline accumulation at concentrations ≥10 g/m²	Min. time for shoreline accumulation at concentrations ≥10 g/m² (hours)	Probability (%) of shoreline accumulation at concentrations ≥100 g/m²	Min. time for shoreline accumulation at concentrations ≥100 g/m² (hours)	Max. accumulated volume (m³) along this shoreline with concentrations ≥100 g/m² for the worst simulation	Max. length of oiled shoreline (km) at concentrations ≥100 g/m² for the worst simulation
Muiron Islands	No EVAs were predicted to be exposed to floating oil	N/A	2	249 (10 days, 9 hours)	NC	N/A	2	NC
Montebello Islands	No EVAs were predicted to be	N/A	1	95 (3 days, 23 hours)	NC	N/A	<1	NC

Receptor contact	Probability (%) of floating oil at concentrations ≥1 g/m²	Min. time for floating oil at concentrations ≥1 g/m² (hours)	Probability (%) of shoreline accumulation at concentrations ≥10 g/m²	Min. time for shoreline accumulation at concentrations ≥10 g/m² (hours)	Probability (%) of shoreline accumulation at concentrations ≥100 g/m²	Min. time for shoreline accumulation at concentrations ≥100 g/m² (hours)	Max. accumulated volume (m³) along this shoreline with concentrations ≥100 g/m² for the worst simulation	Max. length of oiled shoreline (km) at concentrations ≥100 g/m² for the worst simulation
	exposed to floating oil							
Ningaloo Coast North	No EVAs were predicted to be exposed to floating oil	N/A	0.33	376 (15 days, 16 hours)	NC	N/A	<1	NC
Southern Island Coast	No EVAs were predicted to be exposed to floating oil	N/A	1	260 (10 days, 20 hours)	NC	N/A	<1	NC

NC = No Contact, N/A= Not applicable

Source: RPS (2024)

Table 6-7: Summary of oil exposure above response planning thresholds for a MDO spill resulting from a vessel collision at the CSB (Scenario 5)

Receptor contact	Probability (%) of floating oil at concentrations ≥1 g/m²	Min. time for floating oil at concentrations ≥1 g/m² (hours)	Probability (%) of shoreline accumulation at concentrations ≥10 g/m²	Min. time for shoreline accumulation at concentrations ≥10 g/m² (hours)	Probability (%) of shoreline accumulation at concentrations ≥100 g/m²	Min. time for shoreline accumulation at concentrations ≥100 g/m² (hours)	Max. accumulated volume (m³) along this shoreline with concentrations ≥100 g/m² for the worst simulation	Max. length of oiled shoreline (km) at concentrations ≥100 g/m² for the worst simulation
Dampier Archipelago	0.67	48 (2 days)	1.67	56 (2 days, 8 hours)	0.67	58 (2 days,10 hours)	24	5
Barrow Island	NC	N/A	4.33	133 (5 days, 13 hours)	0.33	343 (14 days, 7 hours)	5	1
Lowendal Islands	NC	N/A	6	105 (4 days, 9 hours)	1.33	133	8	2

Receptor contact	Probability (%) of floating oil at concentrations ≥1 g/m²	Min. time for floating oil at concentrations ≥1 g/m² (hours)	Probability (%) of shoreline accumulation at concentrations ≥10 g/m²	Min. time for shoreline accumulation at concentrations ≥10 g/m² (hours)	Probability (%) of shoreline accumulation at concentrations ≥100 g/m²	Min. time for shoreline accumulation at concentrations ≥100 g/m² (hours)	Max. accumulated volume (m³) along this shoreline with concentrations ≥100 g/m² for the worst simulation	Max. length of oiled shoreline (km) at concentrations ≥100 g/m² for the worst simulation
						(5 days, 13 hours)		
Montebello Islands	NC	N/A	9.33	93 (3 days, 21 hours)	1.33	139 (5 days, 19 hours)	8	3

NC = No Contact, N/A= Not applicable

Source: RPS (2024)

Table 6-8: Summary of oil exposure above response planning thresholds for a MDO spill resulting from a vessel collision at the HDD Crossing (Scenario 6)

Receptor contact	Probability (%) of floating oil at concentrations ≥1 g/m²	Min. time for floating oil at concentrations ≥1 g/m² (hours)	Probability (%) of shoreline accumulation at concentrations ≥10 g/m²	Min. time for shoreline accumulation at concentrations ≥10 g/m² (hours)	Probability (%) of shoreline accumulation at concentrations ≥100 g/m²	Min. time for shoreline accumulation at concentrations ≥100 g/m² (hours)	Max. accumulated volume (m³) along this shoreline with concentrations ≥100 g/m² for the worst simulation	Max. length of oiled shoreline (km) at concentrations ≥100 g/m² for the worst simulation
Dampier Archipelago	No EVAs were predicted to be exposed to floating oil	N/A	25	52 (2 days, 4 hours)	5.33	115 (4 days, 19 hours)	9	3
Middle Islands Coast	No EVAs were predicted to be exposed to floating oil	N/A	0.33	275 (11 days, 11 hours)	NC	NC	<1	NC
Northern Islands Coast	Floating oil and water column exposure modelling results for the Northern	N/A	47.67	2	28	2	199	11

Receptor contact	Probability (%) of floating oil at concentrations ≥1 g/m²	Min. time for floating oil at concentrations ≥1 g/m² (hours)	Probability (%) of shoreline accumulation at concentrations ≥10 g/m²	Min. time for shoreline accumulation at concentrations ≥10 g/m² (hours)	Probability (%) of shoreline accumulation at concentrations ≥100 g/m²	Min. time for shoreline accumulation at concentrations ≥100 g/m² (hours)	Max. accumulated volume (m³) along this shoreline with concentrations ≥100 g/m² for the worst simulation	Max. length of oiled shoreline (km) at concentrations ≥100 g/m² for the worst simulation
	Islands Coast EVA were not provided as the release location is within the receptor.							

NC = No Contact, N/A= Not applicable

Source: RPS (2024)

6.4 Evaluation of applicable response strategies

Based on the nature and scale of the credible spill scenarios outlined in Section 6.1 and spill modelling results (Section 6.3) the following spill response strategies have been assessed as potentially applicable for combatting an oil spill (Table 6-9).

Note: The information contained in Table 6-9 has been developed by Santos for preparedness purposes. Santos may not be the Control Agency or Lead IMT for implementing a spill response. For example, for Level 2/3 spills within or entering State waters, DoT will ultimately determine the strategies and controls implemented for most State water activities with Santos providing resources and planning assistance.

Table 6-9: Evaluation of applicable response strategies

OSR Strategy	Tactic	Applicability and Designated Primary (1) or Secondary (2) Response Strategy		Considerations
		MDO	Condensate	
Source Control	Spill kits	✓ 1	✓ 1	Relevant for containing spills that may arise on board a vessel or WHP.
	Secondary containment	✓ 1	✓ 1	Relevant for spills that may arise due to stored hydrocarbons, and from spills arising from machinery and equipment on board a vessel or WHP. Bunded areas will contain hydrocarbons reducing the potential for a spill escaping to marine waters. Where applicable open deck drainage will be closed to prevent hydrocarbon draining into the marine environment.
	Shipboard Oil Pollution Emergency Plan (SOPEP)	✓ 1	✗	MARPOL requirement for applicable vessels. In the event a vessel hydrocarbon storage tank is ruptured, applicable strategies for reducing the volume of hydrocarbon releases will be contained within the vessel SOPEP. This may include securing cargo via transfer to another storage area on-board the vessel, transfer to another vessel, or through pumping in water to affected tank to create a water cushion (tank water bottom). Trimming the vessel may also be used to avoid further damage to intact tanks. These actions will aim to minimise the volume of fuel spilt.
	Pipeline isolation (ESD)	✗	✓ 1	Triggered automatically or manually as per Devil Creek Emergency Response Plan (DC-40-IF-00096)
	Well Emergency Shutdown (ESD)	✗	✓ 1	
	Surface well kill	✗	✓ 1	Considered during relief well planning but may not be possible depending upon technical and safety constraints. Surface well kill is only considered when the estimated leak rate is small enough not to generate an explosive gas cloud and access to the platform is still preserved. This methodology would not be considered should safe access to the platform or ability to operate a vessel alongside the platform not be achievable.
	Capping Stack	✗	✗	Not applicable for production platform wells (not compatible with Capping Stack).
	Relief well drilling	✗	✓ 1	Relevant for loss of well control. Relief well drilling is the primary method for killing the well. To be conducted as per the Source Control Planning and Response Guideline (DR-00-OZ-20001) and well-specific Source Control Plan (SCP)
In-Situ Burning	Controlled burning of oil spill	✗	✗	Not applicable to gas wells due to safety hazards. The condensate is predicted to be very volatile with naturally high rates of evaporation. Not applicable to MDO spills due to inability to contain MDO making it very difficult to maintain necessary slick thickness for ignition and sustained burning. In addition, in-situ

OSR Strategy	Tactic	Applicability and Designated Primary (1) or Secondary (2) Response Strategy		Considerations
		MDO	Condensate	
				burning is not normally considered as an acceptable response strategy due to the atmospheric emissions created.
Monitor and Evaluate Plan	Vessel surveillance	✓ 1	✓ 1	• Provides real-time information on spill trajectory and behaviour (e.g. weathering). • Informs implementation of other response strategies. • Vessel personnel may not be trained observers. • Vessel observers on leaking vessel may not have capacity to observe oil during emergency response procedure implementation. • Constrained to daylight. • Limited to visual range from the vessel. • Limited capacity to evaluate possible interactions with sensitive receptors.
	Aerial surveillance			• Provides real-time information on spill trajectory and behaviour (e.g. weathering). • May identify environmental sensitivities impacted or at risk of impact (e.g. seabird aggregations, other users such as fishers). • Informs implementation of other response strategies.
	Tracking buoys			• Can be implemented rapidly. • Can provide indication of near-surface entrained / dissolved hydrocarbons (most other monitor and evaluate techniques rely on the hydrocarbon being on the surface or shoreline).
	Trajectory Modelling			• Can be implemented rapidly. • Predictive - provides estimate of where the oil may go, which can be used to prepare and implement other responses. • No additional field personnel required. • Not constrained by weather conditions. • Can predict floating, entrained, dissolved and stranded hydrocarbon fractions. • May not be 100% accurate. • Requires in-field calibration.
	Satellite Imagery			• Can work under large range of weather conditions (e.g. night-time, cloud cover etc) • Mobilisation restricted to image availability • Requires processing • May return false positives

OSR Strategy	Tactic	Applicability and Designated Primary (1) or Secondary (2) Response Strategy		Considerations
		MDO	Condensate	
Chemical dispersion	Vessel Application	✗	✗	**MDO** MDO does not contain persistent hydrocarbons and has high natural spreading, dispersion and evaporation rates in the marine environment. Dispersant use is not advised on light distillate fuels such as MDO as these oils will evaporate and naturally disperse quite rapidly under most conditions (IPIECA-IOGP 2016a). Therefore, considering the rapid evaporation rates of MDO and the tendency to naturally disperse, the addition of chemical dispersants would have little to no net environmental benefit whilst potentially increasing localised toxicity in the water column. **Reindeer Condensate** Reindeer condensate is not considered a persistent hydrocarbon and has a very high natural evaporation and dispersion rates in the marine environment, rapidly reducing the volume of hydrocarbons remaining at the sea surface. Spill modelling indicates that these natural weathering processes will prevent floating condensate from impacting shorelines at all but extremely low volumes. Given the gas release and relative shallow depth of the Reindeer platform, applying subsea dispersant through an SFRT is not considered feasible due to access and safety constraints. Also, subsea dispersant injection would not be very efficient and would not mitigate the high levels of VOCs at the sea surface from the released condensate due to the shallow water depth. The use of subsea dispersants may also increase dissolved organics that would have otherwise evaporated at the sea surface. On the basis of the above, chemical dispersant application is not recommended as an applicable strategy for the credible spill scenarios covered under this OPEP.
	Aerial Application	✗	✗	
	Subsea Application	✗	✗	
Offshore Containment and Recovery	Use of offshore booms/ skimmers or other collection techniques deployed from vessel/s to contain and collect oil.	✗	✗	Containment and recovery is not suitable for highly volatile oils given their rapid weathering nature and strong tendency to entrain into the upper water column in the presence of moderate winds (i.e. >12 knots). On water containment and recovery effectiveness drops significantly with reduced oil thickness (McKinney and Caplis 2017; NOAA 2013). McKinney and Caplis (2017) tested the effectiveness of various oil skimmers at different oil thicknesses. Their results showed that the oil recovery rate of skimmers dropped significantly when oil thickness was <50 g/m^2. **MDO** Containment and recovery is not suitable for MDO given its rapid weathering nature and strong tendency to entrain into the upper water column in the presence of moderate winds (i.e. >10 knots). MDO will evaporate and spread quickly to a thin film, making recovery via skimmers difficult and ineffective. **Reindeer Condensate** Given the high level of VOCs and rapid weathering nature of Reindeer condensate, this response is not considered to be effective in reducing impacts. The ability to contain and

OSR Strategy	Tactic	Applicability and Designated Primary (1) or Secondary (2) Response Strategy		Considerations
		MDO	Condensate	
				recover spreading condensate on the ocean water surface is extremely limited due the very low viscosity, high level of VOCs, and very low residuals of this hydrocarbon.
Mechanical Dispersion	Vessel prop-washing	✓ 2	✓ 2	• Safety is a key factor and slicks with potential for high Volatile Organic Compound (VOC) emission are not suitable. • Recommended for the removal of sheens. • Mechanical dispersion will entrain surface oil into the top layer of the water column. The aim of mechanical dispersion is to reduce the concentration of floating oil which could potentially coat receptors at the sea surface (e.g. sea birds) or shoreline receptors (e.g. mangroves). Once dispersed in the water column the smaller droplet sizes enhance the biodegradation process. • MDO and Reindeer condensate are very light oils that can be easily dispersed in the water column by running vessels through the plume and using the turbulence developed by the propellers to break up the slick. Once dispersed in the water column the smaller droplet sizes enhance the biodegradation process. • Given the condensate is predicted to have a high rate of natural volatility and a spill would originate in offshore waters, mechanical dispersion of fresh condensate would not be recommended – this will allow the evaporation process to occur more readily. Dispersing weathered condensate away from the spill site (that has lost lighter products) may be beneficial if there was a potential for this hydrocarbon to impact on receptors at the sea surface or along shorelines. • Mechanical dispersion will be considered at the discretion of the On-Scene Commander/IMT or by the relevant Control Agency.
Protection and Deflection	Booming in nearshore waters and at shorelines	✓ 2	✓ 2	Protection and deflection will be considered if monitor and evaluate activities show or predict contact sensitive shorelines. Note that shoreline protection and deflection activities can result in physical disturbance to intertidal and shoreline habitats. **MDO (Scenario 4, 5 & 6)** Modelling of a vessel collision at the WHP indicated very low probability and accumulation of oil on shorelines associated with this scenario. • The vessel collision scenario at the CSB indicated potential for shoreline impact to Montebello Islands and Lowendal Islands (9% and 6% respectively) and minimum time to receptors of over 90+ hours. For the vessel collision at the HDD crossing the Northern Islands Coast was predicted to have a 47% probability of being impacted by ≥10g/m^2 shoreline oil within 2 hours. Given the high rates of natural dispersion and the high rate of biodegradation of MDO, it would be better to focus on the priority areas for protection.

OSR Strategy	Tactic	Applicability and Designated Primary (1) or Secondary (2) Response Strategy		Considerations
		MDO	Condensate	
				• Modelling predicts low probabilities (<5%) for shoreline accumulation ≥100 g/m^2 for most scenarios (Scenario 4 = no contact predicted; Scenario 5 = ≤1.33%), with the exception of Northern Islands Coast (scenario 3 = 11% and scenario 6 = 28%). • In certain conditions or situations, shoreline protection and deflection may be a suitable strategy to prevent shoreline contact and is therefore considered a secondary response strategy for MDO. This strategy is considered to be a secondary response strategy for MDO where it is safe and practical to implement and where priority protection areas are at risk of impact from MDO. **Reindeer condensate (Scenario 1 ,2 & 3)** Modelling predicts low probabilities of contact with shorelines and minimal shoreline accumulation ≥100 g/m^2. The modelling did not predict shoreline accumulation at, or above the 10 g/m^2 threshold from Reindeer condensate from the LOWC scenario. The modelling results predicted shoreline oil accumulation on the Northern Islands Coast EVA with probabilities exceeding 10 g/m^2 and 100 g/m^2 thresholds for a condensate pipeline leak from the CSB and HDD scenarios. The minimum times before shoreline oil accumulation had occurred were 2 hours and 3 hours for each threshold, respectively. Protection and deflection activities are therefore considered appropriate where it is safe and practical to implement and where priority protection areas are at risk of impact from Reindeer condensate. Given the low probability and concentrations of shoreline accumulation for Reindeer condensate this strategy is considered a secondary response strategy where it is safe and practical to implement and where priority protection areas are at risk of impact.
Shoreline clean-up	Activities include physical removal, surf washing, flushing, bioremediation, natural dispersion	✓ 2	✓ 2	Considered if operational monitoring shows or predicts contact with sensitive shorelines. **MDO (Scenario 4, 5 & 6)** • Modelling predicts low probabilities (<5%) for shoreline accumulation ≥100 g/m^2 for most scenarios (Scenario 4 = no contact predicted; Scenario 5 =≤1.33%), with the exception of Northern Islands Coast (scenario 3 = 11% and scenario 6 = 28%). • Shoreline accumulation volumes are predicted to be low for Scenario 4 (2 m^3); and Scenario 5 (24 m^3) and moderate for Scenario 6 (199 m^3) in the worst-case replicate simulations. **Reindeer Condensate (Scenario 1, 2 & 3)** • Modelling predicts no shoreline contact ≥100 g/m^2 for scenarios 1 and 2 and low probabilities of contact with shorelines for scenario 3. • No shoreline accumulation is predicted ≥100 g/m^2 for scenarios 1 and 2, and shoreline accumulation volumes are predicted to be low for Scenario 3 = 8 m^3

OSR Strategy	Tactic	Applicability and Designated Primary (1) or Secondary (2) Response Strategy		Considerations
		MDO	Condensate	
				Shoreline clean-up activities can result in physical disturbance to shoreline habitats. Given the high rates of natural biodegradation of MDO and Reindeer Condensate, it would be better to focus on high priority areas for clean-up. This strategy is considered to be a secondary response strategy for MDO and Reindeer Condensate where it is safe and practical to implement and where Protection Priority Areas (PPAs) are at risk of impact.
Onshore response	Protection, onshore clean-up and monitoring	✓ 1	✓ 1	The onshore pipeline is buried to 1.2 m and containment by soil will slow initial spread of hydrocarbons. Contamination of groundwater is the main issue but in areas of the pipeline corridor with a shallow groundwater table, and which are subject to inundation after rainfall, contamination of surface waters may occur in which case the use of sorbent boom may be applicable. Site remediation of soil and groundwater will be under direction of DWER and will be detailed in a remediation action plan under Contaminated Site legislation.
Oiled wildlife response	Activities include hazing, pre-emptive capture, oiled wildlife capture, cleaning and rehabilitation.	✓ 1	✓ 1	• Can be used to deter and protect wildlife from contact with oil. • Mainly applicable for marine and coastal fauna (e.g. birds) where oil is present at the sea surface or accumulated at coastlines. Potential for onshore releases to impact nesting areas. • Surveillance can be carried out as a part of monitor and evaluate activities or the fauna specific operational monitoring • Wildlife may become desensitised to hazing method. • Hazing may impact upon animals (e.g. stress, disturb important behaviours such as nesting or foraging) • Permitting requirements for hazing and pre-emptive capture.
Operational and Scientific Monitoring	The monitoring of the effectiveness and potential impacts of response strategies; and the monitoring of environmental receptors to determine the level of impact from the oil spill and associated response activities that is sufficient to inform any remediation activities	✓ 1	✓ 1	Operational monitoring activities include: • hydrocarbon properties and weathering behaviour • water and sediment quality assessment • chemical dispersant effectiveness and fate assessment • rapid marine fauna surveillance • shoreline clean-up assessment Scientific monitoring activities include: • water and sediment quality assessment • intertidal and coastal habitat assessment • seabirds and shorebirds • marine megafauna assessment

OSR Strategy	Tactic	Applicability and Designated Primary (1) or Secondary (2) Response Strategy		Considerations
		MDO	Condensate	
				• benthic habitat assessment • marine fish and elasmobranch assemblages assessment • fisheries assessment • heritage features assessment • social impact assessment The type and extent of operational and scientific monitoring will depend upon the nature and scale of hydrocarbon contact to sensitive receptor locations. Pre-defined initiation criteria exist for operational and scientific monitoring.

6.5 Onshore spill zone of potential impact

As described in Table 6-3 the onshore spill scenario's maximum credible spill relates to the release of 121.4 m^3 of condensate due to a rupture of the export pipeline (16" DC supply pipeline) (11.1 km, from Gnoorea Point to gas plant boundary). The pipeline is buried 1.2 m below surface along 40 Mile Beach Road reserve adjacent to Mardie and Karratha Stations pastoral leases.

Santos will activate emergency shutdown (ESD) as first strike response to 'control' the spill. Maximum spill volume of 121.4 m^3 is the maximum volume remaining in the entire pipeline between isolation points (from WHP to the DCGP). It is unlikely for an onshore rupture to release the entire pipeline volume due to its length and gradient (sloping downward towards the sea from the plant). This volume is therefore considered very conservative for planning purposes.

6.5.1 Predicted spill fate and transport

The onshore section of the Devil Creek Supply Pipeline is below ground; therefore, it is unlikely that there will be any surface expression of condensate given the relatively low rate of condensate flowing the bottom section of the gas supply pipeline and the porosity of the sediments. However, the exception to this could be if the spill occurs at the saline flat section (Figure 6-1). This section has a shallow water table and is subject to inundation after a rainfall/storm event (not tidal influence). Due to the condition, this part of the onshore pipeline section has concrete coating to control the buoyancy forces acting on the pipeline to ensure its integrity at all times. The pipeline section cutting across the saline flats which may flood during rainfall may also be the point where oil can pool if the rupture occurs up gradient of this point i.e. from south-east towards north-west direction of the pipeline route.

Depending on where the rupture occurs, the rate at which the oil percolates down through the subsurface layers before reaching the groundwater table may vary significantly due to the varying water tables and soil profiles. The groundwater table in the vicinity of the pipeline section closer to the gas plant location will likely be contacted much later due to the deep-water table levels (10.9 m -15.1 m AHD) in the area (Figure 6-1). This will contrast significantly when compared to the sections of the pipeline towards the shoreline, particularly at the saline flats area, where the depths are shallower therefore resulting a faster contact time.

Notwithstanding surface expression of the spill at a specific location described above, sub-surface risk to soil and the groundwater system is the most likely exposure pathway. The exposure pathways based on a site conceptual model are described in detail in Section 6.6.2.1**.**

The inferred groundwater flows indicate a likely hydraulic gradient flowing from south-east to north-west (i.e. towards the ocean), due to the elevated topography inland and the general flow of surface run-off to the west (Figure 6-1).

6.5.2 Predicted effect to the groundwater system

Based on extensively studied spill sites such as the pipeline crude oil spill near Bemidji in the US, fundamental knowledge derived pertaining to the fate and transport of hydrocarbons in the subsurface has been applied to the understanding of the soil and groundwater contamination risk of the Devil Creek onshore pipeline spill scenario. In the case of the Bemidji spill even after 16 years, the leading edge of the plume[18] of ground water containing BTEX had moved only about 200 m down hydraulic gradient, whereas advective flow of ground water since the spill has been about 500 m. The primary reason is that hydrocarbons get biodegraded under natural attenuation processes and evidence suggests that the spill reaches equilibrium and stabilises. This condition is likely to be analogous to the Devil Creek onshore pipeline spill scenario thus affecting limited areas of the aquifer around the spill site as shown in Figure 6-1. The groundwater dissolved contaminant plume extent is estimated to have a potential to move 200 m from leak/rupture point to either side of the pipeline within a year and this is under conservative conditions. This Zone of Potential Impact was derived based on the modelled estimates provided in a detailed general pipeline spill assessment[19]. The basis for estimating the 200 m extent was based on the assumption that the soil type is representative of the loamy to sandy soil profiles used in the US study. Soil profiles within the onshore pipeline sections vary considerably as described in Section 6.6.2.

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[18] Note that this different to the leading edge of the oil floating (free phase oil or Light Non-Aqueous Phase Liquid [LNAPL]) on the water table which had moved 40 m down the hydraulic gradient since the spill. The former refers to the contamination plume that contains concentrations of dissolved constituents such as BTEX. Although the plume migration characteristics are influenced by the actual ground-water flow velocities and sorption constants for these compounds, the behaviour of the plume are expected to be similar.

[19] Pipeline Spill Model Report prepared for Summit County to define appropriate setback distances for varying land conditions and spill scenarios. Full reference included in the References Section 19.

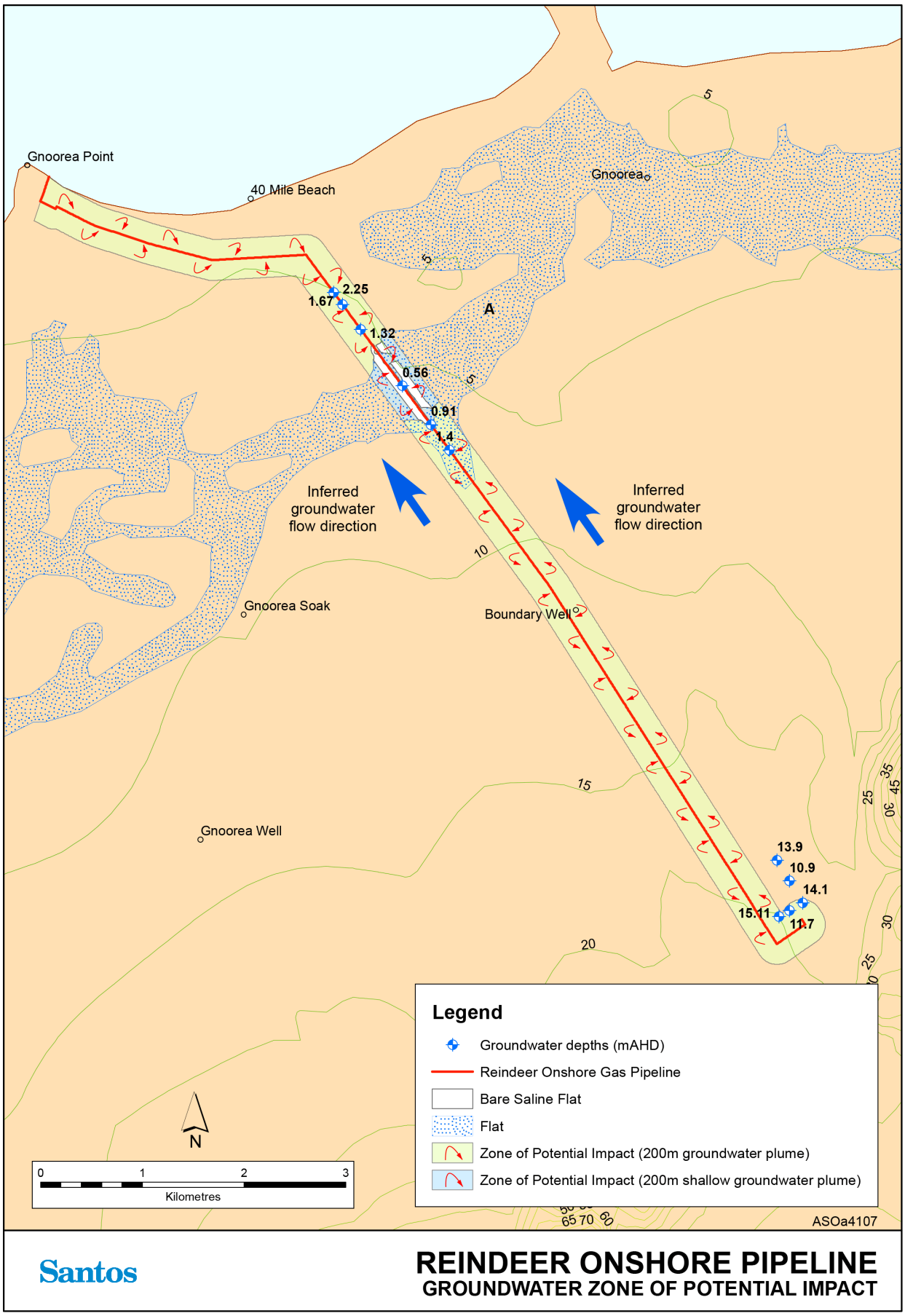

Figure 6-1: Reindeer Onshore Pipeline Groundwater zone of potential impact

6.6 Identification of priority protection areas and initial response priorities

Prioritising receptors helps identify where available resources (for response and/or monitoring) should be directed for the best effect. It enables the control agency to make informed decisions, and ultimately in the development and execution of an effective response strategy.

Combined spill modelling results were used to predict the EMBA for the Reindeer WHP and Offshore Gas Supply Pipeline Operations Environment Plan (EP) (7715-650-EMP-0023) and the Devil Creek Gas Supply Pipeline and Sales Gas Pipeline Operations Environment Plan (EP) (7715-650-EMP-0022-01). The EMBA is the largest area within which effects from hydrocarbon spills associated with this activity, could extend. Within the EMBA, priority protection areas (PPAs) have been identified. Priority protection areas are emergent features (i.e. coastal areas and islands) that are predicted to be contacted above moderate exposure values at greater than 5% probability and would be targeted by nearshore spill response operations such as protection and deflection and shoreline clean-up.

The Reindeer WHP and Offshore Gas Supply Pipeline Operations Environment Plan (EP) (7715-650-EMP-0023) and the Devil Creek Gas Supply Pipeline and Sales Gas Pipeline Operations Environment Plan (EP) (7715-650-EMP-0022-01) describe the basis for determining hot spots and protection priority areas. These are described in EP Sections 7.6 to 7.8 for the LOWC, pipeline leak and MDO spill scenarios respectively in the Commonwealth EP and Sections 7.7 and 7.8 got the pipeline leak and MDO scenarios respectively in the State EP.

6.6.1 Offshore Spill

Table 6-10 shows the rationale for the hotspots that were selected as PPAs from the list of contacted receptors from the surface LOWC, pipeline and MDO release scenarios.

Table 6-10: Determination and rationale for the protection priority areas

Hotspots	Type	HEV Ranking	Hotspot	PPA	Rationale
Barrow Island	Emergent	3	Y (discretionary) MDO spill at CSB (Scenario 5)	N	<5% at moderate exposure and low shoreline volumes
Barrow-Montebello Surrounds	Submerged	3	Y LOWC scenario (Scenario 1)	N	Not an emergent feature
Lowendal Islands	Emergent	3	Y MDO spill at CSB (Scenario 5)	N	<5% at moderate exposure
Montebello Australian Marine Park (AMP)	Submerged	3	Y LOWC scenario (Scenario 1) & MDO spill at WHP (Scenario 4)	N	<5% at moderate exposure for both scenarios
Montebello Islands	Emergent	3	Y MDO spill at CSB (Scenario 5)	N	<5% at moderate exposure
Northern Islands Coast	Emergent	3	Y Pipeline leak at HDD (Scenario 3) MDO spill at HDD (Scenario 6)	Y	>5% moderate exposure and shoreline loading along coastline for both spill scenarios
Dampier Archipelago	Emergent	4	Y (discretionary) MDO spill at CSB (Scenario 5) Y MDO spill at HDD (Scenario 6)	Y	Yes - >5% at moderate exposure for HDD only Yes- shoreline loading for both scenarios
Glomar Shoals	Submerged	5	Y (discretionary due to high HEV value)	N	Not an emergent feature

Table 6-11 lists the key sensitivities and associated locations within the PPAs identified for the worst-case spill scenario for a LOWC (Reindeer condensate), pipeline leak (Reindeer condensate) and vessel collision (MDO). The ranking of these sensitivities (also referred to as receptors) are listed, which is consistent with the rankings in the Provision of Western Australian Marine Oil Pollution Risk Assessment – Protection Priorities: Assessment for Zone 2: Pilbara (Advisian 2017). Using a combination of sensitivities, and their associated rankings; together with the modelled maximum total volumes ashore and minimum time to shoreline contact, an initial response priority is provided in Table 6-11. This information is designed to aid decision making in the preliminary stages of the response operation, so that initial resources are used for best effect.

Note, the PPAs for response also correspond with the wildlife priority protection areas presented in Section 15, with further detail on the species that may be present and key locations provided in Table 6-11.

Table 6-11: Initial response priorities for LOWC (Reindeer condensate) (Scenario 1), pipeline leak (Reindeer condensate) (Scenario 2 & 3) and vessel collision (MDO) (Scenario 4,5 & 6)

Protection Priority Area	Key sensitivities	DoT Ranking (Floating oil)[20]	DoT Ranking (Dissolved oil)	Key locations	Relevant key periods	Peak volume ashore (m^3)	Min. arrival time accumulated oil ashore ≥100 g/m^2 (hours)	Initial response priority
Dampier Archipelago	Mangroves	3	3	West Intercourse and Enderby	N/A	Vessel collision at CSB (MDO) (Scenario 5) 24m^3 Vessel collision at HDD (MDO) (Scenario 6) 9m^3	Vessel collision at CSB (MDO) 58 hours (2 days, 10 hours) Vessel collision at HDD (MDO) 115 hours (4 days,19 hours)	Medium
	Turtles • Hawksbill turtle (*Eretmochelys imbricata*)- Critically Endangered • Green turtle (*Chelonia mydas*) - Endangered • Flatback turtle (*Natator depressus*)- Nesting and breeding	4	3	Enderby Island, Rosemary Island, Keast Island, Legendre Island, Delambre Island, Dixon Island, Bells Beach, Cooling Water Beach Hawksbill turtle- NW of Rosemary Island and Legendre Island Flatback turtle- Legendre Island and Delambre Island are particularly important.	Nesting Sept-Dec Hatching Jan-April			High
	Physical habitats • Coral reefs and other subsea benthic primary producers	3	4 corals are particularly sensitive to dissolved hydrocarbons		Coral spawning: Mar and Oct			Medium
	Birds • Little corella (*Cactua sanguinea*), boobies (*Sula* sp.) and noddys (*Anous* sp). • Behavioural BIA: Fairy Tern (breeding), Roseate Tern (breeding), Wedge-tailed Shearwater (breeding)	2	1	Widespread. Seabird nesting- breeding on Goodwyn, Keast Islands, Nelson Rocks Keast Island provides one of the few nesting sites for pelican (*Pelecanus sp*) in WA.	Fairy tern breeding from July to September Roseate Tern breeding from mid-			Medium

[20] *Provision of Western Australian Marine Oil Pollution Risk Assessment – Protection Priorities: Assessment for Zone 2: Pilbara (Advisian 2017).*

Protection Priority Area	Key sensitivities	DoT Ranking (Floating oil)[20]	DoT Ranking (Dissolved oil)	Key locations	Relevant key periods	Peak volume ashore (m^3)	Min. arrival time accumulated oil ashore ≥100 g/m^2 (hours)	Initial response priority
					March to July			
	<u>Marine Mammals</u> • Eight species (including dugong (Dugong dugon)- Vulnerable, humpback whale (Megaptera novaeangliae)- Nursing area • Migratory pathway for protected humpback whale in July-Sept. • Humpback whale- Migration BIA <u>Protected Area</u> • Commonwealth Marine Reserve	3	2		Humpback whale peak migration between Jun –Aug Dugong breeding Mar-Aug. Dugong mating Aug-Mar.			Low
	<u>Socio-economic and heritage values</u> • Recreational fishing/ charter boats, tourism related to water-based activities and nature • Aboriginal rock art on shorelines, Burrup Peninsula • Camping beaches • Shipping fairway	3	2	Widespread	Year round			Low
	<u>Cultural Heritage</u> National Heritage Property: Dampier Archipelago (including Burrup Peninsula)	4	4					Medium
Northern Islands Coast	<u>Physical habitats</u> • Coral reefs and other subsea benthic primary producers • Seagrass beds surrounding many small islands.	3	4		Coral spawning: Mar and Oct Regnard Islands seagrass beds likely to support foraging dugongs (*Dugong dugon)*	Pipeline leak at HDD (Scenario 3) $8m^3$ Vessel collision at HDD (MDO) (Scenario 6)	Pipeline leak at HDD 3 hours Vessel collision at HDD (MDO) 2 hours	Medium

Protection Priority Area	Key sensitivities	DoT Ranking (Floating oil)[20]	DoT Ranking (Dissolved oil)	Key locations	Relevant key periods	Peak volume ashore (m^3)	Min. arrival time accumulated oil ashore ≥100 g/m^2 (hours)	Initial response priority
	<u>Turtles</u> • Hawksbill turtle (*Eretmochelys imbricata)*- Critically Endangered • Green turtle (*Chelonia mydas)* - Endangered • Flatback turtle (*Natator depressus)*- Nesting and breeding	4	3	Turtle nesting and breeding sites in many of the islands in this region.	Nesting Sept-Dec Hatching Jan-April	199m^3		High
	<u>Birds</u> • Seabird nesting, including pelican (*Pelecanus sp.*), wedge-tailed shearwater (*Puffinus pacificus*) and pied cormorant (*Phalacrocorax varius*). • Behavioural BIA Fairy Tern (breeding) , Roseate Tern (breeding), Wedge-tailed Shearwater (breeding)	2	1	Widespread	Fairy tern breeding from July to September Roseate Tern breeding from mid-March to July			Medium
	<u>Marine Fauna</u> • Grey Nurse Shark nursery area							
	<u>Socio-economic and heritage values</u> • Onslow prawn managed fishery • Beech-de-mer fishery • Tourism beaches • Minor indigenous heritage sites • Recreational fishing/ charter boat tourism	3	2	Tourism beaches- Dolphin Island beach				Low

6.6.2 Onshore Spill

The existing sensitivities surrounding the onshore pipeline section is shown in Figure 6-2. The coverage of the area shown in the map is broad and not limited only to the area most probably affected if an onshore pipeline spill occurs. The relevant environmental settings, values and sensitivities potentially exposed to an onshore pipeline spill are detailed in the Table 6-12.

Table 6-12: Onshore environmental features and sensitivities

Feature/Element	Description of the feature/element
Site Features	
Landforms/Topography	The topography of the areas generally shows a gradual fall in elevation from the 20 m AHD elevation from the gas plant location (south-east) towards the Indian Ocean (about 11 km to northwest of the plant).
Surface water	The nearest surface water is Devil Creek an ephemeral creek located about 200 m to the east of the pipeline alignment. This creek drains to the north and topography of the pipeline section close to the gas plant site does not appear to allow natural drainage of surface water to the creek as majority of the site slopes towards the north.
Soil Profile	The typical subsurface profile in the area closer to the gas plant is mainly made up of clayey silt to sandy clayey silt on the top layer and (0 m-1.8 m). Layers beneath are made up of conglomerates (1.8 m to 4.1m and calcarenite limestone (1.8m to >8m). The profile varies for sections along the pipeline route along 40 Mile Beach Road. Based on geotechnical data two distinct conditions were reported. For the sections closer towards the shoreline, the subsurface profile comprised silty sand overlying calcarenite rock containing some calcrete layers. The remaining section of the route towards the plant site comprise of varying profile generally including silty sand, clayey sand clayey silt, silty clay gravelly clay and many other composition combinations. In several locations the test pit met refusal on rock above the target depth. Perched groundwater tables on silty and clayey soils may occurs following periods of rainfall. The above profiles were based on the pre –construction surveys. It should be noted for the installation to layer above the top of the pipe have been replaced with compacted sand fill material with most of the excavated spoil has been re-used as backfill. Pipe laying involved removing topsoil and replacing with gravel
Groundwater hydraulic gradient and quality	Groundwater quality is expected to be mostly freshwater/brackish making potential beneficial use limited to mainly irrigation, industrial processes but drinking water will require desalination. Sub-surface groundwater flows are considered to most likely have a hydraulic gradient flowing from east to west (i.e. towards the ocean), due to the elevated topography inland and the general flow of surface run-off to the west
Sensitivities/Value Potentially Affected	
Flora	The vegetation in the area has been disturbed by activities which occurred prior to the pipeline operations. Weed proliferation (particularly Buffalo grass) is common and no species of ecological significance is present in the area. The condition of the vegetation is influenced by the seasons and although controlled weed proliferation is still occurs reducing native species cover and diversity. This is also attributed to the external factors such as public vehicle, road maintenance livestock activities causing continuous disturbance. Most significant sensitivity include a single species (*Avicennia marina*) sparse mangrove stand on the west side of Gnoorea Pt, adjacent to the pipeline shore crossing.
Fauna	Fauna of ecological significance in the area are mainly associated within the shoreline location were the mangroves occur (most abundant on the western face of Gnoorea Point) or sandy beach areas adjacent to the pipeline. These include the 54 vertebrate fauna specific of conservation significance expected to be found in the area. Majority are birds likely to be found in the intertidal zone or mangroves areas. However protected fauna including mammals (including the Northern Quoll; Greater Bilby) and reptiles (including turtles). Stygofauna which belong to the freshwater aquatic ‘subterraneous’ ecosystem (not high conservation significance in the context of its occurrence in the area) have been found in the groundwater system.
Socio-Economic Receptors	The area along the beach adjacent to the pipeline close to the shoreline at Gnoorea point is a camping site with a boat ramp. The 40 mile beach road adjacent and parallel to the on shore pipeline route is the main access to the 40 mile beach. 40 Mile Beach Road pipeline reserve is adjacent to Mardie and Karratha Stations pastoral leases. Livestock may be exposed in the event of a spill.

Feature/Element	Description of the feature/element
	A significant sensitivity include a groundwater bore/well (Boundary Well) located less than 200m from the pipeline. Based on the data search available from the Department of Water's Groundwater Bore Database (WIN), it is possible that the bore water can be used for livestock purpose, however, unable to verify if the data is current. In addition to Santos operated wells there are few other wells (outside Santos facility) in the surrounding area, however, not expected to be within the potential zone of impact.

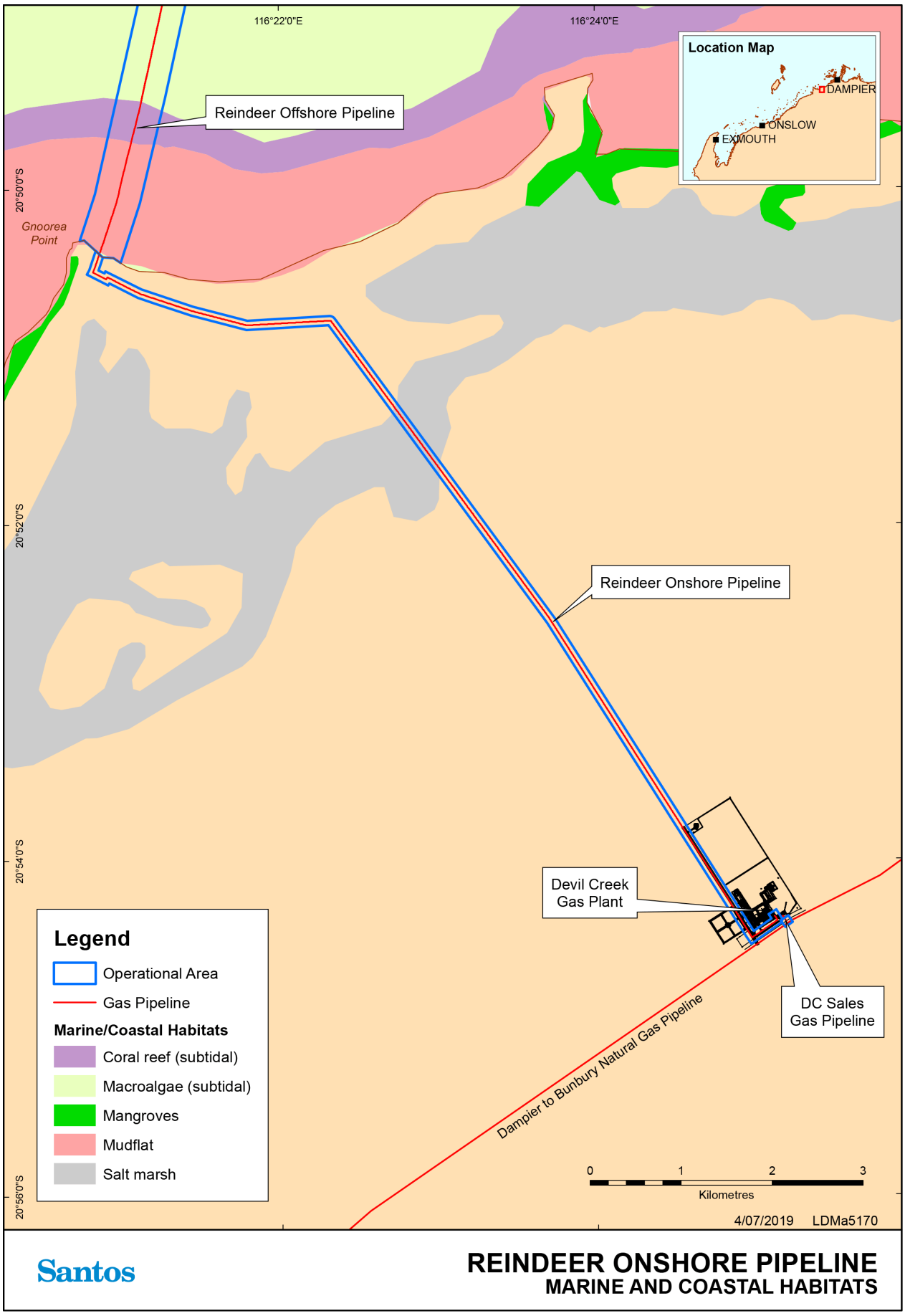

Figure 6-2: Onshore Pipeline Environmental Habitat

6.6.2.1 Conceptual Model

A preliminary understanding of the exposure risk due to the pipeline spill is described here based on the conceptual site model (Figure 6-3) developed by Coffey Environments (2009) for a potential spill nearby the gas plant. This model supported a preliminary site investigation conducted during pre-construction phase of the Devil Creek Gas Plant facility. The key sensitivities represented being exposed to contamination risk is likely to be the same identified for the pipeline.

In reference to a potential exposure pathway to surface water systems, in accordance with the preliminary site investigation, the migration of groundwater off-site to impact on a freshwater aquatic ecosystem exposure scenario was not considered to be complete given Devil Creek is an ephemeral feature and not considered to be hydraulically connected to the groundwater flow system.

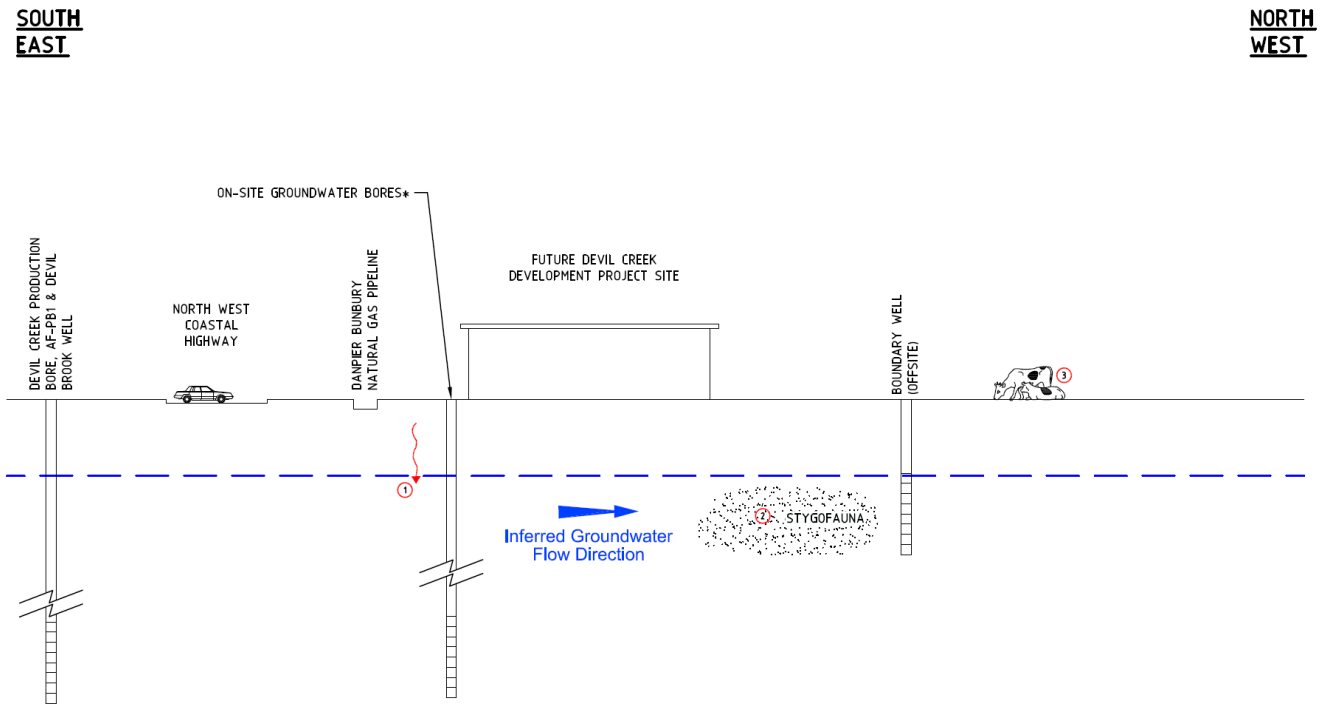

Figure 6-3: Conceptual site model for pipeline spill near the DCGP

6.6.3 Tactical response plans for priority protection areas

Santos Tactical Response Plans (TRPs) are in place for certain receptors (Table 6-13), identifying suitable response strategies, equipment requirements, relevant environmental information, and access and permit requirements. TRPs are to be used by the IMT for first strike and ongoing activities and to assist in informing the appropriate responses for inclusion in an IAP.

Not all PPA's require TRPs in place. The requirement for a TRP considers the hydrocarbon type, predicted time to contact to a PPA from accumulated or floating hydrocarbons in <10 days (above the response planning thresholds defined in Section 6.2). Ten days allows two days to get services procured; six days to draft the TRP; and two days to implement. The Sensitivity Ranking (HEV and DoT), and accessibility (i.e. on mainland compared to a remote island location) are also considered.

A TRP will also be considered should the impact from hydrocarbons be considerable (high accumulation, large floating oil contact). Where TRPs are unavailable for areas likely to be contacted, refer to other sources of information such as aerial photography, Oil Spill Response Atlas, Pilbara Region Oiled Wildlife Response Plan and WAMOPRA. Additionally, TRPs for contacted receptors will be sought from other operators where available.

Table 6-13 has the tactical response plan evaluation for the Dampier Area of Operation PPA.

Table 6-13: Tactical response plans for priority protection areas

PPA	TRP Evaluation	Existing TRP
Dampier Archipelago	A TRP already exists for Dampier Area of Operation • Dampier 1: Legendre Island • Dampier 2: Rosemary Island • Dampier 1: Enderby Island	Yes

6.7 Net environmental benefit analysis (NEBA)

The IMT uses a NEBA, also referred to as a spill impact mitigation assessment (SIMA), to inform the incident action planning process (Section 8), so the most effective response strategies with the least detrimental environmental impacts can be identified, documented and executed.

The Environment Unit Leader will use the information in Section 6.6 to identify and prioritise initial response priorities and apply the NEBA to identify which response strategies are preferred for the situation, oil type and behaviour, environmental conditions, direction of plume and priorities for protection.

As a component of the incident action planning process, NEBA is conducted by the Control Agency with responsibility for the spill response activity. Where there are different activities controlled by different IMTs, as in a cross-jurisdictional response between Santos and DoT, consultation will be required during the NEBA process such that there is consistency in the sensitivities prioritise for response across the Control Agencies.

A strategic NEBA has been developed for all response strategies identified as applicable to credible spills identified in this OPEP (both condensate and MDO), with the benefit or potential impact to each sensitivity identified within the Environment that May Be Affected (EMBA) (refer Table 6-14 for condensate and Table 6-15 for MDO). While not all spill response activities included in the strategic NEBA would be under the control of Santos during a spill incident they have been included to assist in planning conducted by DoT.

In the event of a spill, NEBA is applied with supporting information collected as part of the Monitor and Evaluate Plan (Section 10) to achieve the following:

- Identify sensitivities within the area potentially affected by a spill at that time of the year (noting that the sensitivity of some key receptors, such as birdlife and turtles, varies seasonal).
- Assist in prioritising and allocating resources to sensitivities with a higher ranking (Table 6-11); and
- Assist in determining appropriate response strategies with support of real time metocean conditions, oil spill tracking and fate modelling.

When a spill occurs, NEBA is applied to the current situation, or operationalised. Operational NEBA Templates are filed within the Environment Unit Leader folder on the Santos ER Intranet site. To complete the Operational NEBA:

- All ecological and socioeconomic sensitivities identified within the spill trajectory area are inserted; and
- Potential effects of response strategies on each sensitivity are assessed and assigned a positive, negative or no change rating; and
- All persons involved and data inputs have been considered for the analysis

The Operational NEBA Form documents the decisions behind the recommendation to the Incident Commander on which resources at risk to prioritise, and the positives and negatives of response strategies to deploy. The Operational NEBA/SIMA provides guidance to the IAPs and is revisited each Operational Period.

6.8 Oil spill response ALARP assessment

For each response strategy included within this OPEP an environmental performance outcome has been determined and key control measures and performance standards have been identified such that the response can meet the required performance outcome. For each response strategy, an ALARP assessment has been conducted to demonstrate that the control measures mitigate the risk of an oil spill to ALARP.

Appendix B details the ALARP assessment framework and the results of the ALARP assessment conducted to inform the control measures and performance standards contained within this OPEP.

Table 6-14: Strategic net environmental benefit analysis matrix for Reindeer condensate

Priority for Protection Area	No Controls	Source Control	Monitor and Evaluate	Mechanical Dispersion	Shoreline Protection & Deflection	Shoreline Clean-Up	Oiled Wildlife Response	Operational and Scientific Monitoring
Dampier Archipelago								
Turtle nesting –particularly flatback and green turtles								
Mangroves and mudflats (shorebird foraging)							N/A	
Coral and other subsea benthic primary producers					N/A	N/A	N/A	
Seabird nesting								
Migratory shorebirds								
Aboriginal listed sites incl. pearling camps								
Northern Islands Coast								
Coral and other subsea benthic primary producers					N/A	N/A	N/A	
Grey Nurse Shark Nursery Area						N/A	N/A	
Commercial Fisheries						N/A	N/A	
Aboriginal listed sites							N/A	
Tourism Beaches (inc. Dolphin Beach)							N/A	
		Beneficial impact.						
		Possible beneficial impact depending on the situation (e.g., time frames and metocean conditions).						
		Negative impact.						
N/A		Not applicable for the environmental value.						

Table 6-15: Strategic net environmental benefit analysis matrix table for MDO

Priority for Protection Area	No Controls	Source Control	Monitor and Evaluate	Mechanical Dispersion	Shoreline Protection & Deflection	Shoreline Clean-Up	Oiled Wildlife Response	Operational and Scientific Monitoring
Dampier Archipelago								
Turtle nesting –particularly flatback and green turtles								
Mangroves and mudflats (shorebird foraging)							N/A	
Coral and other subsea benthic primary producers					N/A	N/A	N/A	
Seabird nesting								
Migratory shorebirds								
Aboriginal listed sites incl. pearling camps							N/A	
Northern Islands Coast								
Coral and other subsea benthic primary producers					N/A	N/A	N/A	
Grey Nurse Shark Nursery Area						N/A	N/A	
Commercial Fisheries						N/A	N/A	
Aboriginal listed sites							N/A	
Tourism Beaches (inc. Dolphin Beach)							N/A	
		Beneficial impact.						
		Possible beneficial impact depending on the situation (e.g., time frames and metocean conditions).						
		Negative impact.						
N/A		Not applicable for the environmental value.						

7. External notifications and reporting requirements

The Devil Creek Emergency Response Plan (DC-40-IF-00096) identifies the initial incident notifications and actions to be conducted by onsite personnel, including notifying the incident to the Emergency Commander (Facility OIM) and Devil Creek Central Control Room (CCR) and initial notification of emergency services where applicable.

For oil spill incidents, the Emergency Commander will notify the Perth-based IMT for delegation of further notifications to relevant Regulatory Authorities and for further spill response assistance for Level 2/3 spills.

7.1 Regulatory notification and reporting

Environment incident notification and reporting requirements for Devil Creek facilities are contained within the Environment Incident Notification Guideline and Matrices (QE-91-HF-10003) and should be consulted as the primary source of Regulatory reporting requirements for all environmental incidents at Devil Creek facilities.

Table 7-1 outlines regulatory reporting requirements specifically for oil spill incidents outlined within this OPEP in Commonwealth and State jurisdictions, noting that regulatory reporting may apply to smaller Level 1 spills that can be responded to using onsite resources as well as larger Level 2/3 spills. State water notifications will apply for spills originating in Commonwealth waters if the spill moves from Commonwealth to State waters. There are also additional requirements for Vessel Masters to report oil spills from their vessels under relevant marine oil pollution legislation (e.g. MARPOL). This includes, where relevant, reporting oil spills to AMSA (Rescue Coordination Centre) and WA DoT (MEER unit).

Table 7-2 outlines the Regulatory Notification and reporting for Onshore Pipeline Spills.

Contact details for the Regulatory agencies outlined in Table 7-1 and Table 7-2 are provided within the Company Incident Response Telephone Directory (SO-00-ZF-00025.020). Contact details are kept within a separate document to ensure currency of the information is maintained. This would avoid risk of a superseded version being accessed during an incident.

7.2 Activation of external oil spill response organisations and support agencies

Table 7-3 outlines notifications that should be made to supporting agencies to assist with spill response activities outlined within this plan. This list contains key OSROs that have pre-established roles in assisting Santos in an oil spill response. It is not an exhaustive list of all providers that Santos may use for assisting an oil spill response.

The Incident Response Telephone Directory (SO-00-ZF-0025.020) contains a more detailed list and contact details for incident response support and is updated every six months with up-to-date revisions available within the IMT room and online (intranet procedures and emergency response pages).

7.3 Environmental performance

Table 7-4 lists the environmental performance outcome, control measures, performance standards and measurement criteria for external notifications and reporting.

Table 7-1: External notification and reporting requirements (Commonwealth and State waters)

Agency or Authority	Type of Notification /Timing	Legislation/ Guidance	Reporting Requirements	Responsible Person/Group	Forms
NOPSEMA Reporting Requirements for Commonwealth water spills					
NOPSEMA (Incident Notification Office)	Verbal notification within two hours Written report as soon as practicable, but no later than three days	*Petroleum and Greenhouse Gas Storage Act 2006* Offshore Petroleum Greenhouse Gas Storage (Environment) Regulations 2023	A spill associated with the activity in Commonwealth waters that has the potential to cause moderate to significant environmental damage[1]	Notification by Planning Section Chief (or delegate)	Incident reporting requirements: https://www.nopsema.gov.au/environmental-management/notification-and-reporting/
NOPTA (National Offshore Petroleum Titles Administrator)	Written report to NOPTA within 7 days of the initial report being submitted to NOPSEMA	Guidance Note (N-03000-GN0926) Notification and Reporting of Environmental Incidents	Spill in Commonwealth waters that is reportable to NOPSEMA	Notification by Planning Section Chief (or delegate)	Provide same written report as provided to NOPSEMA
DEMIRS Reporting Requirements for State water spills					
WA Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) (Petroleum Environment Duty Officer)	Verbal phone call within 2 hours of incident being identified Follow up written notification within 3 days	Regulations 28, 29 and 30 of the Petroleum (Submerged Lands) (Environment) Regulations 2012 Guidance Note on Environmental Non-compliance and Incident Reporting	All actual or impending spills in State waters	Notification by Planning Section Chief (or delegate)	Environmental and Reportable Incident/ Non-compliance Reporting Form http://www.dmp.wa.gov.au/Documents/Environment/ENV-PEB-189.docx
Energy Policy WA (part of DEMIRS)	Notification in the event of production disruption		Notification in the event of production disruption	Notification by IMT Planning Section Chief (or delegate)	None, however, provide copy of above Environmental and Reportable Incident/ Non-compliance Reporting Form for information.
AMSA, DoT and Pilbara Ports Authority spill reporting requirements					
AMSA Rescue Coordination Centre (RCC)[2]	Verbal notification within two hours of incident Written POLREP form, within 24 hours on request from AMSA	MARPOL	Santos to notify AMSA of any marine pollution incident[1]	Notification by Planning Section Chief (or delegate)	https://www.amsa.gov.au/forms/harmful-substances-report-polrep-oil

Agency or Authority	Type of Notification /Timing	Legislation/ Guidance	Reporting Requirements	Responsible Person/Group	Forms
WA Department of Transport (WA DoT)[2] (Maritime Environmental Emergency Response (MEER) Duty Officer)	Verbal notification within two hours Follow up with Pollution Report (POLREP) (Appendix C) as soon as practicable after verbal notification If requested, submit Situation Report (Appendix D) within 24 hours of request	*Emergency Management Act 2005* State Hazard Plan: Maritime Environmental Emergencies Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements	Santos to notify of actual or impending Marine Pollution Incidents (MOP) that are in, or may impact, State waters. Emergency Management Regulations 2006 define MOP as an actual or impending spillage, release or escape of oil or an oily mixture that is capable of causing loss of life, injury to a person or damage to the health of a person, property or the environment[1].	Notification by Planning Section Chief (or delegate) MEER Duty Officer contacted per Incident Telephone Directory	WA DoT POLREP (Appendix C): https://www.transport.wa.gov.au/mediaFiles/marine/MAC-F-PollutionReport.pdf WA DoT SITREP: (Appendix D) https://www.transport.wa.gov.au/mediaFiles/marine/MAC-F-SituationReport.pdf
Port of Dampier / Port of Ashburton	Verbal notification immediately to Harbour Master via Dampier / Ashburton VTS. Call to The Emergency Tower mobile POLREP to WA DoT	*Port Authorities Act 1999* Pilbara Ports Authority, Port of Dampier Handbook *or* Port of Ashburton Handbook	For all spills within Port of Dampier or Port of Ashburton port limits	Notification by Vessel Master, Emergency Commander (OSC), or Facility Emergency Response Team (ERT)	WA DoT POLREP (Appendix C): https://www.transport.wa.gov.au/mediaFiles/marine/MAC-F-PollutionReport.pdf
Port of Varanus Island (VI) (Pilbara Ports Authority)	Verbal notification within 4 hours to Harbour Master via VI Port Control. Follow up report within 48 hours through the Pilbara Port Authority Hazard and Incident Reporting Form: https://www.pilbaraports.com.au/safety-and-security/hazard-and-incident-reporting	*Port Authorities Act 1999* Pilbara Ports Authority Port of VI Handbook	For all spills within Port of VI limits	Notification by Vessel Master, On-scene Commander (OSC), or Facility Emergency Response Team (ERT)	WA DoT POLREP (Appendix C): https://www.transport.wa.gov.au/mediaFiles/marine/MAC-F-PollutionReport.pdf

Agency or Authority	Type of Notification /Timing	Legislation/ Guidance	Reporting Requirements	Responsible Person/Group	Forms
	Follow up with POLREP as soon as practicable after verbal notification				
Varanus Island Contaminated Sites Auditor	Initial verbal or electronic notification followed by a report if confirmed contamination	*WA Contaminated Sites Act 2003*	Applies if there is shoreline contact that could cause land contamination on Varanus Island and/or Airlie Island	Notification by Planning Section Chief (or delegate)	Not applicable.
Protected areas, fauna and fisheries reporting requirements					
Commonwealth Department of Climate Change, Energy, the Environment, and Water (DCCEEW) (Director of monitoring and audit section)	Email notification as soon as practicable	*Environment Protection and Biodiversity Conservation Act 1999*	If Matters of National Environmental Significance (MNES) are considered at risk from a spill or response strategy, or where there is death or injury to a protected species	Notification by Planning Section Chief (or delegate)	Not applicable
WA Department of Biodiversity Conservation and Attractions (State Duty Officer and Pilbara Regional Office)	Verbal notification as soon as reasonably practical	Western Australian Oiled Wildlife Response Plan	Notify if spill has the potential to impact or has impacted wildlife in State waters (to activate the Oiled Wildlife Adviser)	Notification by Planning Section Chief (or delegate)	Not applicable
Parks Australia (24-hour Marine Compliance Duty Officer)	Verbal notification as soon as practicable	*Environment Protection and Biodiversity Conservation Act 1999*	An oil spill which occurs within a marine park or are likely to impact on an Australian Marine Park	Notification by Planning Section Chief (or delegate)	Not applicable, but the following information should be provided: Titleholder's details Time and location of the incident (including name of marine park likely to be affected) Proposed response arrangements as per the OSCP Confirmation of providing access to relevant monitoring and evaluation reports when available Details of the relevant contact person in the IMT

Agency or Authority	Type of Notification /Timing	Legislation/ Guidance	Reporting Requirements	Responsible Person/Group	Forms
Department of Primary Industry and Regional Development (DPIRD) Fisheries	Verbal phone call notification within 24 hours of incident	As per consultation with DPIRD Fisheries	Reporting of marine oil pollution1 Notify if spill has the potential to impact or has impacted fisheries in State waters	Notification by Planning Section Chief (or delegate)	Not applicable
Australian Fisheries Management Authority (AFMA)	Verbal phone call notification within 24 hours of incident	For consistency with DPIRD Fisheries notification	Reporting of marine oil pollution1 Fisheries within the environment that may be affected (EMBA) Consider a courtesy call if not in exposure zone	Notification by Planning Section Chief (or delegate)	Not applicable
Department of Water and Environmental Regulation (DWER)	Initial verbal or electronic notification of the discharge as soon as practicable. Written notification of the incident to the CEO of the DWER, copied to the local DWER Industry Regulation Office, as soon as practicable.	*Environmental Protection Act 1986* (Section 72) *Environmental Protection (Unauthorised Discharge) Regulations 2004*	Call DWER 24 hour Pollution Watch hotline *Environmental Protection Act*: Spill or discharge of hydrocarbons to the environment that has caused, or is likely to cause pollution, or material or serious environmental harm (Level 2 / 3 spills) Environmental Protection (Unauthorised Discharge) Regulations: Unauthorised	Notification by Planning Section Chief (or delegate)	Reporting requirements: https://www.wa.gov.au/service/environment/pollutant-prevention/pollution-watch

Agency or Authority	Type of Notification /Timing	Legislation/ Guidance	Reporting Requirements	Responsible Person/Group	Forms
			discharge (where there is potential for significant impact or public interest) to environment of Schedule 1 material		
Stakeholders (including relevant persons)					
First Nations groups or Registered Native Title Bodies Corporate (RNTBC) (as requested through the consultation process)	Verbal phone call notification - Verbal phone call within 12 hours of incident being identified. Follow up with email outlining details of incident.	Not applicable	All spills heading towards relevant parties' interests	Notification by Planning Section Chief (or delegate)	Not applicable
WAFIC and WA commercial fisheries	Phone call within 24 hours of incident being identified with potential impact to the WA commercial fisheries. Follow up with email where available.	As per consultation with WAFIC	Should impact be expected to WA commercial fisheries	Notification by Planning Section Chief (or delegate)	Santos' list of WA commercial fisheries for this activity

1. *For clarity and consistency across Santos regulatory reporting requirements, Santos will meet the requirement of reporting a marine oil pollution incident by reporting oil spills assessed to have an environmental consequence of moderate or higher in accordance with Santos' environmental impact and risk assessment process outlined in Section 5 of the EP.*
2. *Santos reporting requirements only listed. For oil spills from vessels, Vessel Masters also have obligations to report spills from their vessels to AMSA Rescue Coordination Centre (RCC) and, in State waters, WA DoT MEER.*

Table 7-2: Regulatory Notification and reporting for Onshore Pipeline Spills

Agency or Authority	Type of Notification /Timing	Legislation/ Guidance	Reporting Requirements	Responsible Person/Group	Forms
WA Department of Fire and Emergency Services (DFES)	As determined by Devil Creek Emergency Commander (Facility OIM)	Devil Creek Emergency Response Plan (DC-40-IF-00096) State Hazard Plan for Hazardous Materials Emergencies	Refer Devil Creek Emergency Response Plan (DC-40-IF-00096)	Devil Creek Emergency Commander (Facility OIM)	Not applicable
WA Department of Energy, Mines, Industry Regulation and Safety (DEMIRS)	Verbal phone call within two hours of incident being identified Follow up written notification within three (3) days	Guidance Note on Environmental Non-compliance and Incident Reporting	All actual spills regardless of the source or quantity	Notification by Planning Section Chief (or delegate)	Environmental and Reportable Incident/ Non-compliance Reporting Form http://www.dmp.wa.gov.au/Environment/Environment-reports-and-6133.aspx
WA Department of Water and Environmental Regulation (DWER)	Verbal or electronic notification as soon as practicable Follow up written notification as soon as reasonably practicable	Section 72 of the *Environmental Protection Act 1986*	All actual spills likely to cause pollution or environmental harm	Notification by Planning Section Chief (or delegate)	S 72(1) Waste Discharge Notification Form https://www.der.wa.gov.au/images/documents/your-environment/pollution/Notification_of_waste_discharges.pdf
Department of Biodiversity Conservation and Attractions (State Duty Officer)	Verbal notification within two hours	Western Australian Oiled Wildlife Response Plan *Reserves (National Parks, Conservation Parks and Other Reserves) Act 2004*	Notify if spill has the potential to impact or has impacted wildlife (to activate the Oiled Wildlife Advisor)	Notification by Planning Section Chief (or delegate)	Not applicable

Table 7-3: List of spill response support notifications

Organisation	Indicative Timeframe	Type of Communication	Resources Available	Activation instructions	Santos person responsible for activating
AMOSC Duty Officer	As soon as possible but within two hours of incident having been identified	Verbal Service Contract	Santos is a Participating Member of AMOSC and can call upon AMOSC personnel and equipment (including oiled wildlife). Under the AMOSPlan, Santos can also call upon mutual aid from other trained industry company personnel and response equipment. AMOSC's stockpiles of equipment include dispersant, containment, recovery, shoreline clean-up, oiled wildlife and communications equipment. Equipment is located in Geelong (Victoria), Fremantle, Exmouth and Broome (all in WA)	**Step 1.** Obtain approval from Incident Commander to mobilise AMOSC **Step 2.** Notify AMOSC that a spill has occurred. Put on standby as required – activate if spill response escalates in order to mobilise spill response resources consistent with the AMOSPlan **Step 3.** Email confirmation and a telephone call to AMOSC will be required for mobilisation of response personnel and equipment. Only a Santos callout authority (registered with AMOSC) can activate AMOSC and will be required to supply their credentials to AMOSC. A signed contract note must also be completed by the Santos call out authority and returned to AMOSC prior to mobilisation.	Planning Section Chief (or delegate) will notify AMOSC (upon approval from Incident Commander)
Aviation Service Provider	Within two hours of incident having been identified	Verbal	Helicopters/pilots available for aerial surveillance. Contract in place.	Phone call	Logistics Section Chief (or delegate)
Duty Officers/ Incident Commanders (Woodside, Chevron, Jadestone)	Within two hours of incident having been identified	Verbal	Mutual aid resources (through AMOSC mutual aid arrangement)	Phone call	Incident Commander (or delegate)
Exmouth Freight & Logistics	Within two hours of incident having been identified	Verbal	Assistance with mobilising equipment and loading vessels	Phone call	Logistics Section Chief (or delegate)
North West Alliance - Waste	As required for offshore and shoreline clean-up activities	Verbal	Santos has contract arrangements in place with North West Alliance to take overall responsibility to transport and dispose of waste material generated through clean-up activities.	Phone call to the Primary Contact Person. In the event the Primary Contact Person is not available, the Secondary Contact Person will be contacted.	Logistics Section Chief Leader (or delegate)

Organisation	Indicative Timeframe	Type of Communication	Resources Available	Activation instructions	Santos person responsible for activating
OSM Services Provider	Operational and Scientific Monitoring Plan initiation criteria are met (Tables 9-1 and 9-2 of the Joint Industry OSM Framework [APPEA, 2021])	Verbal and written	Santos is a member of OSRL's OSM Supplementary Service, providing access to personnel and equipment for operational and scientific monitoring.	Refer to North West Shelf OSM-BIP (7715-650-ERP-0002) Part B for full activation instructions Step 1. Obtain approval from Incident Commander to activate OSM Services Provider Step 2. Verbally notify OSM Services Provider followed by the submission of the Call Off Order Form Step 3. OSM Service Provider commences activation process	Environment Unit Leader (or delegate)
Intertek Geotech (WA) Environmental Services and Ecotoxicology	When Operational Monitoring Plans (OMP): Hydrocarbon Properties and Weathering Behaviour is activated (Section 16)	Verbal	Oil analysis including gas chromatography/mass spectrometry fingerprinting	Phone call	Planning Section Chief (or delegate)
Oil Spill Response Limited, OSRL Duty Manager	Within two hours of incident having been identified	Verbal OSRL Mobilisation Authorisation Form	Santos has a Service Level Agreement with OSRL, which includes the provision of support functions, equipment and personnel to meet a wide range of scenarios. At minimum OSRL will provide technical support to the IMT and place resources on standby Further details available on the OSRL webpage.	**Step 1.** Contact OSRL Duty Manager in Singapore and request assistance from OSRL. **Step 2.** Send notification to OSRL as soon as possible after verbal notification. **Step 3.** Upon completion of the OSRL incident notification form, OSRL will plan and place resources on standby. **Step 4.** Mobilisation of personnel (beyond 5 technical advisors x 5 days) and equipment requires signed mobilisation form by designated call-out authorities.	Designated call-out authorities (including Incident Commanders)
RPS Group	As soon as possible but within two hours of incident having been identified	Verbal and written	Santos has an agreement in place with RPS Group to allow rapid marine hydrocarbon spill modelling capability to be activated at any time during activities, which will be undertaken for any spill greater than Level 1. AMOSC can also run modelling on behalf of Santos, if required, as part of contracting arrangements with RPS Group	Contact RPS Group Duty Officer	Planning Section Chief (or delegate)

Organisation	Indicative Timeframe	Type of Communication	Resources Available	Activation instructions	Santos person responsible for activating
Wild Well Control Inc (WWCI)	Within four hours of a loss of well control incident having been identified	Loss of well control only Verbal	Well intervention services. Under contract.	As per Source Control Planning and Response Guideline (DR-00-OZ-20001): **Step 1.** Following Santos management confirmation of a LOWC, the Santos Incident Command Team (IMT) Drilling Representative is to call the Wild Well Control 24-hour emergency hotline number to notify WWC of the incident. **Step 2.** As soon as practical after initial notification and once the scale of the subsea loss of containment is confirmed, an emergency mobilisation authorisation form must be filled out, signed off by the authorised Santos Manager and sent through to WWCI. Obtain the most current emergency mobilisation form from the WWCI emergency hotline attendant. The form shall be submitted as directed by WWCI, as advised by the emergency hotline attendant.	Drilling Representative

Table 7-4: Environmental performance – external notification and reporting

Environmental performance outcome	Make notifications and reports within regulatory and defined timeframes.		
Response strategy	**Control measures**	**Performance standards [EPS ID]**	**Measurement criteria**
External notifications and reporting plan	**Response preparedness**		
	Santos Incident Response Telephone Directory (SO-00-ZF-00025.020)	[EPS-RP-001] Incident Response Telephone Directory is revised every six months	Incident Response Telephone Directory Document revision history
	OPEP communications test	[EPS-RP-002] OPEP contact details for regulatory and service provider notifications are checked annually	OPEP Communications Test records
	Response implementation		
	External notifications and reporting tables	[EPS-RP-003] External notification and reporting undertaken as per Table 7-1 and Table 7-2	Incident log

8. Incident Action Planning

The incident action planning process is built on the following phases:

1. Understand the situation
2. Establish incident priorities, objectives and tasks
3. Develop the plan (IAP)
4. Prepare and disseminate the plan
5. Execute, evaluate and revise the plan for the next operational period.

The Santos IMT will use the IAP process to determine and document the appropriate response priorities, objectives, strategies and tasks to guide the incident response which are reviewed and updated as more information becomes available. The IMT will use an IAP for each operational period following the initial first-strike assessments, notifications and activations undertaken.

When acting as the support agency, Santos may be requested by the Control Agency to develop or support the development of an IAP to help guide the incident response.

The Santos IAP process is built on the phases described in Figure 8-1.

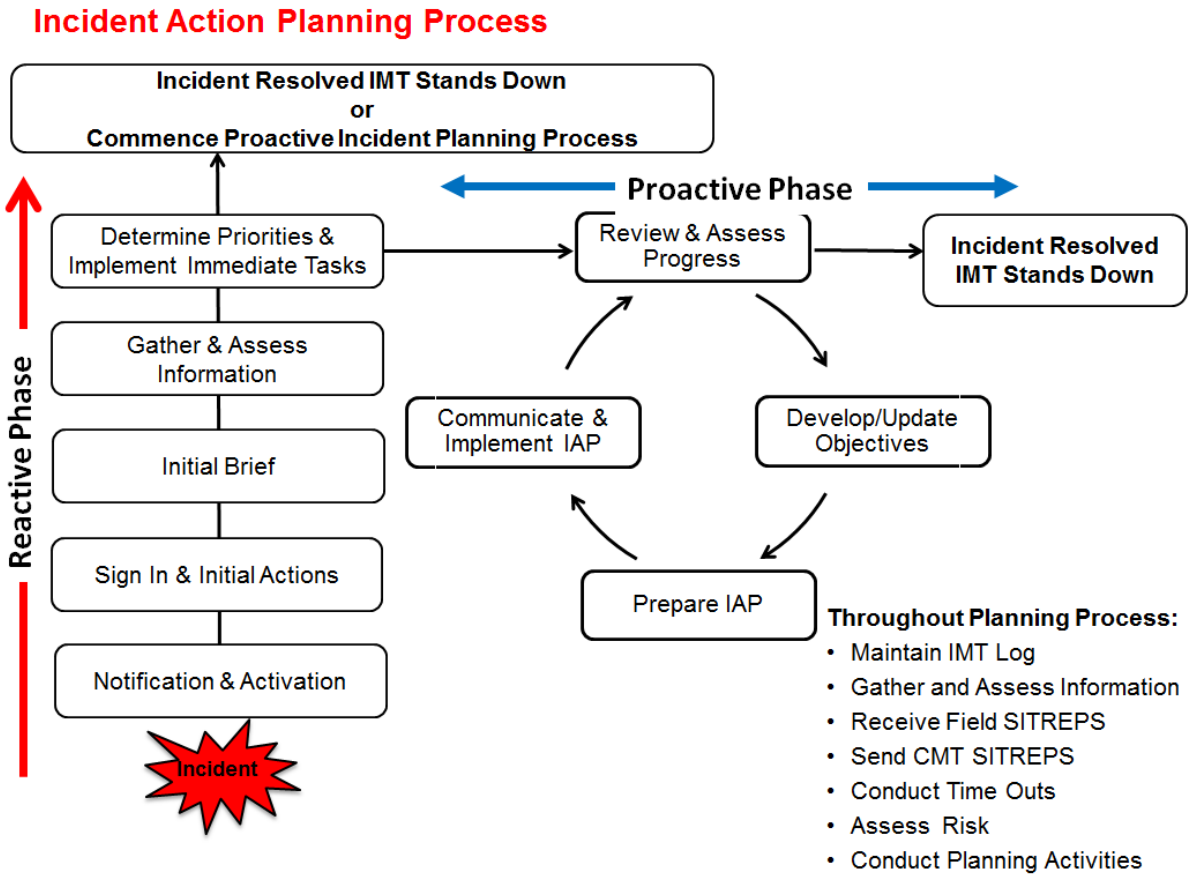

Figure 8-1: Incident action plan process

8.1 Reactive phase planning

The initial phase of the incident action planning process can be considered a reactive phase (indicatively lasting up to 48 hours) where information on the incident is being progressively established through reports coming in from the field. During this phase there is no formal Incident Action Plan to follow (given the incident has just begun and details are still being established) however the OPEP (this document) has been prepared to contain all first strike oil spill response actions required to be followed during this phase in lieu of a formal IAP.

First strike response actions are summarised in Initial Response, Table 2-1 at the beginning of this document and provide links to relevant oil spill strategy sections within the OPEP which contain a more detailed list of implementation actions and considerations as well as statements of performance (performances standards) that must be followed to ensure the initial response meets regulatory requirements and environmental performance outcomes.

For each credible oil spill scenario covered by this OPEP, the first-strike response actions have been informed by a pre-assessment of applicable oil spill response strategies, priority response locations and a strategic NEBA (also referred to as a SIMA). During the reactive phase the strategic NEBA is to be reviewed and, using the specific information gathered from the spill, operationalised into an operational NEBA. This assessment helps verify that the response strategies pre-selected for each spill scenario are providing the best environmental outcome for the incident response.

8.2 Developing an incident action plan

At the end of the reactive phase where the incident specifics have been determined, a more formal phase of spill response is entered whereby a documented IAP is developed to guide the incident response activities for the next operational period. An operational period is defined as the period scheduled for execution of actions specified in the IAP. The next operational period is nominally a daily period but, for long running incidents, may be extended further where the pace of the incident response has settled, and the level of new information has decreased.

As IAPs and response strategies are implemented their performance is monitored. The performance measurement results are fed back into the IMT to provide the IMT with greater situational awareness to enable the effective formulation of following IAPs. Those response strategies that are effective are continued or increased, while those strategies that are ineffective are scaled back or ceased.

The performance against the objectives of the IAP must be documented in the Incident Log by the IMT. This provides the IMT with information required to assist in formulating the following IAP and provides evidence of Santos's response to the incident for regulatory and legal investigations that will follow the termination of the incident.

IAP performance is monitored through IMT communication with in-field response personnel both verbally and through logs/reports/photos sent throughout the response (e.g. surveillance personnel, beach masters, team leaders, laboratory chemists, etc.) who report on the effectiveness of the response strategies.

IAP forms and processes are documented in the Santos SharePoint Oil Spill Response Tile and in the SO ER Documentation SharePoint site. Access subfolders to display all forms required to conduct incident action planning. Each functional position within the IMT has subfolders carrying forms and processes unique to the functional position on the Oil Spill Tile.

8.3 Environmental Performance

Table 8-1 lists the environmental performance outcome, control measures, performance standards and measurement criteria for incident action planning.

Table 8-1: Environmental performance – incident action planning

Environmental performance outcome	Manage incident via a systematic planning process		
Response strategy	**Control measures**	**Performance standards [EPS ID]**	**Measurement criteria**
Incident action planning	**Response Preparedness**		
	IMT Exercise and Training Plan	[EPS-RP-005] Incident action planning and NEBA is practiced by the IMT during exercises	Exercise records
	Response Implementation		
	Incident action plan	[EPS-RP-006] Incident action plan is completed for each operational period and approved by the Incident Commander	Incident Log Incident Action Plan/s

Environmental performance outcome	Manage incident via a systematic planning process		
Response strategy	**Control measures**	**Performance standards [EPS ID]**	**Measurement criteria**
		[EPS-RP-007] Monitor effectiveness of response strategies being implemented and use information in the development of IAPs	Incident Log Incident Action Plan/s
	NEBA	[EPS-RP-008] An operational NEBA will be undertaken for each operational period of the incident	NEBA Incident Action Plan
	IMT activation and de-escalation	[EPS-RP-009] IMT will be activated Immediately once notified of a level 2/3 spill (to Incident Commander).	Incident Action Plan
		[EPS-RP-010] The decision to de-escalate the IMT will be made in consultation with the relevant Control Agency/s, Jurisdictional Authorities and other Statutory Authorities that play an advisory role.	NEBA Incident Action Plan
	Tactical Response Plans	[EPS-RP-011] If monitor and evaluate shows that shoreline contact of Protection Priority Areas is likely, TRPs will be developed or sought from other titleholders/ regional industries prior to shoreline contact.	TRP

9. Source Control

The initial and highest priority response to an oil spill incident following the health and safety of onsite personnel is to prevent or limit further loss of hydrocarbons to the environment.

For major hydrocarbon release incidents from DC pipelines, the Devil Creek Emergency Response Plan (DC-40-IF-00096) outlines the initial actions to be taken by onsite personnel to control the source of a hydrocarbon spill and limit the volume released to the environment.

For vessels with a Shipboard Oil Pollution Emergency Plan (SOPEP), the SOPEP will provide any relevant initial actions to control the source of the spill if the spill is from a vessel.

For the ongoing response to a loss of well control (LOWC) incident at Reindeer Platform, the Source Control Planning and Response Guideline (DR-00-OZ-20001) is to be consulted as the primary source of information for implementing a relief well response.

The sections below provide an outline of source control activities noting that the Devil Creek Emergency Response Plan (DC-40-IF-00096), Vessel SOPEP and Source Control Planning and Response Guideline (DR-00-OZ-20001), where applicable, will provide a higher level of detail for specific incidents.

9.1 Level 1 Vessel and Platform Releases

Level 1 activations are based on spills which will not have an adverse effect on the public or the environment and can be controlled by the use of resources available onsite, without the need to mobilise additional resources for combatting the spill. Level 1 spills associated with this activity are considered credible from leaks and spills associated with hydrocarbon storage and handling on Reindeer platform and supply vessels. This scenario does not include loss of well control or export riser/pipeline releases covered in Sections 9.3 and 9.4, respectively, or vessel fuel tank rupture, covered in Section 9.2.

Table 9-1 provides the environmental performance outcome, initiation criteria and termination criteria for Level 1 vessel and platform releases. The Emergency Commander and/or Incident Commander is ultimately responsible for implementing the response, and may therefore determine that some tasks be varied, should not be implemented or be reassigned. The implementation guide for vessel and platform releases is found in Section 9.1.1.

Table 9-1: Level 1: Vessel & Platform Releases – environmental performance outcome, initiation criteria and termination criteria

Environmental Performance Outcome	Implementation of source control methods to stop the release of hydrocarbons into the marine / onshore environment.			
Initiation Criteria	Notification of spill			
Applicable hydrocarbons	**Reindeer Condensate**	**MDO**	**Hydraulic Oil**	**Lube Oil**
	✓	✓	✓	✓
Termination criterion	Release of oil to the marine environment has ceased and the workplace environment is deemed environmentally safe and free of hydrocarbon.			

9.1.1 Implementation guidance

Implementation guidance is summarised in Table 9-2. In the event MDO is released from a vessel due to a tank rupture, the relevant vessel-specific procedures will be applied. For support vessel collisions, the vessel's SOPEP will be followed to control the source, reduce the loss of hydrocarbons and prevent escalation of the incident.

Table 9-2: Implementation guidance – vessel and platform releases

Action		Consideration	Responsibility	Complete
Initial Actions	In the event of a loss of production hydrocarbons from platform topside production equipment, consult the Devil Creek Emergency Response Plan (DC-40-IF-00096)	-	Offshore Platform Designated Person/ Facility Emergency Commander	❑
	For refuelling and chemical transfers between support vessels and between support vessels and offshore platforms, consult the Refuelling and Chemical Management Standard (SO-91-IQ-00098)	Notwithstanding vessel-specific procedures for source control, the following activities would be evaluated immediately for implementation, providing it is safe to do so: • For spills during pumping operations, pumping activity to cease immediately. • Isolation of damaged, leaking equipment. • Where drainage is open to the marine environment, drainage is to be isolated as soon as practicable following the spill to prevent discharge to the ocean (the Vessel Master or On-scene Commander will confirm that the drainage network is closed on the vessel before washing down the deck after excess oil has been cleaned up). • Use of onsite spill kit resources (i.e. sorbent material) to clean-up spills. • Recovery of dropped container where practicable, where containers of hydrocarbons are dropped during vessel to platform transfers. • Disposal of contaminated waste to licenced waste contractor. • Isolation and repair of damaged, leaking equipment.	Offshore Platform Designated Person/ Vessel Master/ Facility Emergency Commander	❑

9.2 Vessel collision - fuel tank rupture

Table 9-3 provides the environmental performance outcome, initiation criteria and termination criteria for source control response to a fuel tank rupture. The Emergency Commander and/or Incident Commander is ultimately responsible for implementing the response, and may therefore determine that some tasks be varied, should not be implemented or be reassigned. The vessel tank rupture implementation guide is presented in Table 9-4.

Table 9-3: Source control (vessel collision) environmental performance outcome, initiation criteria and termination criteria

Environmental performance outcome	Implementation of source control methods to stop the release of hydrocarbons into the marine environment.
Initiation Criteria	Notification of incident/spill
Applicable hydrocarbons	MDO
Termination criterion	Release of oil to the marine environment has ceased and the workplace environment is deemed environmentally safe and free of hydrocarbons

Details of the worst-case spill scenario are described in Section 6.1.

9.2.1 Implementation guidance

Implementation guidance is summarised in Table 9-4. In the event of a vessel or platform release the relevant vessel-specific procedures will be applied. For support vessel collisions, the vessel's SOPEP will be followed to control the source, reduce the loss of hydrocarbons and prevent escalation of the incident.

Table 9-12 lists the environmental performance outcome, control measures, performance standards and measurement criteria for this strategy.

Table 9-4: Implementation guidance – fuel tank rupture

Action		Consideration	Responsibility	Complete
Initial actions	The vessel's SOPEP, as applicable under MARPOL, or procedure for responding to a ruptured tank will be followed as applicable	Notwithstanding vessel specific procedures for source control, the following activities would be immediately evaluated for implementation providing safe to do so: • Reduce the head of fuel by dropping or pumping the tank contents into an empty or slack tank. • Consider pumping water into the leaking tank to create a water cushion to prevent further fuel inventory loss. • If the affected tank is not easily identified, reduce the level of the fuel in the tanks in the vicinity of the suspected area if stability of the vessel will not be compromised. • Evaluate the transfer of fuel to other vessels. • Trim or lighten the vessel to avoid further damage to intact tanks. • Attempt repair and plugging of hole or rupture.	Vessel Master	❑

9.3 Loss of well control

A Reindeer condensate spill of up to a maximum of 4,029 m^3 is assessed as credible from a loss of well control at the Reindeer platform. Only the surface release is credible, refer to the EP for further justification (see also Table 6-1 & Table 6-2).

The Reindeer Well Operations Management Plan (WOMP) (DR-91-ZG-10038) identifies direct intervention, top-kill and relief well drilling as contingency strategies to respond to a loss of well control at Reindeer Platform wells.

The primary means of controlling a well that cannot be brought under control using onsite resources is the drilling of a relief well to intercept the well bore and kill the flow of hydrocarbons.

Table 9-5 provides the environmental performance outcome, initiation criteria and termination criteria for controlling the source of a loss of well control. The Emergency Commander and/or Incident Commander is ultimately responsible for implementing the response, and may therefore determine that some tasks be varied, should not be implemented or be reassigned.

Table 9-5: Source control (loss of well control) environmental performance outcome, initiation criteria and termination criteria

Environmental Performance outcome	Implementation of source control methods to stop the release of hydrocarbons into the marine environment.
Initiation criteria	Loss of well control
Applicable hydrocarbons	Reindeer condensate
Termination criterion	The primary well is contained and killed to prevent any further release of hydrocarbon to the environment.

Details of the worst-case spill scenario details are described in Section 6.1. Source control methods are described in further detail in the following sections.

9.3.1 Emergency shutdown (ESD)

The Devil Creek Emergency Response Plan (DC-40-IF-00096) details the initial actions to be taken by offshore and onshore personnel to activate Reindeer platform ESD systems, where they are not already triggered automatically.

9.3.2 Hazard zone mapping

A major release of hydrocarbons sub-surface will result in a gas boil zone at the sea surface and is likely to create a hazardous atmosphere. In the event of a major release sub-surface or at the surface, hazard zone prediction modelling is done as part of the in-response oil spill modelling provided by RPS.

9.3.3 Relief well drilling

The risk of a loss of well control event is introduced during well intervention activities due to the requirement to breach and enter the pressure envelope of the well.

As per the Reindeer Well Operations Management Plan (WOMP) (DR-91-ZG-10038) controlling a loss of well control through the drilling of a relief well by a MODU, or through top-kill from the platform or vessel, are strategies that will be pursued if the well cannot be contained through ESD or direct intervention.

Relief well planning is required for Reindeer production wells in the event of relief well drilling. Relief well planning is conducted as per Santos Drilling & Completions Management Process. Findings from the planning will determine pumping/well-kill requirements for top-kill (if possible) and the technical design and MODU requirements for drilling a relief well.

Relief well drilling is the primary source control strategy to control a LOWC. The Source Control Planning and Response Guideline (DR-00-OZ-20001) outlines the overarching process for planning and mobilising personnel and equipment into the field for the purpose of drilling a relief well.

9.3.3.1 Surface / top well kill

Prior to the 2017 Reindeer RST logging campaign which involved well activities entering the pressure envelope of the well, and as such introduced the risk of a loss of well control, a top kill study was conducted to demonstrate the feasibility of this option. The top-kill study was conducted by third party subject matter expert Schlumberger.

For clarity, the top-kill scenario is modelled on a small uncontrolled leak to atmosphere at the production tree that cannot be isolated upstream that may still allow safe access to the platform and tie-in to the leaking well via existing infrastructure (i.e. connecting to the production tree via the kill wing outlet) and safe operation of a vessel located alongside the platform. It is estimated that this leak rate would be in the range of 400cc/min, small enough not to generate an explosive gas cloud and access to the platform is still preserved. This methodology would not be considered should safe access to the platform or ability to operate a vessel alongside the platform not be achievable.

A high-pressure pumping package would be deployed on a vessel, the vessel is moored alongside the platform, and a flexible high pressure kill line is deployed from the vessel to the platform. The simulation assessed the ability to bullhead the well dead from a shut-in gas to surface scenario, whilst out-running the surface leak and not exceeding the safe working pressure of the surface equipment.

The top-kill model utilised a leak rate of up to 10,000cc/min. (which is the lowest leak surface leak rate the modelling software allows) and demonstrated that utilising a minimum kill rate of 350gpm (~10bpm) the gas could be effectively bull-headed without excessive well bore pressures. A large range of reservoir injectivity values were assessed for both seawater and kill-weight mud with a maximum pump pressure of less than 3,000 psi. This is well within the capability of high-pressure pumping equipment (e.g. cement units/triplex pumps, high-pressure treating iron pipe-work and flexible high-pressure hoses) readily available within the region. The simulation is further documented in Reindeer Schlumberger Report 1-1BAORA3.

Santos has successfully planned and executed well kill/bull-heading/flushing operations during routing non-leaking well suspension activities on numerous platforms using this technique with local personnel and equipment.

9.3.3.2 Relief well planning

Relief well planning is embedded into the Santos Drilling and Completions Management Process (DCMP). The following industry accepted guidelines have been adopted to assist relief well planning requirements:

- SPE Technical Report: Calculation of Worst-Case Discharge Rev 1 2016 (SPE, 2016): This is used as part of the prospect screening review to generate a credible rate for oil spill modelling, as well as providing an input for the dynamic kill modelling as part of the Well Specific Source Control Plan.
- Offshore Energies UK (OEUK) Relief Well Planning for Offshore Wells Guideline, Issue 3, 2024 (OEUK, 2024): This methodology is used to confirm a well complexity analysis and tailor required content for the Well Specific Source Control Plan to the appropriate level of detail.

All wells associated with the Reindeer WHP are included in a well specific source control plan (SCP). The SCP is a Santos controlled document and is encompassed in the well management plan (WMP). The SCP will contain relief well planning information, specifically:

- MODU positioning assessment for relief well drilling locations
- relief well tangible equipment requirements and availability
- relief well trajectory analysis and casing design
- dynamic well kill hydraulic simulation results.

These reports are static reports developed prior to higher-risk campaign-specific activities. While the SCP contains planning information relevant to drilling a relief well for any well release (e.g. MODU positioning locations), time-variable information, such as MODU availability, can only be assessed at the specific time that they are needed.

To ensure Santos has current MODU availability, Santos maintains a register of MODU activity within the region and updates this on a monthly basis. The relief well rig capability register includes information about:

- MODU name
- MODU contract status (operator and contract duration)
- Current location
- Maximum water depth capability

- MODU type (floating vs jack-up; mooring type; rig design/class)
- Available drilling envelope
- BOP specifications
- BOP connector specifications
- Mud pumps specifications/capability
- Choke and kill line internal diameters
- Storage capability (i.e. MDO, base-oil, brine, drill-water, potable water, bulks)
- NOPSEMA/ DEMIRS safety case (yes/no)

The SCP includes a review of the most recent MODU capability register to identify the most suitable MODU for the well. In the event a suitable MODU is not in Australian waters, or is not predicted to be in Australian waters at the time of the activity, further work will be completed to identify a regionally suitable MODU, along with a mobilisation plan that demonstrates construction of a relief well within the time frame outlined in Table 9-6 is achievable. Once a MODU is allocated as a potential relief well MODU for a project, the MODU capability register will be annotated as such. As such, any change to the register on a month-to-month basis that affects a preferred MODU will trigger a revision to the SCP for that particular well. The review will be completed within 4 weeks of identifying the change.

In order to facilitate and expedite the use of a regional MODU for relief well drilling an Australian Petroleum Production and Exploration Association (APPEA) Memorandum of Understanding: Mutual Assistance is in place. This agreement provides the mechanism to facilitate the transfer of drilling units and well-site services between operators in Australian and Timor Leste administered waters in order to respond urgently to emergency source control events.

A Safety Case Revision will be required for the relief well rig to undertake the activity; this cannot be submitted before the event. The Safety Case Revision will be based on existing documents, specifically the Safety Case Revision approved for the drilling of the original well and the Safety Case in force for the relief well rig. A Safety Case Revision is to be submitted within 14 days from the well leak, however the critical path time allowed for the preparation of the document is three days. The remaining estimated time would be used for gathering post-event data, mobilising the workforce and conducting a hazard identification. It is not practicable to reduce the critical path days with additional pre-planning as document revision, final review and approval will still be required after completing the hazard identification.

9.3.3.3 Relief well schedule

The worst-case credible loss of well control volume is based on an initial discharge of approximately 173 MMscf/d of Gas with 677 STB/d of Condensate with a total of 6.5 BSCF of gas and 25,000 STB of condensate discharged over a period of 10 weeks. The well is then anticipated to cease flowing due to the low gas rates and high-water rates corresponding to high water gas ratios. In total the worst-case credible loss of well control volume with no restrictions on flow with exhaustion on reservoir pressure is based on 10 weeks (70 days).

An indicative relief well drilling schedule is provided in Table 9-6. This is based on control of a blow-out well by 13 weeks (91 days). This period is used as a base case well control timeframe by Santos based on indicative mobilisation durations, relief well planning and operations. It could take up to 47 days to have a MODU on location ready to spud. The base case well control timeframe for drilling a relief well across Santos' other wells is generally 77 days. The additional 14 days is required for this scope based on the planning assumption that a suitable jack-up MODU capable of drilling in shallow waters is unlikely to be available in Australian waters. As a result, additional time will be required to mobilise the MODU from international waters (i.e. Singapore) to the operational area. Long lead item equipment to enable a relief well to be drilled within the 91-day timeframe is currently held in the Santos inventory or has been confirmed to be available at short notice from vendors or other operators in the region.

This timeline has been assessed as ALARP based on the current controls/measures in place, however, Santos is actively working with industry to evaluate measures to improve on the ALARP response time model through the APPEA Drilling Industry Steering Committee Source Control Response Industry (SCRI) Working Group. The SCRI working group is an initiative established to drive collaboration and continuous improvement in source control emergency response planning. The working group will explore and act on opportunities to align and strengthen the Titleholders' source control emergency response capability through "mutual aid" initiatives and drive continuous improvement by implementing fit-for-purpose and effective source control emergency response strategies.

Table 9-6: Schedule for mobile offshore drilling unit arriving on location

Task	Duration (in days)	Controls
LOWC relief well		
• Event reported • Begin sourcing of rig for relief well drilling operations • Concurrently, stand up relief well drilling team and activate relief well specialists	2	• On-site communications • Active IMT on call including Operations Section Chief/Relief Well Team Lead • Stand-up relief well team (as per Santos Offshore Source Control Planning and Response Guideline (DR-00-OZ-20001) • Relief Well Drilling specialist services contract (Wild Well Control) • Regional MODU tracking • APPEA MoU: Mutual Assistance
• Relief well MODU confirmed. Relief well MODU suspends operations and prepares to mobilise to relief well location. • Demobilisation of equipment from previous operator • Concurrently, prepare relief well MODU Safety Case Revision (SCR) and submit to NOPSEMA/DEMIRS • Concurrently, prepare relief well design and dynamic kill plan. Prepare relief Well Management Plan (WMP) and submit to NOPSEMA/DEMIRS	7	• Active IMT • Santos Offshore Source Control Planning and Response Guideline (DR-00-OZ-20001) • Pre-completed well specific Source Control Plan complete with relief well study • Relief Well Drilling specialist services contract (Wild Well Control) • Regional MODU tracking • APPEA MoU: Mutual Assistance • Access relief well long lead equipment from inventory or other operators (e.g. casing and wellhead) • Drilling services contracted
• Contract relief well MODU • Concurrently, continue preparations for rig mobilisation • Concurrently, NOPSEMA/DEMIRS assessment of relief well MODU SCR and relief well WMP • Mobilise relief well MODU to location.	38	• Active IMT • Santos Offshore Source Control Planning and Response Guideline (DR-00-OZ-20001) • Relief Well Drilling specialists services contract (Wild Well Control)
Total days prior to arrival, ready to spud/commence relief well operations	**47**	
Drill and construct relief well and complete dynamic well kill operations	44	• Active IMT • Santos Offshore Source Control Planning and Response Guideline (DR-00-OZ-20001) • Relief Well Drilling specialist services contract (Wild Well Control)
Total days from LOWC to well kill	**91**	

9.3.4 Implementation guidance

Implementation guidance for source control (drilling of a relief well) is summarised in Table 9-7.

Table 9-7: Implementation guidance – loss of well control

Action		Responsibility	Complete
Initial Actions	**Relief well**		
	Implement the Source Control Planning and Response Guideline (DR-00-OZ-20001).	Relief Well Team Leader	❑
	Notify Santos Drilling and Completions Team to assemble a Source Control Branch and immediately begin preparations.	Relief Well Team Leader	❑
	Notify well control service provider personnel for mobilisation.	Relief Well Team Leader and Source Control Branch Director	❑
	Source MODU through nearby drilling operations if available or procure from nearest operator through mutual aid agreement MoU.	Source Control Branch Director	❑
	Refine, as necessary, the relief well pre-planned work described in this section to reflect the actual depths and asses the suitability of well locations.	Source Control Branch Director	❑
	Assess relief well equipment and personnel requirements. Procure and make ready.	Logistics Section Chief Section Chief	❑
	Deploy equipment and personnel to site to begin spud and drill.	Relief Well Team Leader	❑
Ongoing Actions	**Relief well**		
	Design Relief Well, using relief well pre-planning work	Source Control Branch Director	❑
	Assess relief well equipment and personnel requirements. Procure and make ready.	Logistics Section Chief	❑
	Deploy equipment and personnel to site to begin operations.	IMT Drilling Team Leader	❑
	Monitor progress of relief well drilling and communicate to IMT.	IMT Drilling Team Leader	❑

9.4 Subsea Infrastructure Failure

Subsea infrastructure failure here includes the export riser and subsea pipeline to the shoreline. The worst-case credible spill is a release of 121.4 m^3 of Reindeer condensate from the subsea pipeline between the platform (Subsea isolation valve) and the shoreline. This includes pipeline within Commonwealth and State waters.

Table 9-8 provides the objective, initiation criteria and termination criteria for this tactic. The Emergency Commander and/or Incident Commander is ultimately responsible for implementing the response, and may therefore determine that some tasks be varied, should not be implemented or be reassigned. Refer to Table 9-9 for the implementation guide for subsea infrastructure failure.

Table 9-8: Subsea infrastructure failure – environmental performance outcome, initiation criteria and termination criteria

Environmental Performance Outcome	Implementation of source control methods to stop the release of hydrocarbons into the marine/onshore environment.	
Activation criteria	Notification of a spill	
Applicable hydrocarbons	**Reindeer Condensate**	**MDO**
	✓	**x**
Termination criterion	The oil cargo in the ruptured subsea export pipeline is secured and release to the marine environment stopped.	

Table 9-9: Subsea infrastructure failure– implementation guide

Pipeline Release				
Activation time	Immediately upon receiving notification of incident/ spill.			
Action		**Consideration**	**Responsibility**	**Complete**
Initial Actions	Consult The Devil Creek Emergency Response Plan (DC-40-IF-00096 to activate riser / pipeline emergency shut down [ESD]).	These following Major Incidents outlined within the DC ERP (DC-40-IF-00096) are applicable: DC- Major Incident #8 (Hydrocarbon Release from the Import Pipeline) RE- MAE #3 (Hydrocarbon Release from Riser and Pipeline close to Platform)	Emergency Commander	❑
	Where and when safe to do so, an inspection class remotely operated vehicle (ROV) and support vessel, will be mobilised to visually identify any subsea incident location.	-	Incident Commander/ Operations Team Leader	❑
Resources			**Location**	
Equipment	Inspection class ROV.		On vessels of opportunity Contracted at the time of incident.	
	Vessels		Santos operational sites Vessels of opportunity	
Personnel	Santos Facility Emergency Response Team members		Santos Operational sites	
Maintenance of response	The resources to activate the pipeline ESDs are always present within the Reindeer and DC control room. Additional response tactics that may be implemented following a pipeline release are discussed separately.			

9.4.1 Initial Response

The Devil Creek Emergency Response Plan (DC-40-IF-00096) details the initial actions to be taken by offshore and onshore personnel to activate riser/ pipeline ESD systems, where they are not already triggered automatically.

These following Major Incidents outlined within the DC ERP (DC-40-IF-00096) are applicable:

- DC- Major Incident #8 (Hydrocarbon Release from the Import Pipeline)
- RE- MAE #3 (Hydrocarbon Release from Riser and Pipeline close to Platform)

Pipeline inventory will be minimised where possible through DCGP operations, to reduce the potential volume released to the marine environment.

9.4.2 Identification and Repair

Where and when safe to do so, an inspection class ROV and support vessel, will be mobilised to visually identify any subsea incident location, in addition to vessel and aerial surveillance conducted as per the Monitor and Evaluate Plan (Section 10).

Pipeline repair will involve the mobilisation of a repair team taking into consideration requirements as specified under the 16" DC Supply Pipeline Operational Safety Case and Pipeline Management Plan (RE-14-RF-00036.02). Santos maintains, in secure storage, certified spare 16" pipe and connectors suitable for a sectional replacement in localised damage scenarios.

9.5 Onshore pipeline release

Onshore pipeline failure includes the buried export pipeline (Reindeer 16" pipeline) between the shoreline and the boundary of the Devil Creek Gas Plant (DCGP). A conservative worst case credible spill is a release of 121.4 m^3 of Reindeer condensate. Gas will also be released leading to the potential for ignition and fire. This section covers the initial response to control the source of Reindeer condensate from an onshore pipeline release.

Table 9-10 provides the Environmental Performance Outcome, initiation criteria and termination criteria for this tactic. The Emergency Commander and/or Incident Commander is ultimately responsible for implementing the response, and may therefore determine that some tasks be varied, should not be implemented or be reassigned. Refer to Table 9-11 for the implementation guide for an onshore pipeline release.

Table 9-10: Onshore pipeline release - objectives, initiation criteria and termination criteria

Environmental Performance Outcome	Implementation of source control methods to stop the release of hydrocarbons into the marine/onshore environment.	
Activation criteria	Notification of spill	
Applicable hydrocarbons	**Reindeer Condensate**	**MDO**
	✓	X
Termination criterion	The cargo in the leaking or ruptured pipeline is secured and release to the onshore (terrestrial) environment is stopped.	

Table 9-11: Onshore pipeline release– implementation guide

Onshore Hydrocarbon Spill				
Activation time	Immediately upon receiving notification of incident/ spill.			
Action		**Consideration**	**Responsibility**	**Complete**
Initial Actions	Initial actions undertaken by site to control the release will be conducted as per the Devil Creek Emergency Response Plan (DC-40-IF-00096), specifically DC-Major Incident #8 (Hydrocarbon Release from the Import Pipeline)	Actions include activating Reindeer Platform remote ESD and reducing pipeline inventory through running of gas plant with wellhead valve closed.	Emergency Commander	❑
Resources			**Location**	
Personnel	Emergency Response Team		Devil Creek	

9.5.1 Initial Response

The Devil Creek Emergency Response Plan (DC-40-IF-00096) details the initial actions to be taken by offshore and onshore personnel to activate pipeline ESD systems, where they are not already triggered automatically. The following Major Incidents outlined within the DC ERP (DC-40-IF-00096) are applicable:

- DC- Major Incident #8 (Hydrocarbon Release from the Import Pipeline)

9.5.2 Identification

For the buried onshore pipeline, a small leak from loss of integrity (corrosion) is more likely than a rupture from external impact. Where a small leak is below the limit of detection of automated ESD, identification of the leak may not occur until it is manually identified during routine pipeline ROW/easement surveillance.

The requirements and frequency of pipeline ROW/easement and surveillance for the buried onshore section of the Reindeer 16” pipeline is outlined within the Onshore Pipeline Inspection Procedure (OP-14-IG-00001). The surveillance is currently conducted every 6 months.

9.6 Environmental performance

Table 9-12 indicates the environmental performance outcome, control measures, performance standards and measurement criteria for this response strategy.

Table 9-12: Environmental performance - source control

Environmental Performance Outcome	Implementation of source control methods to stop the release of hydrocarbons into the marine/onshore environment.		
Response Strategy	**Control Measures**	**Performance Standards**	**Measurement Criteria**
Response Preparedness			
	Vessel Spill Response Plan (SOPEP/SMPEP)	[EPS-SC-001] Activity/support vessels have a shipboard oil pollution emergency plan (SOPEP) or shipboard marine	Audit records. Inspection records

Environmental Performance Outcome	Implementation of source control methods to stop the release of hydrocarbons into the marine/onshore environment.		
Response Strategy	**Control Measures**	**Performance Standards**	**Measurement Criteria**
Source control - vessel collision spill control		pollution emergency plan (SMPEP) that outlines procedures to combat spills	
		[EPS-SC-002] Spill exercises on activity/support vessels are conducted as per the vessels SOPEP or SMPEP	Spill exercise close-out reports
Source control – relief well drilling	Source Control Planning and Response Guideline (DR-00-OZ-20001) provides guidance for well specific source control planning and response, and includes the Santos Source Control Emergency Response Plan in Section 7	[EPS-SC-022] The Source Control Planning and Response Guideline (DR 00 OZ 20001) is in place and up to date during the activity	Source Control Planning and Response Guideline (DR-00-OZ-20001)
	Well specific Source Control Plan developed prior to well intervention	[EPS-SC-023] A well specific Source Control Plan is in place prior to a well intervention taking place. Source control plan will identify suitable rig availability for relief well drilling.	Well specific Source Control Plan
	Contract and Equipment Access Agreement with WWCI	[EPS-SC-024] Contract and Equipment Access Agreement with WWCI are maintained providing technical support and equipment	Contract with WWC
	Relief Well Rig Capability Register is maintained during the activity to monitor MODUs potentially available for relief well drilling	[EPS-SC-026] Relief Well Rig Capability Register, to monitor rigs currently present in Australasia and record relevant details including rig specifications, contract status and safety case approvals, is maintained during the activity through monthly monitoring.	Relief Well Rig Capability Register
	Arrangements for source control emergency response personnel	[EPS-SC-025] Arrangements for access to source control personnel are maintained during the activity	Contract/MoUs for source control personnel
Source control – pipeline release	Devil Creek Emergency Response Plan	[EPS-SC-047] Current DC ERP (DC-40-IF-00096) in place covering incident response actions for pipeline hydrocarbon release	DC ERP (DC-40-IF-00096)
		[EPS-SC-048] MAE drills undertaken as per Incident Drills and Exercise Schedule (DC-40-IF-0098)	Facility Drill Schedule
Response Implementation			
Source control – vessel collision spill control	Vessel Spill Response Plan (SOPEP/SMPEP) implemented	[EPS-SC-003] Actions to control spill associated with a vessel incident followed in accordance with SOPEP or SMPEP.	Vessel logs
Source control – relief well drilling	Source Control Planning and response Guideline (DR-00-OZ-20001) provides guidance for well specific source control planning and response, and includes the Santos Source Control Emergency	[EPS-SC-028] Relief well drilling implemented in accordance with the Source Control Planning and Response Guideline (DR-00-OZ-20001) during a well release	Incident Log

Environmental Performance Outcome	Implementation of source control methods to stop the release of hydrocarbons into the marine/onshore environment.		
Response Strategy	**Control Measures**	**Performance Standards**	**Measurement Criteria**
	Response Plan in Section 7		
	Source Control Branch	[EPS-SC-029] Source Control Branch mobilised within 24 hours of being notified of the well release	Incident Log
	Well control specialists	[EPS-SC-031] Well control specialists mobilised within 72 hours of being notified of the well release	Incident Log
	Equipment/Services for relief well drilling	[EPS-SC-030] Equipment/Services for Relief Well drilling sourced within 5 days of the well release being identified	Incident Log
	Relief well MODU	[EPS-SC-032] MODU for relief well drilling to be onsite by Day 47 from the start of a well release.	Incident Log
	Relief well construction	[EPS-SC-033] Relief well completed within 91 days from start of well release	Incident Log
Source control – pipeline release	Devil Creek Emergency Response Plan	[EPS-SC-049] Actions to control loss of containment from pipeline release are in accordance with the DC ERP (DC-40-IF-00096)	Incident log

10. Monitor and evaluate

Understanding the behaviour and likely trajectory of an oil spill is critical to evaluate the appropriate response strategy. There are a number of methods that can be used to monitor and evaluate, including:

- vessel surveillance
- aerial surveillance
- tracking buoys
- oil spill trajectory modelling
- satellite imagery

The sections below outline the operational monitoring strategies considered applicable to worst case spill events identified for Reindeer and Devil Creek operational activities and cessation of production.

10.1 Vessel Surveillance

Table 10-1 lists the environmental performance outcome, initiation criteria and termination criteria for this strategy.

Table 10-1: Vessel surveillance – environmental performance outcome, initiation criteria and termination criteria

Environmental performance outcome	Implement monitor and evaluate methods in order to provide situational awareness to inform IMT decision making.	
Initiation criteria	Notification of Level 2 or 3 spills – may be deployed in a Level-1 incident (to be determined by OSC)	
Applicable hydrocarbons	**MDO**	**Reindeer Condensate**
	✓	✓
Termination criterion	• Vessel-based surveillance is undertaken at scheduled intervals during daylight hours, and continues for 24 hours after the source is under control and a surface sheen is no longer observable, or • NEBA is no longer being achieved or • Agreement is reached with Jurisdictional Authorities to terminate the response.	

Direct observations from field support or other vessels can be used to assess the location and visible extent of the hydrocarbon incidents, and to verify modelling predictions and trajectories. Due to the proximity of observers to the water's surface, vessel surveillance is limited in its coverage in comparison to aerial surveillance and may also be compromised in rough sea-state conditions or where fresh hydrocarbons at surface pose safety risks (e.g. gas/condensate).

10.1.1 Implementation guidance

Table 10-2 provides guidance to the IMT on the actions and responsibilities to be considered when selecting this strategy. Table 10-3 has a list of resources that may be used to implement this strategy. Mobilisation times for the minimum resources that are required to start initial vessel surveillance operations are listed in Table 10-4. The OSC and/or Incident Commander is ultimately responsible for implementing the response, and may therefore determine that some tasks be varied, should not be implemented or be reassigned.

Table 10-21 lists the environmental performance standards and measurement criteria for all monitor and evaluate methods including this strategy.

Table 10-2: Implementation guidance – vessel surveillance

Action		Consideration	Responsibility	Complete
Initial actions	Notify nearest available support vessel to commence surveillance.	Current Santos on hire vessels or vessels of opportunity (VOO) can be used. Automatic Identification System (AIS) vessel tracking is available through Emergency Response (ER) intranet page.	On-Scene Commander Operations Section Chief	☐
	Source additional contracted vessels if required for assistance.	Refer to Santos Vessels for Oil Spill Response (7110-650-ERP-0001) for guidance on vessel availability monitoring and vessel types.	Logistics Section Chief	☐
	Record surface slick location and extent, weather conditions, and marine fauna. Complete vessel surveillance forms (Appendix E) and provide to On-Scene Commander (Level 1 spills) or IMT (Level 2-3 spills).	Photographic images are to be taken where possible and included with surveillance forms. Trained observers will not be available immediately – photos and locations will provide initial information that can be interpreted by IMT.	Vessel Observers	☐
	Relay surveillance information (spill location, weather conditions, marine fauna sightings and visual appearance of the slick) to the IMT within 60 minutes of completing vessel surveillance.	Initial reports to the IMT may be verbal (followed by written transmission) if the vessel is out of range or has no facilities for transmitting forms.	Vessel Master and/or On-Scene Commander	☐
Ongoing Actions	Review surveillance information to validate spill fate and trajectory.	-	Planning Section Chief/ GIS Team Leader	☐
	Use available data to conduct operational NEBA and confirm that pre-identified response options are appropriate.	-	Environment Unit Leader	☐
	Use monitor and evaluate data to periodically reassess the spill and modify the response (through the IAP), as required	Surveillance data is useful in updating the Common Operating Picture	Planning Section Chief	☐

Table 10-3: Vessel surveillance resource capability

Equipment type/ personnel required	Organisation	Quantity available	Location	Mobilisation timeframe
Contracted vessels and vessels of opportunity	Santos Contracted Vessel Providers Vessels of opportunity identified through AIS Vessel Tracking.	Availability dependent upon Santos and vessel contractor activities.	Vessels mobilised from Dampier, Varanus Island, Exmouth or offshore location. Locations verified through AIS Vessel Tracking Software.	Pending availability and location. Expected within 12 hours.

Table 10-4: Vessel surveillance – first strike response timeline

Task		Time from IMT call-out
IMT begins sourcing Santos-contracted vessel or VOO for on-water surveillance		<90 minutes
Santos-contracted vessel VOO onsite for surveillance		<24 hours (daylight dependent)
Minimum resource requirements		
One vessel. No specific vessel or crew requirements.		
Deployment Location	**Approximate Distance to Operational Area[21] (nautical miles)**	**Approx. steam time[22] (hours:mins)**
Exmouth	172 (318 km)	17:00
Dampier/Karratha	45 (83 km)	4:30
Varanus Island	56 (104 km)	5:45

10.2 Aerial surveillance

Table 10-5 provides the environmental performance outcome, initiation criteria and termination criteria for this strategy.

Table 10-5 Aerial surveillance – environmental performance outcome, initiation criteria and termination criteria

Environmental performance outcome	Implement monitor and evaluate tactics in order to provide situational awareness to inform IMT decision making.	
Initiation criteria	Notification of a Level 2/3 spill	
Applicable hydrocarbons	**Reindeer Condensate**	**MDO**
	✓1	✓1
Termination criterion	• Aerial surveillance undertaken at scheduled intervals during daylight hours and continues for 24 hours after the source is under control and a surface sheen is no longer observable, OR • As directed by the relevant Control Agency.	

Aerial surveillance is used to record the presence and size of the hydrocarbon spill at surface as well as other environmental observations including weather conditions, marine fauna and sensitive receptors in the area. Aerial surveillance provides superior coverage over vessel surveillance for estimating the spatial extent of a spill but is generally required only for larger Level 2/3 spills.

[21] *As measured to Reindeer WHP*

[22] *At average rate of 10 nautical miles per hour*

10.2.1 Implementation guidance

Table 10-6 provides guidance to the IMT on the actions and responsibilities that should be considered when selecting this strategy.

Table 10-7 provides a list of resources that may be used to implement this strategy. Mobilisation times for the minimum resources that are required to commence initial aerial surveillance operations are listed in Table 10-8. The On-Scene Commander and/or Incident Commander is ultimately responsible for implementing the response, and may therefore determine that some tasks be varied, should not be implemented or be reassigned. Table 10-21 lists the environmental performance outcome, control measures, performance standards and measurement criteria for this strategy.

Table 10-6: Implementation guidance – aerial surveillance

Action		Consideration	Responsibility	Complete
Initial Actions	Contact contracted aviation provider- provide details of incident and request mobilisation to spill site for initial surveillance.	If aviation asset is available near spill location, use where possible to gather as much information about the spill. If aviation asset is not available at spill location IMT is to seek available resources through existing contractual arrangements. It is possible that the initial surveillance flight will not include a trained aerial surveillance observer. Initial flights can be conducted using a standard crew and initial surveillance should not be delayed waiting for trained personnel. Ensure all safety requirements are met prior to deployment. There should be an attempt to obtain the following data during initial surveillance: • name of observer, date, time, aircraft type, speed and altitude of aircraft • location of slick or plume (global positioning system [GPS] positions, if possible) • spill source • size of the spill, including approximate length and width of the slick or plume • visual appearance of the slick (e.g. colour) • edge description (clear or blurred) • general description (windrows, patches etc.) • wildlife, habitat or other sensitive receptors observed • basic metocean conditions (e.g. sea state, wind, current) • photographic/video images.	Operations Section Chief Logistics Section Chief	❑
	Source available Santos Aerial Observers, arrange accommodation/logistics and deploy to Forward Operations/Air base location.	Santos Aerial Observer list available from First Strike Resources on Santos Offshore ER Intranet page.	Operations Section Chief Logistics Section Chief	❑
	Develop flight plan (frequency and flight path) to meet IMT expectations and considering other aviation operations. Expected that two overpasses per day of the spill area are completed.	Flight plan to confirm with OSC that aircraft are permitted in the vicinity of the spill. Flights are only to occur during daylight and in weather conditions that do not pose significant safety risks.	Operations Section Chief / Aviation Superintendent	❑
	Pre-flight briefing.	-	Aerial Observers Contracted aircraft provider/ pilots	❑
	Aerial Observers to commence surveillance	Consider procedure for interacting with marine fauna.	Operations Section Chief	❑

Action		Consideration	Responsibility	Complete
	Determine the spill extent by completing Aerial Surveillance Log (Appendix F) and Aerial Surveillance Surface Slick Monitoring Template. Calculate volume of oil (Appendix G). Take still and/or video images of the slick.	Thickness estimates are to be based on the Bonn Agreement Oil Appearance Code (BAOAC).	Aerial Observer	❑
	Record presence and type of fauna by completing the Aerial Surveillance Marine Fauna Sighting Record Sheet (Appendix H).	Provide a copy of completed Record Sheets to Environment Unit Leader and OSM Implementation Lead.	Aerial Observer	❑
	Record shoreline habitat type and degree of oiling by completing the Aerial Surveillance Shoreline Observation Log (Appendix I).	Thickness estimates are to be based on the Bonn Agreement Oil Appearance Code (BAOAC).	Aerial Observer	❑
	Relay all surveillance records (logs, forms, photographic images, video footage) to the IMT	Where possible, a verbal report via radio/telephone en-route providing relevant information should be considered if the aircraft has long transits from the spill location to base	Aerial Observer Planning Section Chief Operations Section Chief	❑
Ongoing Actions	Update flight schedule for ongoing aerial surveillance as part of broader Aviation Subplan of IAP	Frequency of flights should consider information needs of IMT to help maintain the Common Operating Picture and determine ongoing response operations	Operations Section Chief/ Aviation Superintendent Planning Section Chief	❑
	Mobilise additional aircraft and trained observers to the spill location to undertake ongoing surveillance activities	-	Logistics Section Chief	❑
	Update Common Operating Picture with surveillance information and provide updates to spill trajectory modelling provider	-	Planning Section Chief GIS Team Leader	❑

Table 10-7: Aerial surveillance resource capability

Equipment type/ personnel required	Organisation	Quantity available	Location	Mobilisation timeframe
Rotary-wing aircraft and flight crew	• Santos contracted provider/s	• 2 x contracted (1 x primary + 1 x backup) • Additional as required	• Karratha	Activation of aerial surveillance using helicopter pilots will occur <3 hours of notification of the spill. Helicopter on site for surveillance <6 hours of the spill (daylight dependent).
Aerial surveillance Crew	• Santos aerial observers	• 7 x Santos staff	• Perth and Varanus Island (VI)	24 hours - available from Day 2 of the incident
	• AMOSC / Industry Mutual Aid	• 5 x AMOSC staff • 5 x AMOSC Core Group personnel available • Additional trained industry mutual aid personnel	• Australia wide	24 hours - available from Day 2 of the incident
Drones and pilots **secondary response to assist vessel-based surveillance	• AMOSC	• Drones available 24/7 through AMOSC sub-contract • 1 x pilot	• Fremantle	Response via duty officer within 15 minutes of first call – AMOSC personnel available within 1 hour of initial activation call. Equipment logistics varies according to stockpile location (refer to Table 10-12)
	• OSRL – Third-Party Unmanned Aerial Vehicle (UAV) provider	• 2 x qualified remote pilots, however response is on best endeavour	• Australia / international	Depending on the port of departure, one to two days if within Australia
	• Local WA hire companies	• 10+	• Perth and regional WA	

Table 10-8: Aerial surveillance – first strike response timeline

Task	Time from IMT call-out
Aircraft activated for aerial surveillance	<3 hours
Aircraft onsite for aerial surveillance	<6 hours (daylight dependent)
Trained Aerial Observers mobilised to airbase	<24-48 hours (from Day 2) (daylight dependent)
Minimum resource requirements	
• Santos contracted helicopter and pilots • Santos trained Aerial Observers	

Nearest Airport	Approximate Distance[23] (nm)	Approx. flight time[24] (hours: minutes)
Port Hedland	137 (253.7 Km)	1:10
Karratha	50 (92.6 Km)	0:25
Learmonth	180 (333.3 Km)	1:30

[23] *As measured to Reindeer WHP*

[24] *At average flight speed of 120 knots/hr*

10.3 Tracking buoys

Table 10-9 provides the environmental performance outcome, initiation criteria and termination criteria for this strategy.

Table 10-9: Tracking Buoys - environmental performance outcome, initiation criteria and termination criteria

Environmental performance outcome	Implement monitor and evaluate tactics in order to provide situational awareness to inform IMT decision making.	
Initiation criteria	Notification of a Level 2 or 3 spill May be deployed in a Level-1 spill if deemed beneficial by the OSC	
Applicable hydrocarbons	**Reindeer Condensate**	**MDO**
	✓1	✓1
Termination criterion	• Tracking buoy deployment will continue for 24 hours after the source is under control and a surface sheen is no longer observable, OR • As directed by the relevant Control Agency or NEBA.	

10.3.1 Implementation guidance

Table 10-10 provides guidance to the IMT on the actions and responsibilities that should be considered when selecting this strategy. Table 10-11 provides a list of resources that may be used to implement this strategy.

Table 10-12 provides a summary of AMOSC equipment mobilisation timeframes. Mobilisation times for the minimum resources that are required to commence implementation of this tactic are listed in Table 10-13. The OSC and/or Incident Commander is ultimately responsible for implementing the response, and may therefore determine that some tasks be varied, should not be implemented or be reassigned. Table 10-9 lists the environmental performance standards and measurement criteria for this strategy.

Table 10-10: Implementation guidance - tracking buoys

Action		Consideration	Responsibility	Complete
Initial Actions	Organise vessel to mobilise two tracking buoys from Varanus Island	Personnel and vessel safety is priority. Current Santos on hire vessels or VOOs can be used. AIS vessel tracking is available through ER intranet page.	OSC/Operations Section Chief	❑
	Deploy two tracking buoys at leading edge of slick.	Note deployment details and weather conditions in incident log.	Vessel Master	❑
	Inform IMT that tracking buoys have been deployed and provide deployment details. Monitor movement of tracking buoys.	Refer login details of tracking buoy monitoring website on Santos ER intranet site.	OSC Planning Section Chief/GIS Team Leader	❑
	Use tracking buoy data to maintain Common Operating Picture.	Data tracked online.	Planning Section Chief/ GIS Team Leader	❑
	Relay information to spill fate modelling supplier for calibration of trajectory modelling.	-	Planning Section Chief/ GIS Team Leader	❑
Ongoing Actions	Assess the need for additional tracking buoys in the spill scenario and identify/nominate preferred deployment locations.	Incident Action Plan to provide guidance regarding any additional deployments of tracking buoys.	Planning Section Chief	❑
	Mobilise additional tracking buoys if required from other Santos operations (Santos presently has 10 Tracker Buoys located on the North West Shelf) and an additional 8 from AMOSC stockpiles.	-	Logistics Section Chief	❑
	Direct the deployment of the Tracker Buoys – for continuous releases over multiple days use a rolling deployment/collection of buoys to provide better coverage of plume direction.	-	Operations Section Chief	❑
	Organise vessel to deploy additional tracking buoys if required.	For continuous releases over multiple days use a rolling deployment/collection of tracking buoys to provide better coverage of plume direction.	Operations Section Chief	❑
	Deploy tracking buoys.	-	Vessel Master	❑
	Monitor movement of tracking buoys.	-	Planning Section Chief/GIS Team Leader	❑
	Relay information to spill trajectory modelling supplier for calibration of trajectory modelling.	-	Planning Section Chief/GIS Team Leader	❑

Table 10-11: Tracking buoy resource capability

Equipment type/personnel required	Organisation	Quantity available	Location	Mobilisation timeframe
Tracking buoys	Santos	4	Varanus Island	VI/Dampier buoys <12 hours pending vessel availability
		2	Exmouth	Exmouth buoys 24 to 48 hours pending vessel availability
		4	Dampier	Additional buoys available from Dampier if required
AMOSC tracking buoys	AMOSC	4	Fremantle	Response via duty officer within 15 minutes of first call-AMOSC personnel available <1 hour of initial activation call. Equipment logistics varies according to stockpile location (refer to Table 10-12).
		4	Geelong	

Table 10-12: Australian Marine Oil Spill Centre equipment mobilisation timeframes (road freight)

	Perth	Darwin	Exmouth	Dampier	Broome
Geelong	40 hours / 3,395 km	44 hours / 3730 km	64 hours / 4,520 km	70 hours / 4,840 km	68 hours / 4,970 km
Perth	NA	48 hours / 4,040 km	15 hours / 1,250 km	19 hours / 1,530 km	27 hours / 2,240 km
Exmouth	15 hours / 1,250 km	38 hours / 3,170 km	NA	7 hours / 555 km	16 hours / 1,370 km
Broome	27 hours / 2,240 km	22 hours / 1,870 km	16 hours / 1,370 km	11 hours / 855 km	NA

Table 10-13: Tracking buoy – first-strike response timeline

Task	Time from IMT call-out
Two tracking buoys deployed from Varanus Island, Exmouth or Dampier using vessels of opportunity.	<24 hours
Minimum Resource Requirements	
• Two tracking buoys for initial deployment (Varanus Island, Exmouth or Dampier depending on the spill scenario)	

10.4 Oil spill trajectory modelling

Table 10-14 provides the Environmental Performance Outcome, initiation criteria and termination criteria for this strategy.

Table 10-14: Oil spill trajectory modelling - environmental performance outcome, initiation criteria and termination criteria

Environmental performance outcome	Implement monitor and evaluate tactics in order to provide situational awareness to inform IMT decision making.	
Initiation criteria	Notification of Level 2 or 3 spill	
Applicable hydrocarbons	**Reindeer Condensate**	**MDO**
	✓1	✓1
Termination criterion	• Spill fate modelling will continue for 24 hours after the source is under control and surface sheens, or in-situ hydrocarbons are no longer detectable, or until no longer beneficial to predict spill trajectory and concentrations, OR • As directed by the relevant Control Agency.	

Oil spill trajectory modelling uses computer modelling (e.g. OILMAP, SIMAP) to estimate the movement, fate and weathering potential of spills. Santos has engaged RPS Group to provide forecast spill fate modelling. RPS Group use SIMAP and OILMAP modelling systems that comply with Australian Standards (ASTM Standard F2067: Standard Practice for Development and Use of Oil Spill Models). RPS Group also provide the capacity for forecast air quality monitoring to enable an assessment of potential health and safety risks associated with VOCs released from a surface slick.

A particular advantage of spill trajectory modelling is that the transport and weathering of spilled hydrocarbons can be forecast, at all times of the day and night, at any location, and under any type of metocean conditions. By contrast, aerial surveillance and vessel-based monitoring will be constrained to daytime use, and have limits imposed by the operating environment. Aerial surveillance and vessel-based monitoring are, however, essential for model validation, verification and calibration of any modelling or first principal predictions.

10.4.1 Implementation guidance

Table 10-15 provides guidance to the IMT on the actions and responsibilities that should be considered when selecting this strategy. Table 10-16 provides a list of resources that may be used to implement this strategy. Mobilisation times for the minimum resources that are required for oil spill modelling are listed Table 10-17. The Incident Commander is ultimately responsible for implementing the response, and may therefore determine that some tasks be varied, should not be implemented or be reassigned. Table 10-21 lists the environmental performance standards and measurement criteria for this strategy.

Table 10-15: Implementation guidance - oil spill trajectory modelling

Action		Consideration	Responsibility	Complete
Initial Actions	Initiate oil spill trajectory modelling (OSTM) by submission of an oil spill trajectory modelling request form (Santos ER SharePoint). Request for three-day forecast trajectory modelling.	-	Environment Unit Leader	❑
	Determine requirement for gas/VOC modelling and request initiation.	Hydrocarbon releases have human health and safety considerations for responders (volatile gases and organic compounds). This to be considered for any tactics that monitor/recover oil, especially at close proximity to release site.	Safety Officer Environment Unit Leader	❑
	Operational surveillance data (aerial, vessel, tracker buoys) to be given to modelling provider to verify and adjust fate predictions of the spill and improve predictive accuracy.	-	Planning Section Chief/GIS Team Leader	❑
	Login to the RPS Group data sharing website and maintain connection. Download modelling results.	Data should be stored digitally and backed up on to independent digital storage media. All datasets should be accompanied by a metadata summary and documented quality assurance and control procedures.	Planning Section Chief/GIS Team Leader	❑
	Place RPS Group modelling data into GIS/Common Operating Picture.	RPS Group is to provide at least daily updates to the IMT of trajectory model outputs to inform response planning. More frequent updates can be provided if weather conditions are highly variable or change suddenly.	Planning Section Chief/GIS Team Leader	❑
	If chemical dispersants are considered applicable strategy for spill scenario, request modelling provider to model how dispersant addition effects the distribution and concentration of floating oil, subsea oil and shoreline loading.	Planning and Operations to provide inputs for modelled simulation based on potential/planned dispersant operations. Outputs from dispersant addition modelling to inform NEBA.	Planning Section Chief Operations Section Chief	❑
	Identify location and sensitivities at risk based on the trajectory modelling and inform IMT. Conduct NEBA on proposed response strategies.	-	Environment Unit Leader	❑
Ongoing Actions	Request spill trajectory modelling be provided daily throughout the duration of the response and integrate data into Common Operating Picture.	-	Planning Section Chief/ GIS Team Leader	❑
	Use results from other monitor and evaluate activities, and/or data derived from hydrocarbon assays of the source hydrocarbon or from other reservoirs in the region (that may be available) as input data (if or when available) to improve model accuracy.	-	Planning Section Chief/ GIS Team Leader	❑

Table 10-16: Oil spill trajectory modelling resource capability

Equipment type/personnel required	Organisation	Quantity available	Location	Mobilisation timeframe
RPS OST modellers and software	RPS Group under direct contract to Santos, also available through AMOSC	Daily OSTM reports	Perth – digital	2-4 hours from activation

Table 10-17: Oil spill trajectory modelling – first strike response timeline

Task	Time from IMT call-out
RPS OSTM activated by IMT	<2 hours
OSTM provided to IMT	<4 hours
Minimum Resource Requirements	
• Contracted OST modellers and software • OSTM Activation Form	

10.5 Satellite Imagery

Table 10-18 provides the environmental performance outcome, initiation criteria and termination criteria for this strategy.

Table 10-18: Satellite Imagery - environmental performance outcome, initiation criteria and termination criteria

Environmental performance outcome	Implement monitor and evaluate tactics in order to provide situational awareness to inform IMT decision making.	
Initiation criteria	Notification of a Level 2 or 3 spill	
Applicable hydrocarbons	**Reindeer Condensate**	**MDO**
	✓	✓1
Termination criterion	• Satellite monitoring will continue until no further benefit is achieved from continuing; or as advised by relevant Control Agency.	

Satellite imagery is considered a supplementary source of information that can improve awareness but is not critical to the response and usage is at the discretion of the IMT.

Suitable imagery may be available satellite imagery suppliers. This can be done through existing AMOSC and OSRL contracts. The most appropriate images for purchase will be based on the extent and location of the oil spill. Synthetic aperture radar (SAR) and visible imagery may both be of value. Availability of satellite images for a specific location will be dependent on several factors including satellite current position, satellite availability/tasking and weather conditions (cloud cover obscures images).

10.5.1 Implementation guidance

Table 10-19 provides guidance to the IMT on the actions and responsibilities that should be considered when selecting this strategy.

Table 10-20 provides a list of resources that may be used to implement this strategy. The Incident Commander is ultimately responsible for implementing the response, and may therefore determine that some tasks be varied, should not be implemented or be reassigned. Table 10-21 lists the environmental performance standards and measurement criteria for this strategy.

Table 10-19: Satellite imagery implementation guide

Action		Consideration	Responsibility	Complete
Initial Actions	Assess requirement for satellite imagery.	-	Planning Section Chief	❑
	Notify AMOSC and OSRL Duty Officer to initiate request for available satellite imagery.	Formal written activation of resources from AMOSC and OSRL by designated call-out authorities (Santos Duty Managers/Incident Commanders) is required.	Planning Section Chief	❑
	Assess suitability and order imagery.	-	Planning Section Chief	❑
	Integrate satellite imagery into Common Operating Picture and provide to trajectory modelling provider for model validation.	-	GIS Team Leader Planning Section Chief	❑
Ongoing Actions	Review satellite imagery to validate spill fate and trajectory.	-	Planning Section Chief	❑
	Use satellite imagery to periodically reassess the spill and modify the response (through the IAP), as required.	Use surveillance data when updating the Common Operating Picture.	Planning Section Chief	❑

Table 10-20: Satellite imagery resource capability

Equipment type/ personnel required	Organisation	Quantity available	Location	Mobilisation timeframe
Satellite Imagery	KSAT – activated through AMOSC MDA – activated through OSRL	Dependent upon overpass frequency (TBC on activation)	Digital	If satellite images are required, Santos to notify provider within 12 hours.

10.6 Environmental performance

Table 10-21 indicates the environmental performance outcome, control measures, performance standards and measurement criteria for this response strategy.

Table 10-21: Environmental performance - monitor and evaluate

Environmental performance outcome	Implement monitor and evaluate tactics in order to provide situational awareness to inform IMT oil spill response decision making.		
Response strategy	**Control measures**	**Performance standards [EPS-ID}**	**Measurement criteria**
Monitor and Evaluate - vessel and aerial surveillance	**Response Preparedness**		
	Maintenance of MSAs with multiple vessel providers for surveillance vessel capability	[EPS-ME-001] Santos maintains MSAs with multiple vessel providers as specified in Table 10-3	MSAs with vessel providers
	Minimum specifications list for surveillance vessels	[EPS-ME-002] Maintain minimum specifications list for surveillance vessels to aid in rapid vessel selection	Santos Vessel Requirements for Oil Spill Response (7710-650-ERP-0001)
	Track location of potential surveillance vessels	[EPS-ME-003] Santos maintains access to Automatic Identification System (AIS) Vessel Monitoring System to track	AIS live tracking portal

Environmental performance outcome	Implement monitor and evaluate tactics in order to provide situational awareness to inform IMT oil spill response decision making.		
Response strategy	**Control measures**	**Performance standards [EPS-ID}**	**Measurement criteria**
		potential surveillance vessel locations.	
	Master Services Agreement (MSA) with aviation supplier for aerial surveillance capability	[EPS-ME-009] MSA in place with helicopter/aircraft provider throughout activity	MSA with aviation suppliers
	Trained aerial observers available through Santos personnel	[EPS-ME-010] Santos maintains a pool of trained aerial observers	Exercise Records Training Records
	Trained aerial observers available through mutual aid arrangements facilitated by AMOSC	[EPS-ME-011] Maintenance of AMOSC contract to facilitate mutual aid arrangements for access to Trained Aerial Observers	AMOSC Participating Member Contract
	Access to certified UAV providers	[EPS-ME-012] Maintenance of contract for access to UAV providers	List of certified UAV providers AMOSC Participating Member contract OSRL Associate Member contract
	Aircraft charter companies for fauna observations	[EPS-ME-013] Maintain a list of aircraft charter companies that could potentially provide fauna observation services	List of providers
	Response Implementation		
	Vessel Surveillance First Strike capability mobilised	[EPS-ME-004] First strike is mobilised in accordance with details and timings as specified in Table 10-4	Incident log
	Vessel surveillance daily observation reports	[EPS-ME-007] Daily observation reports submitted to IMT until termination criteria is met	Incident log
	Vessels and chartered surveillance aircraft compliant with Santos' Protected Marine Fauna Interaction and Sighting Procedure (EA-91-11-00003)	[EPS-ME-006] Vessels comply with Santos' Protected Marine Fauna Interaction and Sighting Procedure (EA-91-11-00003) which ensures compliance with Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000 which includes controls for minimising the risk of collision with marine fauna	Vessel contractor procedures align with Santos' Protected *Marine Fauna Interaction and Sighting Procedure;* Completed vessel statement of conformance
		[EPS-ME-014] Chartered surveillance aircraft comply with Santos' Protected Marine Fauna Interaction and Sighting Procedure (EA-91- 11-00003) which ensures compliance with Part 8 of the Environment Protection and Biodiversity	Aircraft contractor procedures align with Santos' Protected *Marine Fauna Interaction and Sighting Procedure*

Environmental performance outcome	Implement monitor and evaluate tactics in order to provide situational awareness to inform IMT oil spill response decision making.		
Response strategy	**Control measures**	**Performance standards [EPS-ID}**	**Measurement criteria**
		Conservation Regulations 2000 which includes controls for minimising interaction with marine fauna	
	Aerial Surveillance First strike capability mobilised	[EPS-ME-015] First strike is mobilised in accordance with details and timings as specified in Table 10-8.	Incident log
	Aerial surveillance – two passes per day	[EPS-ME-016] Following initiation of aerial surveillance, two passes per day of spill area by observation aircraft provided	Incident log IAP
	Aerial surveillance trained aerial observers	[EPS-ME-017] Trained Aerial Observers mobilised to airbase (Darwin) within 24 hours supplied from day 2 of response (daylight dependent)	Incident log
	Aerial surveillance flight schedules	[EPS-ME-019] Flight schedules are maintained throughout response	IAP
	Aerial surveillance observer log	[EPS-ME-020] Observers completed aerial surveillance observer log following completion of flight	Completed Aerial Surveillance Observer Logs
Monitor and evaluate – tracking buoys	**Response Preparedness**		
	Tracking buoys available	[EPS-ME-023] Maintenance of 10 tracker buoys throughout the activity	Computer tracking software Tracking buoy tests
	Response Implementation		
	Tracking buoy first strike capability mobilised	[EPS-ME-024] First strike is mobilised in accordance with details and timings as specified in Table 10-13	Incident log
Monitor and evaluate – oil spill modelling	**Response Preparedness**		
	Maintenance of contract for emergency response modelling	[EPS-ME-027] Maintenance of contract for forecast spill trajectory modelling services throughout activity	Modelling services contract
	Maintenance of access to additional emergency response modelling	[EPS-ME-028] Access to additional spill modelling capability to ensure redundancy	Membership in place with OSRL
	Response Implementation		
	Oil spill modelling provider first contact	[EPS-ME-029] Oil Spill Modelling provider will be contacted within 2 hours upon notification of a Level 2 or 3 spill	Incident Log

Environmental performance outcome	Implement monitor and evaluate tactics in order to provide situational awareness to inform IMT oil spill response decision making.		
Response strategy	**Control measures**	**Performance standards [EPS-ID}**	**Measurement criteria**
	Oil spill modelling provider output minimum timings	[EPS-ME-030] Modelling delivered to IMT within 2 hours of request to service provider	Incident Log
Monitor and evaluate – satellite imagery	**Response Preparedness**		
	Satellite imagery and analysis capability	[EPS-ME-032] Satellite imagery and analysis accessed through third party provider activated through AMOSC and/or OSRL	AMOSC Participating Member contract, OSRL Associate Member contract
	Response Implementation		
	Satellite imagery and analysis provided to IMT	[EPS-ME-033] Data incorporated into Common Operating Picture and provided to spill modelling provider	Incident Log IAP

11. Mechanical dispersion

Table 11-1 provides the environmental performance outcome, initiation criteria and termination criteria for this strategy.

Table 11-1: Mechanical dispersion - environmental performance outcome, initiation criteria and termination criteria

Environmental performance outcome	To create mixing for oil and water to enhance natural dispersion and biodegradation	
Initiation criteria	Monitor and evaluate data identifies thin oil patches at sea surface that are not naturally dissipating in sea surface and is posing risks to wildlife and shorelines by remaining on the surface	
Applicable hydrocarbons	**Reindeer Condensate**	**MDO**
	✓2	✓2
Termination criterion	• There is no longer a noticeable reduction of surface oil resulting from the activity, or • NEBA is no longer being achieved, or • Unacceptable safety risks associated with gas and VOCs at the sea surface, or • Agreement is reached with Jurisdictional Authorities to terminate the response	

11.1 Overview

This response strategy assists with the natural dispersion process; creating mixing through physical agitation by using a vessel's propellers and wake, which encourages the oil to break into smaller particle sizes that are more easily biodegraded. The two common activities associated with mechanical dispersion are:

- manoeuvring a vessel through the slick, using propeller wash and vessel wake to create mixing in the water body
- spraying water from the fire hose of a vessel and moving the vessel through the water body to create additional mixing and breakup of the slick.

11.2 Implementation guidance

Table 11-2 provides guidance to the IMT on the actions and responsibilities that should be considered when selecting this strategy**.**

Table 11-3 provides a list of resources that may be used to implement this strategy. The OSC/Vessel Master and/or Incident Commander is ultimately responsible for implementing the response, and may therefore determine that some tasks be varied, should not be implemented or be reassigned.

Table 11-2: Implementation guidance – mechanical dispersion

Action		Consideration	Responsibility	Complete
Initial Actions	The Operational NEBA will confirm the suitability and environmental benefit of conducting mechanical dispersion at appropriate locations.	Water depth, sea state. Possible impacts to sensitive shorelines and/or wildlife. Before spill naturally disperses. This activity is to be conducted during daylight hours only and requires a safety plan to be developed prior to implementation.	Operations Section Chief Environment Unit Leader Planning Section Chief	❑
	Safety Officer to develop a safety plan for the activity with respect to potentially dangerous gases and VOCs (including applicable controls).	Ambient gas testing during condensate spills providing safe levels for operation of personnel and vessels	Operations Section Chief Safety Officer	❑
	Notify vessel-based responders to trial mechanical dispersion.	-	Operations Section Chief	❑
	Response personnel on vessels to evaluate the effectiveness of the use of mechanical dispersion operations to reduce the volume of oil on the water surface. Communicate the information to the IMT Operations Section Chief for inclusion in Operational NEBA.	-	Vessel Master/s Santos AMOSC Core Group Responders	❑

Table 11-3: Mechanical dispersion resource capability

Equipment type/personnel required	Organisation	Quantity available	Location	Mobilisation timeframe
Vessels undertaking other activities Vessel(s) can be specifically contracted for the strategy if required (refer to Santos Vessel Requirements for Oil Spill Response document [7710-650-ERP-0001])	Santos contracted vessel providers	Availability dependent upon Santos and vessel contractor activities	Vessels mobilised from Exmouth, Dampier, and NW locations. Locations verified through AIS Vessel Tracking Software.	Varies subject to location and availability

11.3 Environmental performance

Table 11-4 indicates the environmental performance outcome, control measures, performance standards and measurement criteria for this response strategy.

Table 11-4: Environmental performance – mechanical dispersion

Environmental performance outcome	To create mixing for oil and water to enhance natural dispersion		
Response strategy	**Control measures**	**Performance standard [EPS ID]**	**Measurement criteria**
Mechanical dispersion	**Response preparedness**		
	Mechanical dispersion capability in place	[EPS-MD-001] Mechanical dispersion capability in place based on Santos contracted vessels availability	Existing MSAs with multiple vessel providers
	Response Implementation		
	Mechanical dispersion procedures in place to ensure safe and effective execution	[EPS-MD-002] Mechanical Dispersion to be conducted as per the Mechanical Dispersion Plan.	Mechanical Dispersion Plan; IAP; Incident Log
	Operational NEBA to determine net environmental benefit	[EPS-MD-003] Operational NEBA confirms suitability and environmental benefit.	Incident Log; IAP

12. Shoreline protection and deflection plan

Table 12-1 provides the environmental performance outcome, initiation criteria and termination criteria for this strategy.

Table 12-1: Shoreline protection and deflection – objectives, initiation criteria and termination criteria

Environmental performance outcome	Implement shoreline protection and deflection tactics to reduce hydrocarbon contact with coastal protection priorities areas.	
Initiation criteria	• Level 2 or Level 3 spills where shorelines with identified or potential protection priorities will potentially be contacted, and • Approval has been obtained from the relevant Control Agency) to initiate response strategy	
Applicable hydrocarbons	**Reindeer Condensate**	**MDO**
	✓ 2	✓ 2
Termination criterion	• NEBA has determined that this strategy is unlikely to result in an overall benefit to the affected shoreline/s, or • Agreement is reached with Jurisdictional Authorities to terminate the response strategy	

12.1 Overview

Protection and deflection tactics are utilised to divert hydrocarbons away from sensitive shoreline receptors and are more effective if they are deployed ahead of spill contact. They are typically used to protect smaller, high priority sections of shoreline.

The effectiveness of this response will be dependent on spill characteristics, hydrocarbon type, and the operating environment. Deployment is subject to constraints such as the potential grounding of vessels.

Protection and deflection is part of an integrated nearshore/ shoreline response to be managed by the relevant Control Agency where Santos is not the Control Agency (refer to Table 4-2), it will undertake first-strike protection and deflection activities as required. In this circumstance, the relevant Control Agency will direct resources (equipment and personnel) provided by Santos for the purposes of shoreline protection. Santos will provide all relevant information on shoreline character and oiling collected as part of surveillance activities carried out under its control (refer North West Shelf OSM-BIP (7715-650-ERP-0002).

In the event of a spill with the potential for shoreline contact where Santos is not the Control Agency, the ongoing response objectives, methodology, deployment locations and resource allocation will be controlled by the relevant Control Agency and therefore may differ from that included below.

Information gathered during monitor and evaluate activities and operational monitoring including shoreline assessments and assessed through an Operational NEBA will guide the selection of protection and deflection locations and techniques.

Shoreline protection and deflection techniques include:

- nearshore booming, which can involve different booming arrangements including:
  - exclusion booming: boom acts as a barrier to exclude the spill from areas requiring protection
  - diversion booming: booms divert the spill to a specific location where it may be removed (e.g. sandy beach)
  - deflection booming: booms deflect the spill away from an area requiring protection.
- berms, dams and dykes – uses sandbags or embankments to exclude oil from sensitive areas
- shoreside recovery – uses nearshore skimmers to collect oil corralled by nearshore booms (also used during shoreline clean-up)
- passive recovery – uses sorbent booms or pads to collect oil and remove it from the environment. This can be used as a pre-impact tactic where sorbents are laid ahead of the spill making contact with the shoreline
- non-oiled debris removal – removes debris from the shoreline before it is impacted to reduce overall waste volumes from shoreline clean-up.

The effectiveness of these techniques will be dependent on local bathymetry, sea state, currents/tides and wind conditions and the available resources.

12.2 Implementation guidance

Table 12-2 provides guidance to the IMT on the actions and responsibilities that should be considered when selecting this strategy.

Table 12-3 provides a list of resources that may be used to implement this strategy. Mobilisation times for the minimum resources that are required to commence initial protection and deflection operations, unless directed otherwise by the relevant Control Agency, are listed in Table 12-4. The Incident Commander of the Control Agency's IMT (once they assume control) is ultimately responsible for implementing the response, and may therefore determine that some tasks be varied, should not be implemented or be reassigned.

Table 12-2: Implementation guidance – shoreline protection and deflection

Action		Consideration	Responsibility	Complete
Initial Actions	Ensure initial notifications to the relevant Control Agency have been made.	Refer to Section 7 for reporting requirements.	Planning Section Chief	❑
	Collect and provide monitor and evaluate information, operational monitoring data and existing sensitivity information/mapping to Control Agency for confirmation of priority protection areas and NEBA.	-	Environment Unit Leader Planning Section Chief	❑
	Actions below are indicative only and are at the final determination of the relevant Control Agency.			
	Conduct Operational NEBA to determine if protection and deflection is likely to result in a net environmental benefit using information from shoreline clean-up assessments North West Shelf OSM-BIP (7715-650-ERP-0002)	TRPs exist for the Dampier Archipelago Priority Protection Area. TRPs are available on the Santos ER Intranet page [25].	Environment Unit Leader	❑
	If NEBA indicates that there is an overall environmental benefit, develop a Shoreline Protection Plan (IAP Sub-Plan) for each deployment area.	Shoreline Protection Plan may include: • priority nearshore and shoreline areas for protection (liaise with Control Agency for direction on locations) • locations to deploy protection and deflection equipment • permits required (if applicable) • protection and deflection tactics to be employed for each location • list of resources (personnel and equipment) required • logistical arrangements (e.g. staging areas, accommodation, transport of personnel) • timeframes to undertake deployment • access locations from land or sea • frequency of equipment inspections and maintenance (noting tidal cycles) • waste management information, including logistical information on temporary storage areas, segregation, decontamination zones and disposal routes • no access and demarcation zones for vehicle and personnel movement considering sensitive vegetation, bird nesting/roosting areas and turtle nesting habitat (utilise existing roads and tracks first)	Operations Section Chief Planning Section Chief Environment Unit Leader	❑

[25] *Where TRPs are unavailable for areas likely to be contacted, refer to other sources of information such as aerial photography, Oil Spill Response Atlas, Pilbara Region Oiled Wildlife Response Plan and WAMOPRA.*

Action		Consideration	Responsibility	Complete
		• shift rotation requirements.		
	If required identify vessels with relevant capabilities (e.g. shallow draft) for equipment deployment in consultation with Control Agency.	Ensure vessels have shallow draft and/or a suitable tender (with adequate towing capacity and tie-points) if they are required to access shorelines.	Operations Section Chief Logistics Section Chief	❑
	Deploy shoreline protection response teams to each shoreline location selected and implement response.	If passive recovery and/or non-oiled debris removal has been selected as a tactic, ensure deployment activities prioritise their implementation prior to hydrocarbon contact.	Operations Section Chief On-Scene Commander	❑
Ongoing Actions	Conduct daily re-evaluation of NEBA to assess varying net benefits and impacts of continuing to conduct shoreline protection and deflection activities.	-	Environment Unit Leader	❑
	Report to the Operations Section Chief on the effectiveness of the tactics employed.	-	Shoreline Response Programme Manager – AMOSC core group responder	❑
	Response teams to conduct daily inspections and maintenance of equipment.	Shoreline protection efforts will be maintained through the forward operation(s) facilities setup at mainland locations under direction of Control Agency. Response crews will be rotated on a roster basis, with new personnel procured on an as needs basis from existing human resource suppliers.	Shoreline Response Programme Manager	❑

Table 12-3: Shoreline protection and deflection – resource capability

Equipment type/ Personnel required	Organisation	Equipment specifications / Total quantity available	Location / Quantity available	Mobilisation timeframe
Santos owned nearshore boom/skimming equipment	Santos	Beach Guardian (25 m lengths) Total – 6	Varanus Island – 4 Exmouth – 2	Within 72 hours for deployment by vessel from Varanus Island
		Zoom Boom (25 m lengths) Total – 13	Varanus Island – 8 Exmouth – 5	
		Desmi DBD16 brush skimmer Total – 2	Exmouth – 1 Varanus Island – 1	
AMSA nearshore boom/skimmer equipment	AMSA	Canadyne inflatable Total – 5	Karratha – 5	
		Structureflex inflatable Total – 25	Karratha – 10 Fremantle – 15	

Equipment type/ Personnel required	Organisation	Equipment specifications / Total quantity available	Location / Quantity available	Mobilisation timeframe
		Versatech zoom inflatable Total – 18	Karratha – 5 Fremantle – 13	Access to National Plan equipment[26] through AMOSC[27] Equipment mobilisation times vary according to stockpile location
		Slickbar – solid buoyancy Total – 2	Karratha – 2	
		Structureflex – solid buoyancy Total – 13	Karratha – 3 Fremantle – 10	
		Structureflex – land sea Total – 60	Karratha – 30 Fremantle – 30 other locations around Australia	
		LWS 500 weir skimmer Total – 8	Fremantle – 4 Karratha – 4	
		Desmi termite skimmer Total – 2	Fremantle – 1 Karratha – 1	
		LAMOR 15 Ton Disc Skimmer Total – 4	Karratha – 4	
		LAMOR 50 Ton Wier Skimmer Total – 2	Darwin – 1 Karratha -2	
AMOSC nearshore boom and skimming equipment	AMOSC	Beach Guardian Shoreseal boom (25 m lengths) Total – 89	Broome – 4 Exmouth – 20 Fremantle – 19 Geelong – 46	Response via duty officer within 15 minutes of first call; AMOSC personnel available within one hour of initial activation call. Equipment logistics varies according to stockpile location For mobilisation timeframes refer to Table 12-4
		Zoom Boom (25 m lengths) Total – 188	Broome – 8 Exmouth – 20 Fremantle – 34 Geelong – 126	
		Lamor HDB 1300 Boom (200 m) on reel	Broome – 2	

[26] *Updated AMSA Equipment listings for locations around Australia can be found at the AMSA National Environmental Maritime Operations Portal - https://www.amsa.gov.au/marine-environment/pollution-response/national-environmental-maritime-operations*

[27] *Santos will enter a contractual arrangement with AMSA to access the National Plan resources*

Equipment type/ Personnel required	Organisation	Equipment specifications / Total quantity available	Location / Quantity available	Mobilisation timeframe
		Total – 2		
		Lamor HDB 1500 Boom (100 m) on reel Total – 3	Fremantle – 1 Geelong – 2	
		Lamor SFB-18 GP Solid Flotation Curtain Boom (30 m lengths) Total – 58	Fremantle – 18 Geelong – 40	
		Minimax 12 brush skimmer Total – 5	Broome – 1 Exmouth – 1 Fremantle – 2 Geelong – 1	
		Komara 12k disc skimmer Total – 4	Exmouth – 1 Fremantle – 1 Geelong – 2	
		Komara 20k disc skimmer Total – 1	Fremantle – 1	
		Komara 30k disc skimmer Total – 2	Geelong – 2	
		Passive weir skimmer Total – 3	Exmouth – 1 Fremantle – 1 Geelong – 1	
		Ro-vac vacuum skimmer Total – 4	Exmouth – 1 Geelong – 3	
		Desmi GT 185 brush/weir skimmer Total – 2	Exmouth – 1 Geelong – 1	
		Desmi Ro-mop 240 oil mop skimmer Total – 2	Exmouth – 1 Geelong – 1	
		Desmi Ro-mop 260 oil mop skimmer Total – 2	Fremantle – 1 Geelong – 1	
		Skimmer-Lamor Rock Cleaner-Brush Total – 4	Fremantle – 2 Geelong – 2	

Equipment type/ Personnel required	Organisation	Equipment specifications / Total quantity available	Location / Quantity available	Mobilisation timeframe
		Skimmer-Lamor LWS500-Brush/Weir skimmer Total – 6	Fremantle – 3 Geelong – 3	
		Desmi 250 weir skimmer Total – 1	Geelong – 1	
		Canadyne Multi Head-Brush/Disc/Drum Total – 1	Geelong – 1	
		Versatech Multi Head-Brush/Disc/Drum Total – 1	Geelong – 1	
		Egmopol barge with brush skimmer Total – 1	Geelong – 1	
Industry Mutual Aid nearshore boom and skimming equipment	Facilitated by AMOSC	Nearshore boom and skimmers	WA/NT	Access to Industry Mutual Aid through AMOSPlan and facilitated by AMOSC
OSRL nearshore boom/skimming equipment (Note: further booms are available; the listed items are shown as an example). Guaranteed access to 50% of stockpile by equipment type. Access to more than 50% on a case-by-case basis.	OSRL	Air-skirt boom 10 m: 228 Air-skirt boom 20 m: 658 Air-skirt boom 200 m: 4 Beach sealing boom 10 m: 154 Beach sealing boom 15 m: 65 Beach sealing boom 20 m: 113 Inshore recovery skimmers: 126 Range of ancillaries to support above equipment	OSRL global stockpiles at base locations: UK Singapore Bahrain Fort Lauderdale	Response from OSRL Duty Manager within 10 minutes. Equipment logistics varies according to stockpile location.
Personnel (field responders) for OSR strategies	AMOSC Staff	Total – 12	Fremantle – 3 Geelong – 9	Response via duty officer within 15 minutes of first call. Timeframe for availability of AMOSC personnel dependent on location of spill and transport to site
	AMOSC Core Group (Santos)	Total – 16	Perth/NW Australia facilities – 14 Port Bonython (South Australia – 2	From 24 hours <48 hours to WA locations
	AMOSC Core Group (Industry)	As per monthly availability	Office and facility location across Australia	Location dependent. Confirmed at time of activation

Table 12-4: Shoreline protection and deflection – first strike response timeline

Task	Time from shoreline contact (predicted or observed)
IMT confirms shoreline contact prediction, confirm if protection of shoreline sensitivity/s is required and begins sourcing resources	<4 hours
Santos Offshore Core Group mobilised to deployment port location	<24 hours
Protection booming equipment mobilised to deployment port location	<24 hours
Waste storage equipment mobilised to deployment port location	<24 hours
Boom deployment vessel mobilised to deployment port location	<24 hours
AMOSC Staff and Industry Core Group mobilised to deployment port location	<24-48hours
Protection/deflection operation deployed to protection location	<60-72 hours (weather/daylight dependent)
Minimum Resource Requirements	
Note: Resource requirements for protection and deflection will be situation/receptor specific. TRPs are held by Santos and DoT and have been developed for various NWS locations and are available on the Santos ER Intranet page; TRPs exist for the Dampier Archipelago Priority Protection Area, further described in Section 6.6.3 [28].Indicative first strike resources for a single site protection area are: • One small vessel suitable for boom deployment • Shoreline (e.g. Beach Guardian) and nearshore booms (e.g. Zoom Boom) plus ancillary equipment (e.g. anchors, stakes) sufficient for protection of shoreline resource • One skimmer appropriate for oil type • Waste storage equipment • One Protection and Deflection Team • Personal protective equipment	

12.3 Worst-case resourcing requirements

Protection and deflection resourcing requirements have been determined from stochastic modelling for affected shorelines. Table 12-5 presents all receptors contacted at ≥100 g/m² using the stochastic modelling results for scenarios 3, 5 and 6 presented in Section 6.3.1 (Scenarios 1, 2 and 5 did not predict any shoreline contact ≥100 g/m^2). It also presents planning considerations and estimated number of protection and deflection teams required for the different scenarios.

It should be noted that not all of the receptors listed in Table 12-5 will be contacted by each spill. These results are presenting the range of possible worst-case timeframes to contact and length contacted based on all runs that make up the stochastic model for each spill. Santos will use initial monitor and evaluate data (e.g. trajectory modelling, aerial surveillance) and operational monitoring data (i.e. feedback from SCAT operations) to determine where resources should be allocated. This may include directing resources to conduct protection and deflection at locations not identified as protection priority areas.

Resource requirements for protection and deflection will be situation/receptor specific. TRPs are held by Santos and DoT and have been developed for all of the PPAs (refer to Section 6.6.3).

Table 12-5: Resource requirements for shoreline protection and deflection for all locations contacted >100 g/m^2 based on stochastic results for all scenarios

Location	Min. arrival time shoreline oil accumulation ≥100 g/m² (days, hours)	Max. length of shoreline oiled (km) ≥100 g/m² in the worst simulation	Estimated No. of required protection and deflection teams to set up and monitor (and remarks)
Scenario 3 – subsea pipeline leak of Reindeer condensate near the HDD crossing (121.4 m^3)			
Northern Islands Coast	3 hours	3	1 team (comprises mainland locations and small islands with sensitive receptors; keep response personnel to minimum to reduce

[28] *Where TRPs are unavailable for areas likely to be contacted, refer to other sources of information such as aerial photography, Oil Spill Response Atlas, Pilbara Region Oiled Wildlife Response Plan and WAMOPRA*

Location	Min. arrival time shoreline oil accumulation ≥100 g/m² (days, hours)	Max. length of shoreline oiled (km) ≥100 g/m² in the worst simulation	Estimated No. of required protection and deflection teams to set up and monitor (and remarks)
			disturbance of surrounding habitat and fauna)
Total estimated Protection and Deflection Teams required			**1 team**
Scenario 5 – MDO spill resulting from a vessel collision at the CSB (325 m³)			
Dampier Archipelago	2 days, 10 hours	5	2 teams (Archipelago of small islands with sensitive receptors; keep response personnel to minimum to reduce disturbance of surrounding habitat and fauna)
Barrow Island	14 days, 7 hours	1	1 team (island with sensitive receptors; keep response personnel to minimum to reduce disturbance of surrounding habitat and fauna)
Lowendal Islands	5 days, 13 hours	2	1 team (island chain with strong tidal currents present between islands that could affect success of anchoring)
Montebello Islands	5 days, 19 hours	3	2 teams (island chain with strong tidal currents present between islands that could affect success of anchoring)
Total estimated Protection and Deflection Teams required			**6 teams**
Scenario 6 – MDO spill resulting from a vessel collision at the HDD Crossing (325 m³)			
Dampier Archipelago	4 days, 19 hours	3	1 team (small island with sensitive receptors; keep response personnel to minimum to reduce disturbance of surrounding habitat and fauna)
Northern Islands Coast	2 hours	11	3 teams (comprises mainland locations and small islands with sensitive receptors; keep response personnel to minimum to reduce disturbance of surrounding habitat and fauna)
Total estimated Protection and Deflection Teams required			**4 teams**

Source: Modelling results as per RPS (2024)

A typical shoreline protection and deflection team would consist of 12 personnel as a minimum, comprised of the following:

- 1 x Incident Commander/Site Supervisor
- 1 x Shallow draft vessel skipper
- 1 x Shallow draft vessel deck-hand
- 9 x Protection and deflection operatives.

The resourcing requirements will be determined based on feedback from SCAT activities, on operational NEBA, and in consultation with DoT as the Control Agency. Shoreline effort will likely consist of a combination of protection and deflection and clean-up, with resources often working together and/or in parallel.

12.4 Environmental performance

Table 12-6 indicates the environmental performance outcomes, controls and performance standards for the Protection and Deflection response strategy.

Table 12-6: Environmental performance outcomes – protection and deflection

Environmental Performance Outcome	Implement shoreline protection and deflection tactics to reduce hydrocarbon contact with coastal protection priorities.		
Response Strategy	**Control Measures**	**Performance Standards**	**Measurement Criteria**
Shoreline Protection and Deflection	**Response Preparedness**		
	Access to Santos protection and deflection equipment and personnel	[EPS-PD-001] Santos personnel and equipment stored and maintained / available as per Table 12-3	Santos oil spill response team database; Santos equipment register, Exercise reports
	Access to protection and deflection equipment and personnel	[EPS-PD-002] Maintenance of access to protection and deflection equipment and personnel through AMOSC, AMSA National Plan and OSRL throughout activity as per Table 12-3	Access to National Plan resources through AMSA
			AMOSC Participating Member Contract
			OSRL Associate Member Contract
			TRG Arrangements
	Protection and deflection small vessel providers for nearshore booming operations are identified	[EPS-PD-004] Maintenance of a list of small vessel providers operating in the North West Region that could be used for nearshore booming	List of small vessel providers
	Response Implementation		
	First strike capability mobilised	[EPS-PD-005] First strike is mobilised in accordance with details and timings as specified in Table 12-4 unless directed otherwise by the Control Agency	Incident log
	IMT and Control Agency to agree protection priorities	[EPS-PD-007] Santos IMT to confirm protection priorities in consultation with Control Agency	IAP; Incident log
	Prepare operational NEBA to determine if shoreline protection and deflection activities are likely to result in a net environmental benefit	[EPS-PD-008] Records indicate operational NEBA completed prior to shoreline protection and deflection activities commencing. Operational NEBA to be undertaken each operational period. Ensure NEBA considers waste management and the possibility of secondary contamination	Operational NEBA; Incident log; IAP
	IAP Protection and Deflection Sub-plan is developed to ensure effective execution and environmental impacts from response are minimised	[EPS-PD-006] IAP Shoreline Protection and Deflection Sub-plan including shoreline/nearshore habitat/bathymetry assessment and waste management is developed to provide oversight and management of shoreline protection and deflection operation, prior to shoreline protection and deflection operations commencing	Incident log; IAP Shoreline Protection and Deflection Sub-plan
	Use of shallow draft vessels for shoreline and nearshore operations	[EPS-PD-009] Shallow draft vessels are used for shoreline and nearshore operations unless directed otherwise by the designated Control Agency	Vessel specifications documented in IAP

Environmental Performance Outcome	Implement shoreline protection and deflection tactics to reduce hydrocarbon contact with coastal protection priorities.		
Response Strategy	**Control Measures**	**Performance Standards**	**Measurement Criteria**
	Conduct shoreline/nearshore habitat/bathymetry assessment	[EPS-PD-010] Unless directed otherwise by the designated Control Agency, a rapid shoreline/ nearshore habitat/ bathymetry assessment will be conducted prior to nearshore activities.	IAP records; Assessment records

13. Shoreline clean-up plan

Table 13-1 provides the environmental performance outcome, initiation criteria and termination criteria for this strategy.

Table 13-1: Shoreline clean-up – environmental performance outcome, initiation criteria and termination criteria

Environmental Performance Outcome	Implement shoreline clean-up tactics to remove stranded hydrocarbons from shorelines in order to reduce impact on coastal protection priorities and facilitate habitat recovery.	
Initiation criteria	• Level 2 or Level 3 spills where shorelines with identified or potential protection priorities that will be, or have been, contacted • NEBA indicates shoreline clean-up will benefit receptors • Approval has been obtained from Control Agency to initiate response strategy	
Applicable hydrocarbons	**Reindeer Condensate**	**MDO**
	✓2	✓2
Termination criterion	• As directed by DoT	

13.1 Overview

Clean-up of shorelines may be required for a worst-case spill of MDO and to a lesser extent a spill of Reindeer condensate. Both types of hydrocarbons are light and volatile with a very low proportion of residue following weathering. These hydrocarbons are difficult to handle for removal given their light nature but are readily washed from sediments by wave and tidal flushing. Contaminated sand and debris are the likely waste products from a shoreline response.

Shoreline clean-up aims to remove hydrocarbons from shorelines and intertidal habitat to achieve a net environmental benefit. Removal of these hydrocarbons helps reduce remobilisation of hydrocarbons and contamination of wildlife, habitat and other sensitive receptors. Shoreline clean-up is often a lengthy and cyclical process, requiring regular shoreline clean-up assessments (Refer to North West Shelf OSM-BIP [7715-650-ERP-0002]) to monitor the effectiveness of clean-up activities and assess if they are resulting in any adverse impacts.

Shoreline clean-up is part of an integrated nearshore/ shoreline response to be controlled by Control Agency. Where Santos is not the Control Agency (refer to Table 4-2) it will undertake first-strike actions as required. In this circumstance, the relevant Control Agency will direct resources (equipment and personnel) provided by Santos for the purposes of shoreline clean-up. The information obtained from monitoring and evaluation tactics (Section 10), and operational monitoring (Section 16), will be used by the IMT in the development of the operational NEBA to inform the most effective clean-up tactics (if any) to apply to individual sites. Intrusive shoreline clean-up techniques have the potential to damage sensitive shorelines. The appropriateness of clean-up tactics will be assessed against natural attenuation for sensitive sites. Selection of shoreline clean-up methods and controls to prevent further damage from the clean-up activities are to be undertaken in consultation with the Control Agency and selected based on NEBA.

Shoreline clean-up techniques include:

- Shoreline clean-up assessment – uses assessment processes (refer to North West Shelf OSM-BIP (7715-650-ERP-0002) to assess shoreline character, assess shoreline oiling and develop recommendations for response. Typically, this should be the first step in any shoreline clean-up response.
- Natural recovery – oiled shorelines are left untreated, and the oil naturally degrades over time.
- Manual and mechanical removal – removes oil and contaminated materials using machinery, hand tools, or a combination of both.
- Washing, flooding and flushing – uses water, steam, or sand to flush oil from impacted shoreline areas.
- Sediment reworking and surf washing – uses various methods to accelerate natural degradation of oil by manipulating the sediment.

13.2 Implementation guidance

Table 13-2 provides guidance to the IMT on the actions and responsibilities that should be considered when selecting this strategy.

Table 13-3 provides a list of resources that may be used to implement this strategy. Mobilisation times for the minimum resources that are required to commence initial shoreline clean-up operations, unless directed otherwise by the relevant Control Agency, are listed in Table 13-4. The OSC and/or Incident Commander is ultimately responsible for implementing the response, and may therefore determine that some tasks be varied, should not be implemented or be reassigned.

Table 13-2: Implementation Guidance – shoreline clean-up

Action		Consideration	Responsibility	Complete
Initial Actions	**Actions below are indicative only and are at the final determination of the Control Agency.**			
	Initiate Shoreline Clean-up Assessment (if not already activated).	• Refer to North-West Shelf OSM-BIP (7715-650-ERP-0002) for additional information. • Unmanned Aerial Vehicles (UAVs) may be necessary for some sensitive environments and where personnel safety is at risk (e.g. dangerous fauna in remote locations).	Environment Unit Leader	❑
	Using results from Shoreline Clean-up Assessment, conduct Operational NEBA to assess shoreline clean-up suitability and recommended tactics for each shoreline location.	• Shoreline Clean-up Assessment Teams are responsible for preparing field maps and forms detailing the area surveyed and make specific clean-up recommendations. • The condition of affected shorelines will be constantly changing. Results of shoreline surveys should be reported as quickly as possible to the IMT to help inform real-time decision-making. • Engage a Heritage Adviser if spill response activities overlap with potential areas of cultural significance.	Environment Unit Leader	❑
	If operational NEBA supports shoreline clean-up, prepare a Shoreline Clean-up Plan for inclusion in the IAP,	Shoreline Clean-up Plan may include (but not be limited to): • clean-up objectives • clean-up end points (may be derived from Shoreline Clean-up Assessment) • clean-up priorities (may be derived from Shoreline Clean-up Assessment) • assessment and location of staging areas and worksites (including health and safety constraints, zoning) • utility resource assessment and support (to be conducted if activity is of significant size in comparison to the size of the coastal community) • permits required (if applicable) • chain of command for onsite personnel • list of resources (personnel, equipment, personal protective equipment) required for selected clean-up tactics at each site • details of accommodation and transport management • security management • waste management information, including logistical information on temporary storage areas, segregation, decontamination zones and disposal routes	Environment Unit Leader Planning Section Chief Operations Section Chief	❑

Action		Consideration	Responsibility	Complete
		• establish no access and demarcation zones for vehicle and personnel movement considering sensitive vegetation, bird nesting/roosting areas and turtle nesting habitat (utilise existing roads and tracks first). • Shift rotation requirements. Refer to IPIECA guide: A Guide to Oiled Shoreline Clean-up Techniques (IPIECA-IOGP 2016c) for additional guidance on shoreline clean-up planning and implementation.		
	In consultation with the Control Agency procure and mobilise resources to a designated port location for deployment, or directly to location via road transport.	-	Logistics Section Chief Supply Unit Leader Deputy Logistics Officer (DoT IMT)	❑
	Deploy shoreline clean-up response teams to each shoreline location to begin operations under direction of the Control Agency.	Each clean-up team to be led by a Shoreline Response Team Lead, who could be an AMOSC Core Group Member or trained member of the AMSA administered National Response Team. Clean-up teams and equipment will be deployed and positioned as per those observations by the Shoreline Clean-up Assessment Teams in consultation with the Control Agency. Team members will verify the effectiveness of clean-up, modifying guidelines as needed if conditions change.	Operations Section Chief Logistics Section Chief Deputy Logistics Officer (DoT IMT)	❑
Ongoing Actions	Shoreline Response Team Lead shall communicate daily reports to the IMT Operations Section Chief to inform of effectiveness of existing tactics and any proposed tactics and required resources.	Where possible, maintain some consistency in personnel within Shoreline Response Teams. If the same personnel are involved in Shoreline Clean-up Assessment and clean-up, they will be better placed to adapt their recommendations as the clean-up progresses and judge when the agreed end points have been met.	Shoreline Response Team Leader Operations Section Chief	
	The IMT Operations Section Chief shall work with the Planning Section Chief to incorporate recommendations into the Incident Action Plans for the following operational period, and ensure all required resources are released and activated through the Supply and Logistics Section Chiefs.	-	Operations Section Chief Planning Section Chief Supply Unit Leader Logistics Section Chief	❑
	Monitor progress of clean-up efforts and report to the Control Agency.	-	Operations Section Chief On-Scene Commander Deputy OSC (Control Agency FOB)	❑

Table 13-3: Shoreline clean-up – resource capability

Equipment type / Personnel required	Organisation	Equipment specifications / Total quantity available	Location / Quantity available	Mobilisation timeframe
Manual clean-up tools (shovels, rakes, wheelbarrows, bags, etc.)	AMOSC shoreline kits	Boom Accessories – Beach Guardian Deployment Kit Total – 14	Fremantle – 2 Geelong – 8 Broome – 1 Exmouth - 3	Response via duty officer within 15 minutes of first call – AMOSC personnel available within one hour of initial activation call; equipment logistics varies according to stockpile location (Table 13-4)
	Santos	Shoreline clean-up container	Varanus Island – 1	Within 48 hours for deployment from Varanus Island
	Hardware suppliers	As available	Karratha / Exmouth / Perth	-
Shoreline flushing (pumps/hoses)	AMOSC	Shoreline flushing kit 3” Total – 2	Fremantle –1 Geelong – 1	Response via duty officer within 15 minutes of first call – AMOSC personnel available within one hour of initial activation call For mobilisation timeframes see Table 13-4
		Shoreline flushing kit 4” Total – 1	Geelong -1	
		Shoreline impact lance kit Total – 1	Geelong – 1	
Nearshore booms/ skimmers	AMOSC AMSA Industry mutual aid	Refer to Protection and Deflection (Table 12-3)	-	-
Decontamination/staging site equipment	AMOSC	Decontamination-kit (PPE) Total – 3	Broome – 1 Exmouth – 1 Geelong -1	Response via duty officer within 15 minutes of first call – AMOSC personnel available within one hour of initial activation call For mobilisation timeframes see Table 13-4
		Decontamination kit Locker Total – 3	Exmouth – 1 Fremantle – 1 Geelong – 1	
		Decontamination – vehicle washdown trailer Total – 2	Fremantle – 1 Geelong – 1	
		Decontamination – Decon. Support trailer Total – 1	Geelong – 1	

Equipment type / Personnel required	Organisation	Equipment specifications / Total quantity available	Location / Quantity available	Mobilisation timeframe
	AMSA	Decontamination station Total – 4	Karratha –2 Fremantle – 2	Access to National Plan[29] equipment through AMOSC[30] Equipment mobilisation times vary according to stockpile location.
	Oil spill equipment provider (e.g. Global Spill., PPS)	As available	Perth	Subject to availability
Waste storage (including temporary storage and waste skips and tanks for transport)	AMOSC temporary storage	Fast tanks (9,000 L and 3,000 L) Total – 8	Geelong – 4 Fremantle – 2 Exmouth – 2	Response via duty officer within 15 minutes of first call – AMOSC personnel available within one hour of initial activation call For mobilisation timeframes see Table 13-4
		Vikotank (13,000 L) Total – 2	Broome – 1 Geelong – 1	
		Lamor (11,400 L) Total – 4	Fremantle – 4	
		IBCs (1 m^3) Total – 18	Geelong – 18	
	AMSA temporary storage	Fast tanks – (10 m^3) Total – 22	Darwin – 2 Karratha – 2 Fremantle – 4 Adelaide – 1 Brisbane – 2 Devonport – 2 Melbourne – 1 Sydney – 4 Townsville – 4	Access to National Plan equipment through AMOSC. Equipment mobilisation times vary according to stockpile location.
		Structureflex – (10 m^3) Total – 3	Brisbane – 1 Adelaide – 2	
		Vikoma – (10 m^3)	Darwin – 1	

[29] *Updated AMSA Equipment listings for locations around Australia can be found at the AMSA National Environmental Maritime Operations Portal - https://www.amsa.gov.au/marine-environment/pollution-response/national-environmental-maritime-operations*

[30] *Santos will enter a contractual arrangement with AMSA to access the National Plan resources*

Equipment type / Personnel required	Organisation	Equipment specifications / Total quantity available	Location / Quantity available	Mobilisation timeframe
		Total – 20	Adelaide – 1 Brisbane – 1 Devonport – 2 Fremantle – 4 Fremantle – 3 Melbourne – 2 Sydney – 2 Townsville – 4	
	Santos Waste Management Service Provider	Refer to Waste management (Section 17)	Perth, Karratha	<24 hours
Personnel (field responders) for OSR strategies	AMOSC Staff	Total – 12	Fremantle – 3 Geelong – 9	Response via duty officer within 15 minutes of first call. Timeframe for availability of AMOSC personnel dependent on location of spill and transport to site
	AMOSC Core Group (Santos)	Total – 16	Perth/NW Australia facilities – 14 Port Bonython (South Australia) – 2	12+ hours <48 to WA locations
	AMOSC Core Group (Industry)	As per monthly availability	Office and facility location across Australia	Location dependent. Confirmed at time of activation
	Santos contracted Work Force Hire company (e.g. Dare)	As per availability (up to 2,000)	Australia-wide	Subject to availability (indicatively 72+ hours)

Table 13-4: Shoreline clean-up – first strike response timeline

Task	Time from shoreline contact (predicted or observed)
IMT confirms shoreline contact prediction, confirms applicability of strategy and begins sourcing resources.	<4 hours
Santos Offshore Core Group mobilised to deployment port location.	<24 hours
Clean-up equipment mobilised to deployment port location.	24-48 hours
Waste storage equipment mobilised to deployment port location.	<24 hours
Remote island transfer vessel (if required) mobilised to deployment port location.	<24 hours
AMOSC Staff, Industry Core Group and Labour Hire mobilised to site/deployment port location.	<48 hours
Clean-up operation deployed to clean-up area under advice from Shoreline Assessment Team.	<60-72 hours (weather/daylight dependent)
Minimum Resource Requirements	
Resource requirements for shoreline clean-up will be situation/receptor specific. TRPs if developed for the area/receptor will outline suggested resource requirements and shoreline assessments (as part of operational monitoring) will be conducted prior to clean-up to confirm techniques. TRPs are held by Santos and DoT[31]. For further description on relevant TRPs for this activity, refer to Section 6.6.3.Indicative minimum requirements for one Santos-activated shoreline clean-up team are: • manual clean-up/shoreline flushing equipment kit • waste storage (bags, temporary storage tanks, skips as appropriate) • decontamination/staging equipment kit • personal protective equipment. One clean-up team comprises: • one Team Leader (AMOSC staff, Industry Core Group or Santos Core Group) • 10[32] shoreline clean-up responders (AMOSC Core Group, Santos contracted labour hire personnel).	

13.3 Shoreline clean-up resources

Shoreline clean-up equipment available for use by Santos is a combination of Santos owned, AMOSC, AMSA, DoT and OSRL equipment as well as other operator resources available through the AMOSPlan mutual aid arrangements. Shoreline consumables are available through hardware, PPE and specialist oil/chemical spill suppliers and mobile plant is available through hire outlets in Broome, Perth, Karratha and other regional centres. Where vessel deployments are required, Santos will leverage from existing contracted vessel providers in the first instance, and if required will source vessels from vendors that Santos already has a master service agreement with, or spot hiring vessels as needed. The Santos Vessel Requirements for Oil Spill Response (7710-650-ERP-0001) contains the specification for various types of vessels that may be required in an oil spill response, including vessels for shoreline clean-up support.

Shoreline clean-up personnel available to Santos is a combination of AMOSC Staff, Core Group Responders (comprising AMOSC trained Santos and Industry personnel), OSRL responders, State Response Team members and National Response Team members. Personnel for manual clean-up and mobile plant operation can be accessed through Santos's labour hire arrangements.

The level of deployment of equipment and personnel for clean-up will be commensurate to the spatial extent of shoreline contact, the volume of oil arriving and the sensitivity and access constraints of the shoreline in question. Deployment will be under the direction of the relevant Control Agency and the advice of shoreline clean-up specialists from AMOSC Core Group and National/State response teams. Shoreline clean-up assessments (Refer to North West Shelf OSM-BIP [7715-650-ERP-0002]) will provide information to guide the clean-up strategy and deployment of resources.

[31] *Where TRPs are unavailable for areas likely to be contacted, refer to other sources of information such as aerial photography, Oil Spill Response Atlas, Pilbara Region Oiled Wildlife Response Plan and WAMOPRA.*

[32] *Remote islands and ecologically sensitive locations will have reduced personnel numbers to reduce impacts from clean-up operations (Refer to Section 6.6)*

13.4 Worst-case resourcing requirements

Resourcing requirements for shoreline clean-up operations have been conservatively determined based on a manual clean-up rate of 1 m^3 of oily waste per person per day. A bulking factor of 10 has been applied to manual clean-up activities (IPIECA-IOGP 2016b).

Santos has used stochastic modelling data for shoreline contact to plan for the worst-case shoreline clean-up requirements. Table 13-5 presents all receptors (protection priorities and other locations predicted to be contacted) contacted at ≥100 g/m^2 using the stochastic modelling results for scenarios 3, 5 and 6 presented in Section 6.3.1 (Scenarios 1, 2 and 5 did not predict any shoreline contact ≥100 g/m^2). For planning purposes, it also presents the estimated number of shoreline clean-up teams required for the different scenarios and planning considerations. Santos will also use an operational NEBA to assess the suitability of the number of shoreline clean-up teams required.

It should be noted that not all of the receptors listed in Table 13-5 will be contacted by each spill. These results are presenting the range of possible worst-case timeframes to contact and peak volume of oil ashore based on all runs that make up the stochastic model for each spill. Santos will use initial monitor and evaluate data and operational monitoring data (e.g. SCAT) to determine where resources should be allocated. This may include directing resources to conduct shoreline clean-up at locations not identified as protection priority areas.

Table 13-5: Resource requirements for shoreline clean-up for all locations contacted ≥100 g/m² based on stochastic results for all scenarios

Location	Min. arrival time shoreline oil accumulation ≥100 g/m² (days, hours)	Peak volume ashore (m³)	Potential max. waste generated (m³) – bulking factor of 10[33]	No. shoreline clean-up teams recommended (max 6 personnel / team)	Planning considerations
Scenario 3 – Subsea pipeline leak of Reindeer condensate near the HDD crossing (121.4 m3)					Small islands with sensitive receptors; keep response personnel to minimum to reduce disturbance of surrounding habitat and fauna. For key turtle nesting beaches and peak nesting periods for PPAs refer to Table 15-3 For key turtle nesting beaches on the Muiron Islands see Rob *et al.* (2019). Barrow Island: • Varied access • Chevron facilities present on eastern side of island Lowendal Islands: • Varied access • Santos facilities present on Varanus Island Montebello Islands • Numerous small islands with limited access • Strong currents present through channels Northern Islands Coast • Varied access • Remote shorelines and saltmarshes Dampier Archipelago • Facilities present at Dampier on mainland • Cultural heritage sites on numerous small islands
Northern Islands Coast	3 hours	8	80	2	
Total estimated Shoreline Clean-up Teams required				**2 teams**	
Scenario 5 – MDO spill resulting from a vessel collision at the CSB (325 m3)					
Dampier Archipelago	2 days, 10 hours	24	240	3	
Barrow Island	14 days, 7 hours	5	50	1	
Lowendal Islands	5 days, 13 hours	8	80	1	
Montebello Islands	5 days, 19 hours	8	80	1	
Total estimated Shoreline Clean-up Teams required				**6 teams**	
Scenario 6 – MDO spill resulting from a vessel collision at the HDD Crossing (325 m³)					
Dampier Archipelago	4 days, 19 hours	9	90	2	
Northern Islands Coast	2 hours	199	1,990	7	
Total estimated Shoreline Clean-up Teams required				**9 teams**	

Source: Modelling data – RPS (2024)

[33] *Bulking factor of 10 is for conservative planning purposes only. Reindeer condensate and MDO have low persistent residual fractions (<1% for Reindeer Condensate and <10% MDO) and asphaltene content and are therefore unlikely to emulsify and bulk to this extent.*

13.4.1 Operational and environmental considerations affecting resourcing

Tidal ranges in the EMBA can range up to 4 m. Close to Barrow Island, Lowendal Islands and Montebello Islands the shallow bathymetry results in large areas of exposed seabed at low tide and strong currents persist close to the Islands (Chevron Australia 2014). In addition, much of the coastline is remote and inaccessible via road, making many shoreline clean-up techniques difficult and their use may result in greater environmental impacts. In addition, the remote nature, potential presence of dangerous fauna (i.e. saltwater crocodiles and Irukandji jellyfish) present significant safety risks to responders working in these environments.

Large scale operations involving large numbers of personnel may cause adverse environmental impacts at many of these sensitive shoreline locations. The constant removal of oil, even via manual removal can result in the removal of substrate (e.g. sand, pebbles). If intrusive clean-up is conducted frequently, over a long period of time and along contiguous lengths of coastline, this may result in geomorphological changes to the shoreline profile and adverse impacts to shoreline invertebrate communities which provide an array of ecosystem services (Michel *et al.* 2017).

Given the safety constraints and ecological sensitivities of these shorelines, shoreline clean-up operations should be conducted by smaller teams for a longer period of time. Intermittent manual treatment (<20 visits/month) and use of passive recovery booms is likely to be more effective than intrusive methods (e.g. intrusive manual removal >20 visits/month). Although this may take longer to undertake the clean-up, it is considered that the benefits outweigh the impacts as smaller teams are more targeted, recovering more oil and less sand and debris, reducing trampling of oil into the shore profile and minimising ecological impacts on the shorelines and their sensitive species.

The number of shoreline clean-up teams recommended to treat these shorelines is not based on extensive, intrusive and contiguous removal of oil and waste along all shorelines, but rather use of smaller teams and at lower frequency of visits. Where shoreline based manual removal is safe and deemed advantageous by shoreline clean-up assessment teams and the operational NEBA, this should be conducted via land access (if possible) or via suitable vessels. However, it should be noted that it is generally not feasible to move response equipment into and out of mangroves, tidal flats and delta environments without causing excessive damage. Even foot traffic must be minimised, either by laying down wooden walkways or relying on vessel-based activities as much as possible (API 2020). Santos has considered the access limitations, safety issues and number of clean-up teams that may be able to operate in each of these environments. A summary of these findings is presented below.

MDO and Reindeer Condensate are light products and although shoreline clean-up resources are planned for, not all the hydrocarbons may need to be removed (or be able to be removed) as they will continue to weather rapidly after beaching and is likely to disperse naturally.

13.4.2 Remote island deployment

The islands in the EMBA are a mixture of large islands, such as Barrow Island, and smaller uninhabited islands, including Muiron Islands. For shoreline clean-up of remote islands, the following process could be implemented so as to minimise the secondary impacts of high numbers of spill response personnel on shorelines. If shoreline contact is predicted with locations where TRPs exist, the TRP will be used to plan the deployment. Where TRPs are unavailable for areas likely to be contacted, refer to other sources of information such as aerial photography, Oil Spill Response Atlas, and WAMOPRA.

Vessels are to be mobilised to the designated deployment port to mobilise shoreline clean-up teams by water. The shoreline clean-up will be undertaken through on-water deployment to the defined shorelines in four stages:

6. Drop off six-person clean-up containers (contents list in Appendix J) to shoreline contact locations defined by IMT through observation data; or if locations are too sensitive to be used as staging sites, then transfer equipment via landing barge for offsite staging.
7. Deploy marine and environmental specialists to demarcate the clean-up zones with barrier posts and tape to prevent secondary impacts to flora and fauna by the clean-up teams.
8. Deploy clean-up teams in six person squads with a trained/competent shoreline responder as a Team Leader to conduct clean-up methods (flushing, bag and retrieve, etc.) with all waste being bagged and stored in temporary storage areas lined with damp-proof coarse (DPC) grade HDPE sheeting above the high-tide mark.
9. Deploy waste pickup landing barges to retrieve collected wastes from the temporary storage areas and to complete the shoreline clean-up and final polishing.

Multiple six-person teams are to be used based on the actual volume of oil deposited, which will be determined via shoreline clean-up assessments (North West Shelf OSM-BIP [7715-650-ERP-0002]). These teams can be resourced through the existing Santos arrangements, using a combination of personnel from OSROs for trained shoreline clean-up team leader roles and labour hire companies for clean-up team member roles.

13.5 Shoreline clean-up decision guides

To assist with planning purposes, guidance for the selection of appropriate shoreline response strategies based on the type of shoreline sensitivities is provided within Appendix K.

Operational guidelines for shoreline response activities including worksite preparation, manual and mechanical oil removal and vessel access for remote shorelines are included in Appendix L.

The WA Incident Management Plan – Marine Oil Pollution (WA DoT, 2023) also provides guidance on shoreline clean-up techniques and termination criteria.

13.6 Environmental performance

Table 13-6 indicates the environmental performance outcome, control measures, performance standards and measurement criteria for the shoreline clean-up response strategy.

Table 13-6: Environmental performance – shoreline clean-up

Environmental Performance Outcome	Implement shoreline clean-up tactics to remove stranded hydrocarbons from shorelines in order to reduce impact on coastal protection priorities and facilitate habitat recovery.		
Response Strategy	**Control Measures**	**Performance Standards [EPS ID]**	**Measurement Criteria**
Shoreline Clean-Up	**Response Preparedness**		
	Access to shoreline clean-up equipment and trained personnel	[EPS-SCU-001] Access to shoreline clean-up equipment and personnel through AMOSC, AMSA National Plan, OSRL and TRG maintained throughout activity.	Access to National Plan resources through AMSA
			AMOSC Participating Member Contract
			OSRL Associate Member Contract
			TRG Arrangements
	Access to Santos shoreline clean-up personnel	[EPS-SCU-002] Santos personnel available as per Table 13-3	Santos oil spill response team database
	Access to vessels suitable for remote island transfers of equipment, personnel and waste	[EPS-SCU-005] MSAs with multiple vessel providers maintained throughout activity	MSAs with multiple vessel providers Vessel details show suitability
	Vessel requirements for offshore island shoreline clean-up operations are identified	[EPS-SCU-006] Maintenance of vessel specification for remote island shoreline clean-up operations	Vessel specifications within Santos Vessel Requirements for Oil Spill Response (7710-650-ERP-0001)
	Access to shoreline clean-up labour hire personnel	[EPS-SCU-003] Maintenance of contract with labour hire provider	Labour hire contract
	Onboarding procedure to access shoreline clean-up labour hire personnel	[EPS-SCU-004] Maintenance of an onboarding procedure for oil spill response labour hire	Onboarding procedure
	Response Implementation		
	First strike capability mobilised	[EPS-SCU-007] First strike is mobilised in accordance with details and timings as specified in Table 13-4 unless directed otherwise by DoT	Incident log

Environmental Performance Outcome	Implement shoreline clean-up tactics to remove stranded hydrocarbons from shorelines in order to reduce impact on coastal protection priorities and facilitate habitat recovery.		
Response Strategy	**Control Measures**	**Performance Standards [EPS ID]**	**Measurement Criteria**
	IMT and Control Agency to agree protection priorities	[EPS-SCU-012] Santos IMT to confirm protection priorities in consultation with the control agency	IAP; Incident Log
	Prepare operational NEBA to determine if shoreline clean-up activities are likely to result in a net environmental benefit	[EPS-SCU-013] Records indicate operational NEBA completed prior to shoreline activities commencing. Operational NEBA to be undertaken each operational period. Ensure NEBA considers waste management and the possibility of secondary contamination	Operational NEBA; Incident Log; IAP
	IAP Shoreline Clean-up Sub-plan is developed to ensure effective execution and minimise environmental impacts from response	[EPS-SCU-015] IAP Shoreline Clean-up Sub-plan including waste management is developed to provide oversight and management of shoreline clean-up operation	Incident Log; IAP Shoreline Protection and Deflection Sub-plan
	Shoreline clean-up operations will be implemented under the direction of the Control Agency to ensure effective and coordinated execution	[EPS-SCU-008] Clean-up strategies will be implemented under the direction of the Control Agency. Santos will make resources available to the Control Agency.	Incident Log
	Santos AMOSC core group responders available to the Control Agency for shoreline clean-up positions.	[EPS-SCU-016] Santos will make available AMOSC Core Group responders, or other appropriately trained responders, for shoreline clean-up team positions to the Control Agency	Incident Log
	Equipment for shoreline clean-up made available to the Control Agency from Santos, AMOSC and OSRL stockpiles	[EPS-SCU-017] Santos will make available to the Control Agency equipment from AMOSC and OSRL stockpiles	Incident Log
	NEBA included in development of following operational period IAP	[EPS-SCU-014] Effectiveness of shoreline clean-up to be evaluated by Team Leaders and reported to IMT for inclusion in NEBA. NEBA undertaken every operational period by the relevant Control Agency to determine if response strategy is having a net environmental benefit. NEBA included in development of following period Incident Action Plan	IAP; Incident Log
	Access plans are developed to ensure effective execution and minimise environmental impacts from response	[EPS-SCU-018] Access plans for shoreline operations will be developed. Unless directed otherwise by the Control Agency, Access plans will prioritise use of existing roads and tracks, establish demarcation zones to protect sensitive areas and select vehicles appropriate to conditions	IAP demonstrates requirement is met
	Soil profile assessment is undertaken prior to earthworks to ensure effective execution and minimise environmental impacts from response	[EPS-SCU-020] Unless directed otherwise by the designated Control Agency, a soil profile assessment is conducted prior to earthworks	Soil Profile Assessment; IAP; Incident Log

Environmental Performance Outcome	Implement shoreline clean-up tactics to remove stranded hydrocarbons from shorelines in order to reduce impact on coastal protection priorities and facilitate habitat recovery.		
Response Strategy	**Control Measures**	**Performance Standards [EPS ID]**	**Measurement Criteria**
	Pre-cleaning and inspection of equipment (quarantine) is undertaken to minimise environmental impacts from response on offshore islands	[EPS-SCU-021] Vehicles and equipment provided by Santos are verified as clean and invasive species free prior to deployment to offshore islands	Quarantine documentation; IAP; Incident Log
	If spill response activities overlap with potential areas of cultural significance, Heritage Adviser will be engaged	[EPS-SCU-022] In consultation with the Control Agency, engage a Heritage Advisor to provide advice on any sites of cultural significance that may be affected directly by the spill, or indirectly through implementation of spill response measures.	Documented in IAP; Incident Log
	Select forward staging areas in consultation with the Control Agency	[EPS-SCU-023] Any establishment of forward staging areas at shoreline areas done under direction or in consultation with the Control Agency	Incident Log; IAP
	Establish demarcation zones in sensitive areas	[EPS-SCU-024] Unless directed otherwise by the Control Agency, demarcation zones are mapped out in sensitive habitat areas for vehicle and personnel movement, considering sensitive vegetation, bird nesting/ roosting areas and turtle nesting habitat.	IAP demonstrates requirement is met
	Operational restrictions of vehicle and personnel movement are established to limit erosion and compaction	[EPS-SCU-019] Unless directed otherwise by the designated Control Agency, operational restrictions on movement of personnel and vehicles, including vehicle types and traffic volumes, are established to minimise impacts from erosion and compaction	IAP demonstrates requirement is met
	Stakeholder consultation for deployments in coastal areas	[EPS-SCU-025] Consultation is undertaken with relevant stakeholders prior to deployment of resources to townships and marine/coastal areas	Consultation records

14. Onshore response

There is the potential for a leak or rupture of the buried export pipeline (Reindeer 16" pipeline) between the shoreline and the boundary of the Devil Creek Gas Plant (DCGP). The worst-case credible spill is a release of 121.4 m^3 of Reindeer condensate. This represents the entire pipeline inventory and is considered a conservative volume given the significant length of pipeline grading away from the buried shoreline section to the WHP. As per HAZMAT, direct on-site recovery and clean-up of hazardous materials and infrastructure is the responsibility of the owner of the hazardous materials (Santos). Under the *Environmental Protection Act 1986*, DWER would issue a pollution notice to the owner of hazardous materials that are involved in an emergency situation, requiring clean-up. Remediation of contamination at the spill site will be required as per the *Contamination Sites Act 2003* and Contamination Sites Regulations 2006.

Table 14-1 provides the Environmental Performance Outcome, initiation criteria and termination criteria for this tactic. The Emergency Commander and/or Incident Commander is ultimately responsible for implementing the response, and may therefore determine that some tasks be varied, should not be implemented or be reassigned. The implementation guide for the onshore response plan is found in Table 14-2.

Table 14-1: Onshore Response Plan – objectives, initiation criteria and termination criteria

Environmental Performance Outcome	Assist DFES in the control of hazardous material Remediate the site as directed by the Jurisdictional Authority.	
Initiation criteria	Level 2 or 3 spills – may be deployed in a Level-1 incident (to be determined by On-Scene Commander)	
Applicable hydrocarbons	**Reindeer Condensate**	**MDO**
	✓	X
Termination criterion	The site has been cleaned and remediated to the satisfaction of DWER (and DBCA)	

Table 14-2: Onshore response implementation guide

Onshore Response				
Activation time	Level 2 or 3 spills – may be deployed in a Level-1 incident (to be determined by On-Scene Commander)			
Action		**Consideration**	**Responsibility**	**Complete**
Initial Actions	Source control actions as per the Devil Creek Emergency Response Plan (DC-40-IF-00096).	-	Emergency Commander (Facility OIM)	❑
	Site will notify DFES as applicable as per the Devil Creek Emergency Response Plan (DC-40-IF-00096)	-	Emergency Commander (Facility OIM)	❑
	The Devil Creek Emergency Response Team will respond under the advice of DFES and the Emergency Commander, as per the Devil Creek Emergency Response Plan (DC-40-IF-00096)	-	Emergency Commander (Facility OIM)	❑
	In the event of an onshore spill with the potential for groundwater contamination DWER and relevant landowner will be contacted regarding the potential for interaction with groundwater bores and advice on any isolations of water supply required.	Landowners bordering the pipeline corridor and contact details are outlined within the Devil Creek Stakeholder Management Plan for the Gas Plant and Associated Facilities (DC-00-RG-00018)	IMT Incident Commander/ Government Relations/Media Advisor	❑
	Asist DFES with resources as required for initial HAZMAT response.	Pipeline is buried in permeable soils and hydrocarbon is highly volatile and non-persistent. Low likelihood of free pooling hydrocarbon and high risk of fire/ explosion. The following equipment/techniques may be applicable to remove oi/contamination at surface: • Oil absorbents (materials and sorbent pads/boom) to reduce spread of hydrocarbon. • Shore sealing and absorbent booms if contaminated surface water is present. • Pumping equipment to remove free hydrocarbons of contaminated water at surface.	Emergency Commander (Facility OIM) Operations Unit Leader	❑

Onshore Response				
Escalation and Ongoing Response Actions	Conduct remediation of soil and groundwater affected by hydrocarbon contamination. The relevant Jurisdictional Authority for remediation is DWER and relevant legislation being the Contaminated Sites Act and Contaminated Site Regulations.	Available remediation options to reduce source contamination include methods such as: • use of down-well sorbent materials • use of down-well and trench skimmers • single/dual-phase extraction • vacuum extraction • Thermal and chemical flushing treatments • Available remediation options to reduce the spread contamination include methods such as: • Bentonite slurry walls • Sheet pile walls • Permeable reactive barriers • Funnel and gate systems • Hydraulic containment systems	Santos Contaminated Sites Project Team	❑

Onshore Response		
Resources		**Location**
Equipment	ERT Trailer containing oil spill sorbents	DC Gas Plant
	Portable pumps and IBCs	DC Gas Plant
	Sorbent booms, shore-sealing boom, nearshore boom, skimmer, shoreline clean-up container, oil pumps (shovels, sorbents, wheel barrows, PPE)	Santos (Varanus Island/ Exmouth)
	Additional booms and oil pumping equipment	AMOSC (Exmouth/Fremantle)
	Vacuum trucks Waste skips/containers for transportation	Waste contractor – Karratha
Personnel	Emergency Response Team Members	Devil Creek
	Santos AMOSC Core Group Members	Santos operational sites
	DFES response personnel	Karratha VFRS Dampier VFRS Perth
	DWER pollution response team	Perth
	HAZMAT Emergency Advisory Team (HEAT)	Perth
	Waste contractor personnel	Karratha
Maintenance of response	Santos has equipment and personnel available to implement and maintain an onshore response at the DC facility. Santos has arrangements in place with service providers (e.g. AMSOC) that allows the response to be scaled and sustained beyond the limits of the equipment and personnel from the VI Hub if required.	

14.1 Initial response

Given the flammable/explosive nature of a release of condensate/gas from the onshore pipeline, initial response will be dictated by safety constraints and done under the direction of DFES as the designated Control Agency. The nature of the hydrocarbon is such that protection of safety and control of fire will be top priorities. Measures to control the spread of contamination (through soil and groundwater) will be under advice from DWER.

Given the onshore section of pipeline is buried to a depth of 1.2 m up to and beyond the boundary of the Devil Creek Gas Plant, there is an existing barrier to the rapid spread of condensate in the event of a rupture or leak. As described in Section 3.4 containment is expected to be within 200 m of the pipeline with resultant contamination of soil and groundwater within this zone of impact.

The greatest potential for surface expression of condensate through the movement of contaminated groundwater is at the area of saline flats approximately 2 km from the shoreline along the pipeline route) where the groundwater table is at its lowest. In times of inundation after heavy rain this area can pool with water. A spill in this section could contaminate surface water which could be responded to using sorbent materials applied at the surface. Sorbent materials are available at the DCGP or through AMOSC stockpiles stored for use in coastal response (AMOSC and Santos stocks). Equipment (HAZMAT trailers) for petroleum/chemical spills are also located at Karratha/Dampier DFES VFRS. Any surface water contamination in this area is not considered to be under tidal/marine influence and given the topography and proximity to waterways it is not expected that drainage of contaminated into defined waterways will occur.

14.2 Site remediation

The type of activities that may be required are varied and will be guided by an initial and Detailed Site Investigation (DSI) under the review of a Contaminated Sites Auditor registered with DWER. The DSI will typically involve collection of groundwater and soil samples and the development of a conceptual site model. On the basis of the DSI, remediation activities will be evaluated and outlined within an approved Remediation Action Plan (RAP).

14.3 Onshore response plan environmental performance

Table 14-3 indicates the Environmental performance outcome, control measures, performance standards and measurement criteria for the Onshore response strategy.

Table 14-3: Environmental performance outcomes, controls and performance standards for shoreline onshore response strategy

Environmental Performance Outcome	Assist DFES in the control of hazardous material Remediate the site as directed by the Jurisdictional Authority.		
Response Strategy	**Control Measures**	**Performance Standards [EPS-ID]**	**Measurement Criteria**
Onshore Response	Onshore Response	[EPS-ON-005] Initial clean-up strategies will be implemented under the direction of DFES	Incident Log
		[EPS-ON-006] Santos will make available AMOSC Core Group Responders for onshore clean-up team positions to the Control Agency	Incident Log
		[EPS-ON-007] Santos will make available to the Control Agency equipment from Santos, AMOSC and OSRL stockpiles	Incident Log
		[EPS-ON-008] NEBA undertaken every operational period by the relevant Control Agency to determine if response strategy is having a net environmental benefit. NEBA included in development of following period Incident Action Plan.	IAP/Incident Log
		[EPS-ON-001] Onshore response continues until termination criteria is met, as outlined within the Onshore response Plan.	Onshore Response Plan

Environmental Performance Outcome	Assist DFES in the control of hazardous material Remediate the site as directed by the Jurisdictional Authority.		
Response Strategy	**Control Measures**	**Performance Standards [EPS-ID]**	**Measurement Criteria**
	Remediation	[EPS-ON-009] Undertake remediation and monitoring as required under Contaminated Sites Regulations 2003	Contaminated Sites records incl. Detailed Site Investigation (DSI) and Remedial Action Plan (RAP)

15. Oiled wildlife

The WA DoT is the Control Agency and DBCA is the Jurisdictional Authority and lead agency for oiled wildlife response within WA State waters, WA marine parks and Islands. Santos and AMSA are the Control Agencies for oiled wildlife response within Commonwealth waters from facility and vessel spills respectively.

Table 15-1 provides the environmental performance outcome, initiation and termination criteria for this strategy.

Table 15-1: Oiled wildlife response – environmental performance outcome, initiation criteria and termination criteria

Environmental Performance Outcome	Implement tactics in accordance with the Santos Oiled Wildlife Response Framework Plan (7700-650-PLA-0017) to prevent or reduce impacts, and to humanely treat, house, and release or euthanise wildlife.	
Initiation criteria	Monitor and evaluate information and/or operational monitoring data shows that wildlife is contacted or are predicted to be contacted by a spill	
Applicable hydrocarbons	**Reindeer Condensate**	**MDO**
	✓1	✓1
Termination criterion	• Oiling of wildlife has not been observed over a 48 hour period; and • Oiled wildlife have been successfully rehabilitated; and • Agreement is reached with Jurisdictional Authorities and stakeholders to terminate the incident response.	

15.1 Overview

The short-term effects of hydrocarbons on wildlife may be direct such as the external impacts from coating or internal effects from ingestion and inhalation. Oiled wildlife response (OWR) includes wildlife surveillance/reconnaissance, wildlife hazing, pre-emptive capture and the capture, cleaning, treatment, and rehabilitation of animals that have been oiled. In addition, it includes the collection, post-mortem examination, and disposal of deceased animals that are found in the vicinity of an oil spill or are reasonable suspected of have succumbed to the effects of oiling.

Long-term effects of a spill on wildlife may be associated with loss/degradation of habitat, impacts to food sources, and impacts to reproduction. An assessment of such impacts is covered in Section 6.8 of the EP and post-spill via scientific monitoring (Section 16).

Table 15-2 provides guidance on the designated Control Agency and Jurisdictional Authority for OWR in State and Commonwealth waters. For a petroleum activity spill in Commonwealth and Territory waters, Santos acts as the Control Agency and will be responsible for the wildlife response. The Santos Oiled Wildlife Response Framework Plan (7700-650-PLA-0017) will be referred to for guidance for coordinating an OWR when Santos is the Control Agency and for the OWR first-strike response, otherwise the relevant State OWR Plan will be referred to, as described below.

The key plan for OWR in WA is the Oiled Wildlife Response Plan (WAOWRP) (DBCA, 2022a). The WAOWRP establishes the framework for preparing and responding to potential or actual wildlife impacts during a spill and sets out the management arrangements for implementing an OWR in conjunction with the SHP-MEE (WA DoT 2024). It is the responsibility of DBCA to administer the WAOWRP under the direction of the DoT (Table 15-2**)**. The Santos Oiled Wildlife Response Framework Plan (7700-650-PLA-0017) is consistent with and interfaces the WAOWRP and WA Oiled Wildlife Response Manual (WA OWR Manual) (DBCA, 2022b).

If a spill occurs in WA State waters or enters State waters, DBCA is the Jurisdictional Authority for wildlife, and for Level 2/3 spills, will also lead the oiled wildlife response under the control of the DoT. DBCA is the State Government agency responsible for administering the *Biodiversity Conservation Act (WA) 2016* (BC Act), which has provisions for authorising activities that affect wildlife.

For Level 1 spills, Santos will be the Control Agency, including for wildlife response. It is however also an expectation that for Level 2/3 petroleum activity spills, Santos will conduct the initial first-strike response actions for wildlife and continue to manage those operations until DBCA is activated as the lead agency for wildlife response and formal handover occurs. Following formal handover, Santos will function as a support organisation for the OWR and will be expected to continue to provide planning and resources as required.

Table 15-2: Jurisdictional and control agencies for oiled wildlife response

Jurisdictional boundary	Spill source	Jurisdictional Authority for OWR	Control agency		Relevant Documentation
			Level 1	Level 2/3	
Commonwealth waters (3 to 200 nautical miles from territorial/state sea baseline)	Vessel	DCCEEW	AMSA		Western Australian Oiled Wildlife Response Plan (WAOWRP) Western Australia Oiled Wildlife Response Manual Santos Oiled Wildlife Response Framework Plan (7700-650-PLA-0017)
	Petroleum activities		Titleholder		
Western Australian (WA) state waters (State waters to 3 nautical miles and some areas around offshore atolls and islands)	Vessel	DBCA	WA DoT[34]		
	Petroleum activities		Titleholder	WA DoT	

15.2 Wildlife priority protection areas

For planning purposes, determination of wildlife priority protection areas is based on stochastic modelling of the worst-case spill scenarios, the known presence of wildlife, and in consideration of the following:

- presence of high densities of wildlife, threatened species, and/or endemic species with high site fidelity
- greatest probability and level of contact from floating oil and/or shoreline accumulation
- shortest timeframe to contact

The wildlife priority protection areas for Reindeer and Devil Creek operations are outlined in Table 15-3 and align with the priority protection sites for spill response described in Section 6.6. Onshore environmental sensitivities at the DCGP site and priorities for protection are given in Section 6.6.2.

Depending on the timing of a potential hydrocarbon spill, certain species could be more impacted because of key seasonal biological activities such as breeding, mating, nesting hatching or migrating. Table 15-4 provides further detail of key wildlife activities in the Pilbara/Kimberley regions and the corresponding time of year.

Table 15-3: Wildlife priority protection areas (summary information based on EPs [EA-60-RI-00186 and EA-60-RI-10003])

Wildlife priority protection area	Key locations / fauna type	Reason
Northern Islands Coast	Turtles, birds and marine mammals	• Turtle nesting and breeding sites in many of the islands in this region. • Seabird nesting, including pelican (*Pelecanus sp.*), wedge-tailed shearwater (*Puffinus pacificus*) and pied cormorant (*Phalacrocorax varius*). • Seagrass beds surrounding many small islands, including Regnard Islands, likely to support foraging dugongs (*Dugong dugon*).
Dampier Archipelago	Turtles: • Enderby Island, Rosemary Island, Keast Island, Legendre Island, Delambre Island, Dixon Island, Bells Beach, Cooling Water Beach	• Hawksbill turtle (*Eretmochelys imbricata*), green turtle (*Chelonia mydas*) and flatback turtle (*Natator depressus*) nesting and breeding • Delambre and Legendre beaches are particularly important for flatback turtle.

[34] *If an OWR is required in WA State waters, the DBCA is responsible for the administration of the Western Australian Oiled Wildlife Response Plan (WAOWRP) under the direction of the DoT.*

Wildlife priority protection area	Key locations / fauna type	Reason
	Marine mammals and birds	• Dugongs (*Dugong dugon*) • Humpback whale (*Megaptera novaeangliae*) nursery area • Seabirds including little corella (*Cacatua sanguinea*), boobies (*Sula* sp.) and noddys (*Anous* sp.). • Keast Island provides one of the few nesting sites for pelican (*Pelecanus sp.*) in WA.

Table 15-4: Key wildlife activities in the Pilbara/Kimberley regions and corresponding time of year

Wildlife type	Activity	Period
Humpback whales	Migration pathway to and from Kimberley calving grounds	Peak between Jun-Aug
Dugong	Breeding Mating	Mar-Aug Aug-Mar
Marine turtles	Nesting Hatching	Sep-Dec Jan-April
Shorebirds	Migratory pathway stop-over	Sep-Apr

15.3 Magnitude of wildlife impact

Given the distribution and behaviour of wildlife in the marine environment, a spill which only impacts offshore waters is likely to result in limited opportunities to rescue wildlife. In such instances, continued wildlife reconnaissance, carcass recovery, sampling of carcasses that cannot be retrieved and scientific monitoring are more likely to be the focus of response efforts. In contrast, a spill which results in shoreline accumulation is likely to result in far greater wildlife impacts and opportunities to rescue wildlife.

The oil spill modelling for the worst-case spill scenarios for the Reindeer/DC activities predicts that the greatest accumulation of oil will occur at Montebello Islands, Northern Islands Coast, Lowendal Islands and Dampier Archipelago. Using the WAOWRP (DBCA 2022a) Guide for Rating the Wildlife Impact of an Oil Spill (Table 15-5), and stochastic modelling for the worst-case spill scenarios (Section 6.3), it is predicted that high wildlife impacts have the potential to occur as a result of a worst-case spill scenario associated with this activity.

Table 15-5: WAOWRP Guide for rating the wildlife impact of an oil spill

Wildlife Impact Rating	Low	Medium	High
What is the likely duration of the wildlife response?	< 3 days	3-10 days	>10 days
What is the likely total intake of animals?	< 10	11-25	>25
What is the likely daily intake of animals?	0-2	2 to 5	>5
Are threatened species, or species protected by treaty, likely to be impacted, either directly or by pollution of habitat or breeding areas?	No	Yes – possible	Yes – likely
Is there likely to be a requirement for building primary care facility for treatment, cleaning and rehabilitation?	No	Yes – possible	Yes – likely

Source: DBCA (2022)

15.4 Implementation guidance

Refer to Section 6 of the Santos Oiled Wildlife Response Framework Plan (7700-650-PLA-0017) for guidance on the tasks and responsibilities that should be considered when implementing an OWR when Santos is the Control Agency or prior to formal hand over to the relevant Control Agency. The implementation guidance within the Oiled Wildlife Response Framework Plan (7700-650-PLA-0017) includes:

- Record keeping

- Situational awareness
- Activation of Santos IMT Wildlife Branch
- Notifications
- Santos Oiled Wildlife Rapid Assessment Teams (RATs)
- Wildlife Reconnaissance
- Santos Oiled Wildlife Sample Collection Protocol
- Wildlife Reconnaissance
- Mobilisation of required resources
- Handover to external Control Agency (if relevant).

The OWR first strike plan will focus on notifications, wildlife reconnaissance and response preparation (refer to Section 6.1 of the Santos Oiled Wildlife Response Framework Plan [7700-650-PLA-0017]). Refer to Table 15-6 for an indicative timeframe and Appendix P for resource capability. Preventative actions, such as hazing, along with capture, intake and treatment require a higher degree of planning, approval (licences) and skills and will be planned for and carried out under the wildlife portion of the IAP (refer to Section 6.2 of the Santos Oiled Wildlife Response Framework Plan [7700-650-PLA-0017]).

Table 15-6: Oiled wildlife response – first strike response timeline

Task	Time from oiled wildlife contact (predicted or observed)
IMT notifies regulatory authorities and AMOSC of oiled wildlife / potential for contact	<2 hours
Mobilise Santos personnel for oiled wildlife reconnaissance (this will be already occurring through Aerial Observer mobilisation and Shoreline Assessment Team mobilisation)	<24 hours
Mobilisation of AMOSC oiled wildlife equipment and industry OWR team to forward staging area	<48 hours
Minimum Resource Requirements	
The requirements for oiled wildlife response will be situation specific and dependent upon reconnaissance reports. First strike resources: • Reconnaissance platforms (Refer to Santos Oiled Wildlife Framework Plan (7700-650-PLA0017) and Appendix P) • 6 x trained industry oiled wildlife response team personnel (AMOSC staff & contractors/ AMOSC Industry OWR group) Additional resources: • Refer to Santos Oiled Wildlife Response Framework Plan (7700-650-PLA-0017) • Refer to Appendix P for information on OWR capability and equipment	

15.5 Environmental performance

Table 15-7 indicates the environmental performance outcome, control measures, performance standards and measurement criteria for this response strategy.

Table 15-7: Environmental performance – oiled wildlife response

Environmental performance outcome	Implement tactics in accordance with the Santos Oil Wildlife Response Framework Plan (7700-650-PLA-0017) to prevent or reduce impacts, and to humanely treat, house, and release or euthanise wildlife		
Response strategy	**Control measures**	**Performance standards**	**Measurement criteria**
Oiled Wildlife Response	**Response preparedness**		
	Access to oiled wildlife response equipment and personnel	[EPS-OWR-001] Access to oiled wildlife response equipment and personnel through Santos, AMOSC, AMSA	Access to National Plan resources through AMSA
			AMOSC Participating Member Contract.

Environmental performance outcome	Implement tactics in accordance with the Santos Oil Wildlife Response Framework Plan (7700-650-PLA-0017) to prevent or reduce impacts, and to humanely treat, house, and release or euthanise wildlife		
Response strategy	**Control measures**	**Performance standards**	**Measurement criteria**
		National Plan and OSRL maintained throughout activity as per Appendix P.	OSRL Associate Member Contract.
	Santos Oiled Wildlife Framework Plan (7700-650-PLA-0017)	[EPS-OWR-005] Santos Oiled Wildlife Response Framework Plan (7700-650-PLA-0017) provides guidance for coordinating an OWR when Santos is the Control Agency and outlines Santos' response arrangements	Santos Oiled Wildlife Framework Plan (7710-650_PLA-0017) Revision records
	Access to labour hire personnel	[EPS-OWR-003] Maintenance of contract with labour hire provider	Labour hire contract
	Labour hire onboarding procedure to access labour hire personnel	[EPS-OWR-004] Maintenance of an onboarding procedure for oil spill response labour hire	Onboarding procedure
	Access to Santos trained oiled wildlife response personnel	[EPS-OWR-002] Maintain Santos personnel trained on OWR and positioned at Perth and VI	Training records
	Response implementation		
	First strike capability mobilised	[EPS-OWR-006] First strike is mobilised in accordance with details and timings as specified in Table 15-6 unless directed otherwise by relevant Control Agency	Incident log
	OWR Management	[EPS-OWR-007] OWR managed in accordance with the Santos Oiled Wildlife Framework Plan (7700-650-PLA-0017)	Incident log
	Prepare operational NEBA prior to operations commencing	[EPS-OWR-008] Prepare operational NEBA to determine magnitude of wildlife impact and determine if OWR activities are likely to result in a net environmental benefit (particularly in relation to hazing and pre-emptive capture). Operational NEBA to be undertaken each operational period.	IAP; Incident log
	IAP Oiled Wildlife Response Sub-plan developed, including waste management, to provide oversight and management of OWR operations	[EPS-OWR-009] IAP Oiled Wildlife Response Sub-plan is developed to ensure effective, coordinated execution with the Santos Oiled Wildlife Framework Plan (7700-650-PLA-0017) and minimise environmental impacts from response	Incident log indicates IAP Oiled Wildlife Response Sub-plan prepared prior to oiled wildlife response operations commencing
	Oiled Wildlife Sample Collection Protocol	[EPS-OWR-010] Oiled wildlife sample collection carried out in accordance with the Santos Oiled Wildlife Sample Collection Protocol	Incident log

16. Operational and scientific monitoring

OSM is a key component of the environmental management document framework for offshore petroleum activities, which includes activity EPs and OPEPs. Operational monitoring is instrumental in providing situational awareness of a hydrocarbon spill, enabling the IMT to mount a timely and effective spill response and continually monitor the effectiveness of the response. Scientific monitoring is also the principal tool for determining the extent, severity and persistence of environmental impacts from a hydrocarbon spill and for informing resultant remediation activities.

Santos has developed a North West Shelf OSM-BIP (7715-650-ERP-0002) which describes a program of monitoring oil pollution that will be adopted in the event of a hydrocarbon spill incident (Level 2–3) to marine waters. It aligns with the Joint Industry Operational and Scientific Monitoring Framework (APPEA, 2021) and describes how this Framework applies to Santos activities and spill risks for the geographic extent of the North West Shelf OSM-BIP (7715-650-ERP-0002). The relationship between the Joint Industry OSM Framework and Santos environmental management framework is illustrated in Figure 16-1.

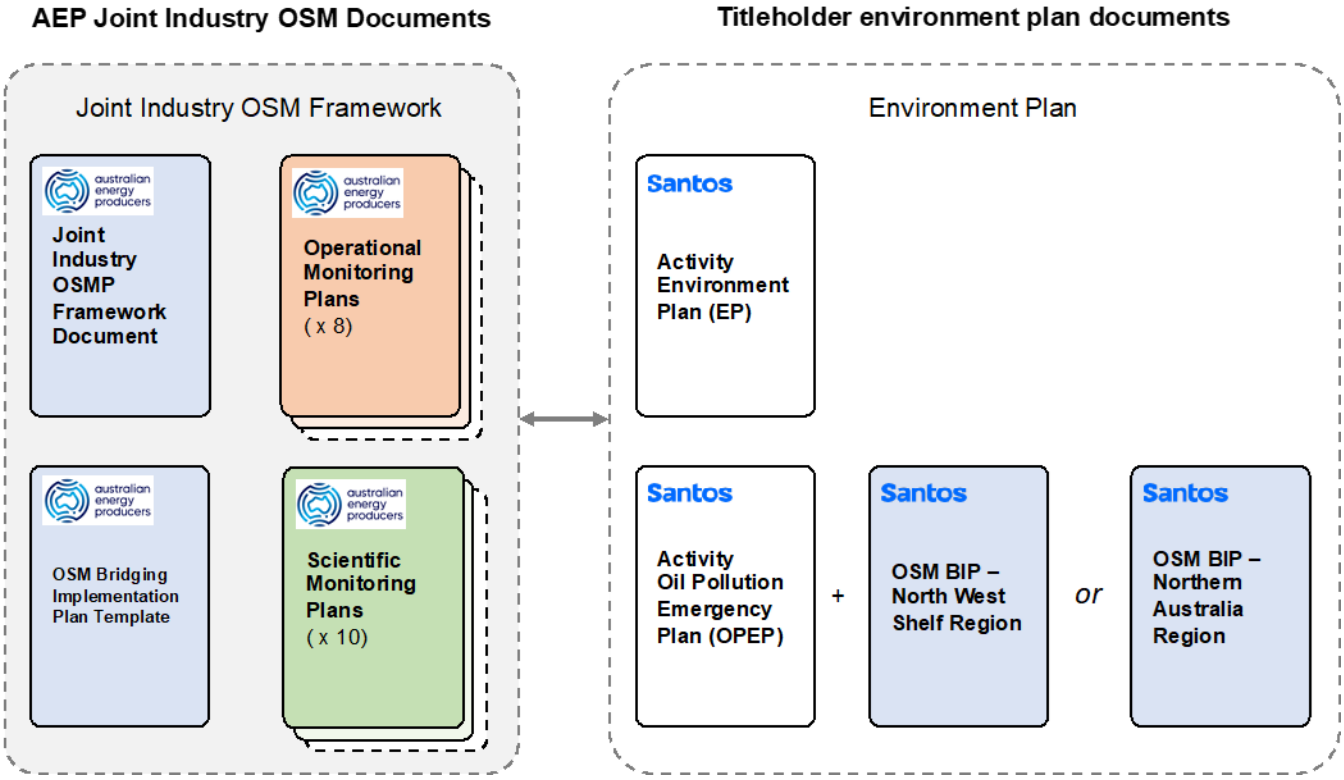

Figure 16-1: Relationship of Joint Industry and Titleholder OSM Documentation

The Northern Australia OSM-BIP is structured so that it can provide a flexible framework that can be adapted to individual spill incidents. A series of Operational Monitoring Plans (OMPs) and Scientific Monitoring Plans (SMPs) form part of the Joint Industry OSM Framework and provide detail on monitoring design, standard operating procedures, data management, quality assurance and quality control and reporting.

There are two types of monitoring that would occur following a Level 2–3 spill event:

- **Operational Monitoring** – which is undertaken during the course of the spill and includes any physical, chemical and biological assessments that may guide operational decisions such as selecting the appropriate response and mitigation methods and / or to determine when to terminate a response activity. This monitoring is additional to the activities (aerial/vessel surveillance, tracking buoys, oil spill trajectory modelling and satellite tracking) performed as part of the Monitor and Evaluate Strategy (Section 10). The design of operational monitoring requires judgements to be made about scope, methods, data inputs and outputs that are specific to the individual spill incident, balancing the operational needs of the response with the logistical and time constraints of gathering and processing information. Information needs to be collected and processed rapidly to suit response needs, with a lower level of sampling and accuracy needed than for scientific purposes. For details on initiation and termination criteria for OMPs refer to the North West Shelf OSM-BIP (7715-650-ERP-0002).
- **Scientific Monitoring (SM)** – which can extend beyond the termination of response operations. Scientific monitoring has objectives relating to attributing cause-effect interactions of the spill or associated response with changes to the surrounding environment. SM will be conducted on a wider study area, extending beyond the

spill footprint, will be more systematic and quantitative, and aim to account for natural or sampling variation. For further details on the SMPs refer to the OSM-BIP.

Table 16-1 lists the Joint Industry OMPs and SMPs that are relevant to this OPEP.

The North West Shelf OSM-BIP (7715-650-ERP-0002) is tailored to Santos' activities on the north west shelf. It includes details on priority locations for monitoring, resourcing requirements; and operational guidance including logistics, mobilisation and permitting; with the exception of capability requirements for OMP: Shoreline Clean-up Assessment. The capability requirements for OMP: Shoreline Clean-up Assessment are typically assessed for each activity, according to deterministic modelling for the worst-case scenario that shows the simulation with the longest length of shoreline contacted, as this criterion influences the number of assessment teams required. Resourcing requirements for OMP: Shoreline Clean-up Assessment for this OPEP activity are provided in Appendix M.

The capability assessment for the remaining OMPs and SMPs is assessed against different deterministic modelling criteria, as described in the North West Shelf OSM-BIP (7715-650-ERP-0002). The North West Shelf OSM-BIP (7715-650-ERP-0002) describes the methodology for assessing the worst-case OSM capability requirements for Santos activities in this region. In summary, Santos assessed the worst-case spill scenario for OSM capability as the scenario contacting the most receptors at the low thresholds at a probability >5% and within 7 days. Santos confirms that all the Reindeer and Devil Creek spill scenarios (Section 6.1) fit within the OSM combined EMBA and assessment criteria defined within Appendix A of the North West Shelf OSM-BIP (7715-650-ERP-0002). Further, receptors contacted are all included within the baseline priority list in Section 2.2 of the North West Shelf OSM-BIP (7715-650-ERP-0002). This assessment is detailed in Appendix N.

Santos will review the initiation criteria for OMPs and SMPs (provided in Table 9-1 (OMPs) and Table 9-2 (SMPs) of the Joint Industry Operational and Scientific Monitoring Framework (APPEA, 2021) when preparing the initial IAPs, and subsequent IAPs. If any initiation criteria are met, then that relevant OMP and/or SMP will be activated via the OSM Services Provider.

Table 16-1: Joint Industry Operational and Scientific Monitoring Plans relevant to the activity

Operational monitoring	Relevant for this OPEP	Scientific Monitoring	Relevant for this OPEP
Hydrocarbon Properties and Weathering Behaviour at Sea	✓	Water Quality Impact Assessment	✓
Water Quality Assessment	✓	Sediment Quality Impact Assessment	✓
Sediment Quality Assessment	✓	Intertidal and Coastal Habitat Assessment	✓
Surface chemical dispersant effectiveness and fate assessment	✓	Seabirds and Shorebirds Assessment	✓
Subsea chemical dispersant effectiveness and fate assessment	✓	Marine Mega-fauna Assessment	✓
Rapid Marine Fauna Surveillance	✓	Benthic Habitat Assessment	✓
Shoreline Clean-up Assessment	✓	Marine fish and elasmobranch assemblages assessment	✓
-	-	Fisheries Impact Assessment	✓
-	-	Heritage Features Assessment	✓
-	-	Social Impact Assessment	✓

16.1 Environmental performance

Table 16-2 indicates the environmental performance outcomes, control measures, performance standards and measurement criteria for operational and scientific monitoring.

Table 16-2: Environmental performance – operational and scientific monitoring

Environmental performance outcome	Implement monitoring programs to monitor the effectiveness of control measures and inform response activities; and assess and report on the impact, extent, severity, persistence and recovery of sensitive receptors contacted by a spill or affected by spill response		
Response strategy	**Control measures**	**Performance standards**	**Measurement criteria**
Response preparedness			
Operational and Scientific monitoring – Preparedness	Maintenance of OSM Services Provider (MSP) contract	[EPS-OSM-002] Maintain contracts with third-party provider/s to provide access to suitably qualified and competent personnel and equipment to assist in the implementation of monitoring	Contract with OSM services provider
	OSM Services Provider capability verified through regular capability reporting	[EPS-OSM-003] Obtain monthly capability reports from OSM services provider to demonstrate suitable resources are available throughout the activity	Monthly capability reports from OSM Services Provider
	Adequacy of existing baseline data sources across the Santos combined EMBA reviewed periodically	[EPS-OSM-004] Regular review of existing baseline data	Baseline data review report
	Water quality monitoring vessels	[EPS-OSM-006] Maintenance of vessel specification for water quality monitoring vessels within Santos Vessel Requirements for Oil Spill Response (7710-650-ERP-0001)	Vessel specification
	Pre-completed risk assessment for operational and scientific monitoring activities	[EPS-OSM-016] Pre completed and approved risk assessment is in place with the OSM Services Provider for operational and scientific monitoring activities	OSM Services Provider pre-completed and approved risk assessment
	Access to Santos oil sampling kits	[EPS-OSM-001] Oil sampling kits pre-positioned at Exmouth, Dampier and Varanus Island. Equipment contents as per the Santos Oil and Water Sampling Procedures (7710-650-PRO-0008) Appendix C.	Evidence of deployment to site
	OSM Services Provider testing and exercising	[EPS-OSM-005] Annual testing of OSM Services Provider arrangements and capability	Exercise and testing records
	OSM-BIP reviewed annually	[EPS-OSM-030] Annual review of OSM-BIP	Record of revision
Response implementation			
Operational and Scientific monitoring – Activation and Mobilisation	Activate Operational and Scientific Monitoring Plans	[EPS-OSM-010] OMPs and SMPs will be activated in accordance with the initiation criteria provided in Table 9-1 and 9-2 of the Joint Industry	Incident Action Plan and Incident Log confirm OMPs and SMPs are activated in accordance with the initiation criteria provided in Table 9-1 and

Environmental performance outcome	Implement monitoring programs to monitor the effectiveness of control measures and inform response activities; and assess and report on the impact, extent, severity, persistence and recovery of sensitive receptors contacted by a spill or affected by spill response		
Response strategy	**Control measures**	**Performance standards**	**Measurement criteria**
		OSM Framework (APPEA, 2021)	9-2 of the Joint Industry OSM Framework (APPEA, 2021)
	Activation of operational and scientific monitoring plans according to OMPs and SMPs initiation criteria	[EPS-OSM-009] Initiation criteria of OMPs and SMPs will be reviewed during the preparation of the initial Incident Action Plan (IAP) and subsequent IAPs; and if any criteria are met, relevant OMPs and SMPs will be activated	IAP/s Incident log
	OSM BIP	[EPS-OSM-025] Monitoring to be conducted in accordance with the Santos North West Shelf OSM-BIP (7715-650-ERP-0002.)>	Incident log; Monitoring records
	OSM implementation Minimum Standards	[EPS-OSM-026] Implementation of operational and scientific monitoring will comply with the Minimum Standards listed in Appendix A of the Joint Industry OSM Framework (APPEA, 2021)	Incident log; Monitoring records
	OSM Services Provider to commence activation within specified time from initial notification	[EPS-OSM-011] OSM services provider shall commence activation process within 30 mins of initial Call-off Order form being received from Santos	OSM services provider records
	Santos to provide support to OSM Services Provider	[EPS-OSM-012] Santos personnel to support OSM services provider through the provision of monitor and evaluate information and relative location of sensitive receptors to the spill	Incident log; OSM services provider records
	Mobilisation of appropriately specified monitoring vessels	[EPS-OSM-017] Source monitoring vessel(s) with specification in accordance with Section 5.2 of Santos Vessel Requirements for Oil Spill Response (7710-650-ERP-0001)	Incident log
Operational and Scientific monitoring – Water quality and dispersant amenability	Ecotoxicity testing of oil samples to take place	[EPS-OSM-007] Oil samples collected to be sent for laboratory ecotoxicity testing of oil	Incident log
	Ecotoxicity testing to derive species protection triggers	[EPS-OSM-008] 90, 95 and 99% Species protection triggers levels will be derived from ecotoxicity testing results (minimum five species' tests) within 24 hours of receiving all results	Ecotoxicity report from environmental contractor
	Dispersant amenability analysis of oil samples to take place	[EPS-OSM-029] If applicable (not MDO), oil samples sent to laboratory for dispersant amenability	Incident Log

Environmental performance outcome	Implement monitoring programs to monitor the effectiveness of control measures and inform response activities; and assess and report on the impact, extent, severity, persistence and recovery of sensitive receptors contacted by a spill or affected by spill response		
Response strategy	**Control measures**	**Performance standards**	**Measurement criteria**
Operational and Scientific monitoring – Shoreline assessment and nearshore operations	Use of shallow draft vessels for shoreline and nearshore operations	[EPS-OSM-020] Shallow draft vessels are used for shoreline and nearshore operations unless directed otherwise by the relevant Control Agency	Vessel specification documentation contained in IAP
	Shoreline clean-up assessment direction and leadership	[EPS-OSM-018] OMP: Shoreline Clean-up Assessment will be implemented under the direction of the relevant Control Agency	Incident log
	SCAT Field Coordinator assessment/selection of vehicle appropriate to shoreline conditions	[EPS-OSM-021] SCAT Field Coordinator assess/select vehicles appropriate to shoreline conditions	IAP demonstrates requirement is met
	Conduct shoreline/ nearshore habitat/ bathymetry assessment	[EPS-OSM-022] Unless directed otherwise by the designated Control Agency, a rapid shoreline/ nearshore habitat/ bathymetry assessment is conducted prior to nearshore activities	IAP records; Assessment records
	Establish demarcation zones for vehicle and personnel movement considering sensitive vegetation, bird nesting/ roosting areas and turtle nesting habitat	[EPS-SM-023] Unless directed otherwise by the designated Control Agency, demarcation zones are mapped out in sensitive habitat areas	IAP demonstrates requirement is met
	Operational restriction of vehicle and personnel movement to limit erosion and compaction	[EPS-OSM-024] Unless directed otherwise by the designated Control Agency, action plans for shoreline operations include operational restrictions on vehicle and personnel movement	IAP demonstrates requirement is met
	Daily SCAT reports issued during SCAT operations	[EPS-OSM-019] Reports from OMP: Shoreline Clean-up Assessment will be provided to the IMT daily, detailing the assessed areas to maximise effective utilisation of resources	Incident log
Operational and Scientific monitoring – Stand-down and termination	Stand-down, termination and post-spill activities	[EPS-OSM-027] Once post-spill SMP monitoring reports are drafted they will be peer reviewed by an expert panel	Monitoring records
	Stand-down, termination and post-spill activities	[EPS-OSM-028] OMPs and SMPs will be terminated in accordance with the termination criteria provided in Tables 9-1 and 9-2 of the Joint Industry OSM Framework (APPEA, 2021)	Incident Action Plan and Incident Log confirm OMPs and SMPs are terminated in accordance with the termination criteria provided in Tables 9-1 and 9-2 of the Joint Industry OSM Framework (APPEA, 2021)

17. Waste management

Table 17-1 lists the environmental performance outcome, initiation and termination criteria for this strategy.

Table 17-1: Waste management – environmental performance outcome, initiation criteria and termination criteria

Environmental performance outcome	Comply with waste treatment, transport and disposal regulations and prevent secondary contamination while reducing, reusing and recycling waste where possible	
Initiation criteria	Response activities that will be generating oily waste have been initiated.	
Applicable hydrocarbons	**Reindeer Condensate**	**MDO**
	✓	✓
Termination criterion	• All waste generated from the oil spill response has been stored, transported and disposed as per the regulatory requirements; and • Agreement is reached with Jurisdictional Authorities to terminate the response	

17.1 Overview

The implementation of some spill response strategies will generate solid and liquid waste that will require rapid management, storage, transport and disposal. It is important that waste is collected and removed quickly to ensure waste management does not create a bottleneck in response operations.

The type and amount of waste generated during a spill response will vary depending on the spill type/characteristics, volume released, and response strategies implemented. To account for this potential variability, waste management (including handling and capacity) needs to be scalable to allow a continuous response to be maintained.

Where Santos is the Control Agency, or at the request of the designated Control Agency, Santos will engage its contracted Waste Service Provider (WSP) to provide sufficient waste receptacles to store collected waste and manage oily waste collection, transport and disposal associated with spill response activities. The WSP will arrange for all personnel, equipment and vehicles to carry out these activities from nominated collection points to licensed waste management facilities. All transport will be undertaken via controlled-waste-licensed vehicles and in accordance with the Environmental Protection (Controlled Waste) Regulations 2004. Santos' Oil Pollution Waste Management Plan (7715-650-ERP-0001) provides detailed guidance to the WSP in the event of a spill.

Where DoT is the Control Agency, Santos will provide a Deputy Waste Management Coordinator to the DoT IMT Logistics Unit to support the DoT IMT in coordinating waste management services (as per

Table 5-5).

17.2 Implementation guidance

Table 17-2 provides guidance to the IMT on the actions and responsibilities that should be considered when selecting this strategy. The Incident Commander is ultimately responsible for implementing the response, and may therefore determine that some tasks be varied, should not be implemented or be reassigned.

Table 17-2: Implementation guidance – waste management

Action		Consideration	Responsibility	Complete
Initial Actions	Contact WSP (Primary or Secondary Contact Person) and activate Waste Project Manager.	Refer to Incident Response Contacts Directory (SO-00-ZF-00025.020) for contact details.	Logistics Section Chief	☐
	Based on operational modelling and applicable response strategies communicate the type and quantity of empty liquid and solid waste receptacles required to support planned operations.	It is better to overestimate volumes and scale back resources then to underestimate waste volumes.	Logistics Section Chief Planning Section Chief	☐
	Using most recent monitor and evaluate data and any existing and future response activities, determine most suitable locations for waste receptacles to be positioned and for temporary storage locations to be established.	Shoreline waste collection points (temporary storage site) will be determined by the DoT and will depend upon the location of shoreline clean-up activities and staging areas and the availability of vehicle access routes. Consideration would be given to positioning receptacles and locating temporary storage sites to ensure secondary contamination of sensitive receptors is avoided or minimised. The approval of temporary storage sites would be given through Department of Water and Environmental Regulation (DWER).	Logistics Section Chief Planning Section Chief Environment Unit Leader	☐
	For each receival location indicate the anticipated: • material types • material generation rates • material generation quantities • commencement date/time • anticipated clean-up duration • receptacle types required • logistical support requirements • any approvals required from Ports, Local Governments, Landowners, State Government Agencies (Refer to *Oil Pollution Waste Management Plan* [7715-650-ERP-0001]).	Consider facilities for waste segregation at source.	Logistics Section Chief Planning Section Chief	☐
	Once the above information is obtained, ensure all necessary waste management information is included in the IAP.	Waste management should be conducted in accordance with Santos' *Oil Pollution Waste Management Plan* (7715-650-ERP-0001); and where relevant, the DoT *Waste Management Guidelines*, and the respective Port, Port Operator and/or Ship Owner's waste management plan.	Logistics Section Chief Planning Section Chief Deputy Waste Management Coordinator (DoT IMT) WSP Operations Supervisor	☐

Action		Consideration	Responsibility	Complete
	Mobilise waste management resources and services to agreed priority locations.	-	WSP Operations Supervisor Logistics Section Chief Deputy Waste Management Coordinator (DoT IMT)	☐
Ongoing Actions	Provide ongoing point of contact between IMT and WSP.	If DoT is the Control Agency, the Deputy Waste Management Coordinator shall be the point of contact between DoT and the WSP.	Deputy Waste Management Coordinator (DoT IMT) Logistics Section Chief	☐
	Ensure all waste handling, transport and disposal practices comply with legislative requirements.	Alert Logistics Section Chief (or delegate) if any non-compliance is anticipated or detected. Site clean-up, removal and disposal of response waste should be conducted in accordance with Santos' Oil Pollution Waste Management Plan (7715-650-ERP-0001); and where relevant, the DoT Waste Management Guidelines, and the respective Port, Port Operator and/or Ship Owner's waste management plan.	WSP Operations Supervisor	☐
	Ensure records are maintained for all waste management activities, including but not limited to: • waste movements (including types of receptacles, receival points, temporary storage points, final disposal locations) • volumes generated at each site (including total volume and generation rates) • types of waste generated at each site • approvals obtained (as required).	-	WSP Operations Supervisor	☐

17.3 Waste approvals

Site clean-up, removal and disposal of response waste should be conducted in accordance with Santos' Oil Pollution Waste Management Plan (7715-650-ERP-0001); and where relevant, the DoT Waste Management Guidelines, and the respective Port, Port Operator and/or Ship Owner's waste management plan. In addition, regulatory approval may be required for the temporary storage, transport, disposal and treatment of waste, through the Department of Water and Environmental Regulation (DWER).

DWER administers the *Environmental Protection Act 1986* (WA) and is the relevant regulatory authority for waste management in WA. The Santos Oil Pollution Waste Management Plan (7715-650-ERP-0001) provides detail on the regulatory requirements for each port/location likely to be used for waste management during any spill response operation associated with Santos' activities.

If required, DoT may establish an Operational Area Support Group (OASG), as defined in the SHP-MEE, to request support from relevant WA Government Agencies, including DWER, during a State waters spill response. The Santos' Waste Management Plan – Oil Spill Response Support (7715-650-ERP-0001) provides detail on the regulatory requirements for each port/location likely to be used for waste management during any spill response operation associated with Santos' activities.

17.4 Waste service provider capability

Detailed guidance on Santos' WSP responsibilities for spill response waste management is provided in the Santos Oil Pollution Waste Management Plan (7715-650-ERP-0001).

Key responsibilities of the WSP include:

- Maintain emergency response standby preparedness arrangements, including:
  - Access to personnel, equipment and vehicles required for a first strike and ongoing response commensurate to Santos worse case spill and waste requirements
  - Provide primary and secondary contact details for activation of NWA's spill response waste management services
  - Access to suitably trained personnel for completing critical tasks in spill response waste management
  - Participate in exercising undertaken by Santos.
- Maintain ability to assist in the Control Agency's IAP and Waste Management Sub-plan process as required.
- Mobilise resources to waste collection points identified by the Control Agency.
- Ensure waste handling, transport and disposal practices meet legislative requirements.
- Keep auditable records of waste streams from collection points to final disposal points.
- Provide regular progress reporting to the Control Agency IMT and a final report relating to quantities and destinations of collected waste.
- Provide a project manager responsible for the rollout of spill response resources to meet spill response waste management objectives.
- Provide location specific Operations Supervisor/s to handle on-site operational aspects (management of personnel and equipment, reporting, liaison with relevant field-based spill responders)

17.5 Waste management resources

Santos has access to capacity to deliver storage receptacles, remove, transport and dispose of all waste material from oil spill response activities to predetermined disposal points.

Table 17-3 provides the capability of the waste service provider for waste removal and storage, which is in excess of the waste management requirements for spill response activities associated with this OPEP. The weekly removal capacity is 8,778 m^3. From stochastic modelling and using a bulking factor of 10, the maximum waste collected during shoreline clean-up is from Scenario 6 (MDO spill resulting from a vessel collision at the HDD Crossing (325 m^3), conservatively estimated at 2,080 m^3 in total (refer to Table 13-5). The maximum accumulation including a conservative bulking factor, evaluated in shoreline clean-up Section 13.4 is exceeded by the waste service provider total removal capacity specified in Table 17-3.

Table 17-3: North West Alliance vehicle and equipment availability

Plant and Equipment	No	Capacity	Functionality	Uses per week	Waste stored/shifted per week (m^3)
Waste removal					
Oily waste					
Skip lift truck	14	Lift up to 10 t, 4.3 m^3 per service	Servicing of skip bins	7	420
Front lift truck	10	28 m^3 body, 11.2 m^3 per service	Servicing of front lift bins	7	784
Side loading truck	10	18 m^3 body, 7.2 m^3 per service	Servicing of MGB's	7	504
Hook lift truck	8	Lift up to 15 t, 17.5 m^3 per service	Servicing of hook lift bins	7	980
Flat bed truck	16	15 pallet spaces, 17.5 m^3 per service	Servicing of bins	7	840
Liquid oil					
Liquid waste tankers (triple 'road-train' configuration)	10	75 m^3 capacity	Collection of liquid waste at the port of reception (Dampier)	7	5,250
Waste storage					
Oily waste					
ISO-tainers	15	22 m^3 capacity	Various waste streams	2	660
MGBs	500	240L	Mobile bins	2	240
Offshore 8 pack Lifting Cradle (MGBs)	2	16 x 240L MGBs	Able to remove 16 x 240L MGBs simultaneously	continuous	
Lidded bins	6	1,100L	contain various waste streams	2	13
Front lift bins	50	3 m^3	various waste streams	2	300
Front lift bins	25	4.5 m^3	various waste streams	2	225
Offshore rated front lift bins	100	3 m^3	various waste streams	2	600
Offshore rated skip bins	45	7 m^3	various waste streams	2	630
Marrell skip bins (onshore)	60	6–9 m^3, assumed 8 m^3 per service	various waste streams	2	960
Hook lift bins	12	15–30 m^3, assumed 23 m^3 per service	various waste streams	25	6,900
Forklift	4	4 t forklift	All areas	continuous	
Weekly waste storage capacity					**10,528**
Weekly total waste removal capacity					**8,778**
Weekly liquid oil removal capacity					**5,250**

Source: As per Oil Pollution Waste Management Plan (7715-650-ERP-0001)

17.6 Environmental performance

Table 17-4 indicates the environmental performance outcome, control measures, performance, standards and measurement criteria for the response strategy.

Table 17-4: Environmental performance – waste management

Environmental Performance Outcome	Comply with waste treatment, transport and disposal regulations and prevent secondary contamination while reducing, reusing and recycling waste where possible.		
Response strategy	**Control measures**	**Performance standards**	**Measurement criteria**
Waste management	**Response preparedness**		
	Access to waste management equipment, personnel, transport and disposal facilities	[EPS-WM-001] Waste management sourced through contract with waste service provider. Contract with waste service provider to be maintained throughout activity.	Contract with WSP for emergency response services Annual desktop assurance report.
	Access to vessels for waste transport	[EPS-WM-002] MSAs with multiple vessel providers maintained throughout activity.	MSAs with vessel providers
	Response Implementation		
	Implement Oil Pollution Waste Management Plan (7715-650-ERP-0001)	[EPS-WM-004] WSP shall: Appoint a Project Manager within 24 hours of activation Track all wastes from point of generation to final destination Provide monthly waste management reports and more regular situation reports during the response until termination criteria are met	Incident Log; Waste tracking records
		[EPS-WM-007] WSP to provide waste bins for oil and oily waste for shoreline clean-up operations to clean-up site or deployment port, if requested, within 24 hours	Incident log
	Compliance with controlled waste, unauthorised discharge and landfill regulations	[EPS-WM-008] Waste handling and disposal compliant with: - Environmental Protection (Rural Landfill) Regulations 2002 - Environmental Protection (Unauthorised Discharges) Regulations 2004 - Environmental Protection (Controlled Waste) Regulations 2004	Waste tracking records demonstrate requirement is met

18. Response termination

The decision to terminate the spill response is made in consultation with the relevant Control Agency/s, Jurisdictional Authorities and other Statutory Authorities that play an advisory role. This decision will be made with consideration of:

- the efficacy and benefit of current response options
- any potential for additional pollution
- any potential for additional environmental damage caused by further clean-up efforts
- an assessment of prevailing weather conditions that can increase risk to response teams or increase the efficacy in weathering hydrocarbon.

An operational NEBA will be conducted to inform the decision-making process. Termination criteria are defined within each section of contingency response activities defined within the OPEP.

Upon conclusion of the spill response activity, Santos will:

- prepare detailed reports and collate all documents
- report on the performance objectives of each individual spill response that was mobilised
- undertake an inventory of consumables and prepare accounts
- arrange for the return of equipment
- arrange for the refurbishment of consumed equipment
- conduct an investigation into the cause of the incident and report to relevant authorities
- assess long-term scientific monitoring requirements.

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Appendix A Hydrocarbon characteristics and behaviour

Marine diesel oil (MDO)

ITOPF (2023) and RPS (2024) categorise MDO as a Group II light persistent oil. The physical characteristics of MDO are summarised in Table A-1. In the marine environment, a 5% residual of the total quantity of MDO spilt will remain after the volatilisation and solubilisation processes associated with weathering, which will decay slowly over time.

The MDO has a density of 890.0 kg/m^3 at 15ºC (API of 27.5) and a low pour point of -9.0°C. The low viscosity (14.0 cP at 25°C) indicates that this oil will spread quickly when released and will form a thin to low thickness film on the sea surface, increasing the rate of evaporation.

Generally, about 4% of the MDO mass should evaporate within the first 12 hours (BP < 180°C); a further 32% should evaporate within the first 24 hours (180°C < BP < 265°C); and an additional 54% should evaporate over several days (265°C < BP < 380°C). Approximately 10% (by mass) of MDO will not evaporate, though will decay slowly over time.

It's noteworthy that the heavier components for the condensate (and the MDO), specifically the low volatile and persistent portions, will have a strong tendency to become entrained into the water column in the presence of moderate winds (above 10 knots) and in turn breaking waves, however, it can re-surface under calm conditions (less than 10 knots).

In summary, in the marine environment MDO will behave as follows:

- Will spread rapidly in the direction of the prevailing wind and waves
- In calm conditions evaporation is the dominant process contributing to the fate of spilled MDO from the sea surface and will account for 60–80% reduction of the net hydrocarbon balance
- Has a strong tendency to entrain into the upper water column (0–10 m) (and consequently reduce evaporative loss) in the presence of moderate winds (>10 knots) and breaking waves. However, it re-surfaces when the conditions calm
- The evaporation rate of MDO will increase in warmer air and sea temperatures such as those present around the area
- MDO residues usually consist of heavy compounds that may persist longer and will tend to disperse as oil droplets into the upper layers of the water column.

Table A-1: Properties of MDO

Hydrocarbon type	Density (kg/m^3)	Dynamic viscosity at 25 °C (cSt)	API	Wax content (%)	Pour point °C
MDO	890.0 (@15 C)	14.0	27.5	1	−9

Source: RPS (2024)

Reindeer condensate

The physical characteristics of Reindeer condensate are summarised in Table A-2. Reindeer condensate assay results show the condensate to be highly volatile with low viscosity. The weathering curve for Reindeer condensate indicates that a large proportion of the condensate will evaporate rapidly. Evaporation rates will increase with temperature, but in general about 74% of the oil mass should evaporate within the first 12 hours (BP < 180 °C); a further 17% should evaporate within the first 24 hours (180 °C < BP < 265 °C); and a further 8% should evaporate over several days (265 °C < BP < 380 °C). It is then expected that the remaining 1% consisting of waxy hydrocarbons, shall persist in the marine environment for much longer periods and would be subject to relatively slow degradation.

The whole condensate has a low asphaltene content (<0.5%), indicating a very low tendency for the hydrocarbons to take up water to form water-in-oil emulsions over the weathering cycle.

However, because the oil would be released into the water column under the spill scenarios, there will be variable periods of time required for the droplets to surface before atmospheric weathering can commence. This factor will extend the effective weathering time for the oil and will result in variable compartmentalisation of the oil between the water surface and the water column over time.

Table A-2: Properties of Reindeer condensate

Hydrocarbon type	Density (kg/m^3)	Dynamic viscosity at 20°C (cSt)	API	Wax content (%)	Pour point °C	Asphaltene (%)
Reindeer condensate	784.2 (@15 C)	0.683	48.9	<5%	-36	<0.5

Source: Intertek (2023)

Appendix B Oil spill response ALARP framework & assessment

ALARP Assessment Framework

Rationale

As of part the regulatory approval requirements for petroleum activities, the EP and/or OSCP must demonstrate that through the implementation of all reasonable control measures environmental risks have been reduced to a level that is As Low As Reasonably Practicable (ALARP).

With respect to hydrocarbon spill risk and response planning, this includes an assessment to demonstrate that the oil spill response control measures are reducing risk to a level that is ALARP.

This ALARP Assessment Framework provides a process to facilitate the identification of all existing and potential spill response control measures, the selection or rejection of which are supported by reasoned arguments.

Guidance documents

Guidance documents used in the preparation of this framework include:

- Oil Spill Risk Assessment and Response Planning Procedure (SO-91-II-20003)
- NOPSEMA Guidance Note ALARP (N-04300-GN0166, August 2022)
- NOPSEMA Guidance Note Control Measures and Performance Standards (N04300-GN0271, Revision 26 June 2020)
- NOPSEMA Guideline Environment Plan Decision Making (N-04750-GL1721, January 2024)
- NOPSEMA Guidance Note Risk Assessment (GN0165, June 2020)
- NOPSEMA Oil Pollution Risk Management (GN1488, July 2021).

Overview

The ALARP Assessment Framework uses activity-specific information to systematically assess existing and potential control measures and ensure that all practicable control measures are identified and documented.

When selecting controls to reduce risk is it good practice to apply a preferential order; elimination, substitution, prevention, reduction and mitigation. In the context of this ALARP Assessment Framework for oil spill response, all control measures are response strategies to reduce the impacts of an unplanned event that has already occurred. All source control response measures may be classed as ‘reduction’ in the hierarchy of controls with all other response measures classed as ‘mitigation’.

The ALARP Assessment Framework is shown in Figure B-1.

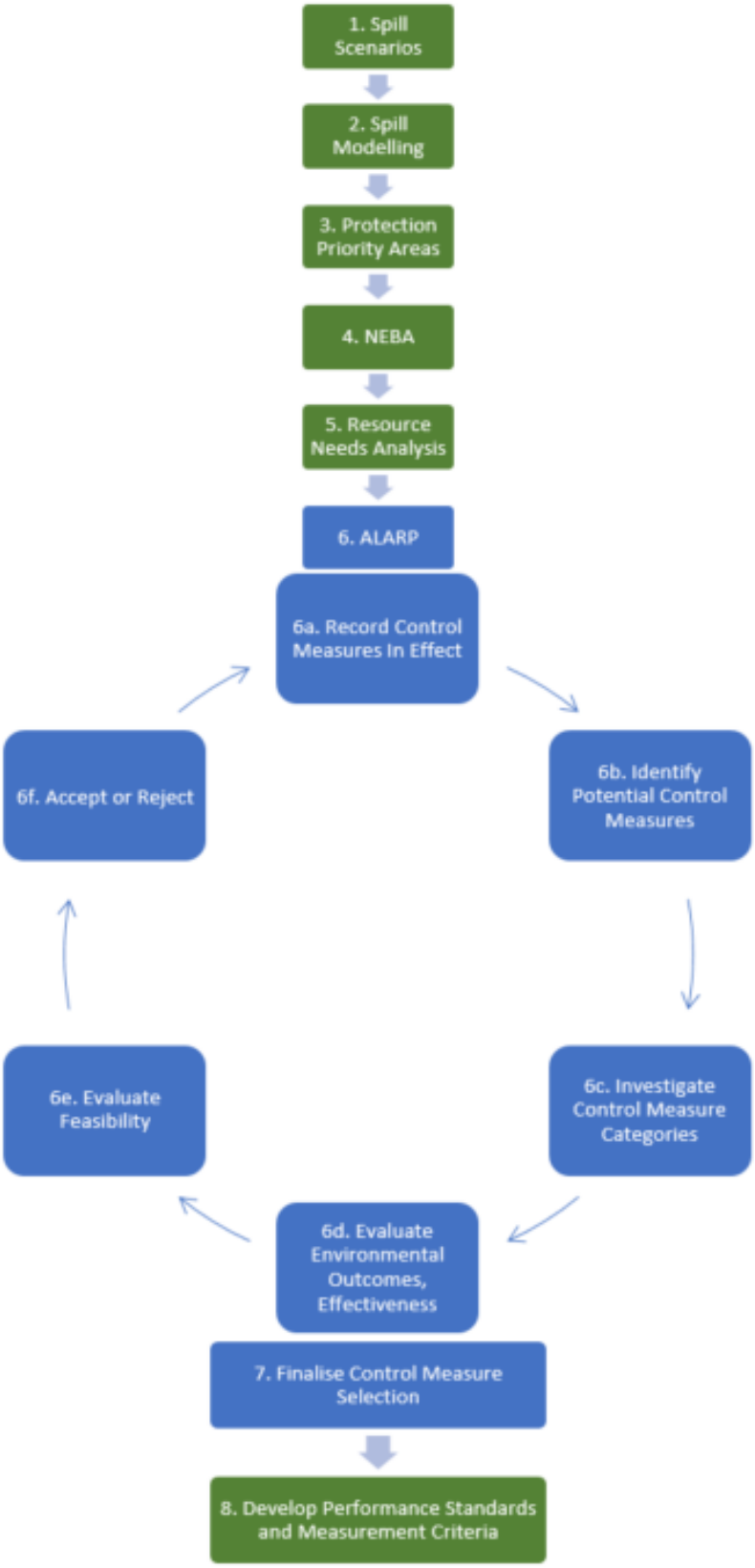


Figure B-1: ALARP Assessment Framework

In Figure B-1, Steps 1 to 5 (in GREEN) denote input information into the ALARP Assessment Framework. This information comprises:

1. **Spill Scenarios**: This step will involve assessing all possible spill scenarios from the activity and identifying the worst-case credible scenarios as a basis for pollution response planning.
2. **Spill Modelling**: A quantitative spill modelling assessment is conducted for the worst-case credible scenarios identified in Step 1.

3. **Protection Priority Areas**: The Environment that may be Affected (EMBA) is the largest area within which impacts from hydrocarbon spills associated with the activity could extend. The EMBA is predicted using spill modelling results from Step 2. Protection Priority Areas (PPA) are locations of high ecological value within the EMBA that would be targeted in response. Selection of PPAs is detailed in the Oil Spill Risk Assessment and Response Planning Procedure (SO-91-II-20003).
4. **NEBA**: Net Environmental Benefit Analysis (NEBA) is used to select the most effective response strategies to protect the PPAs identified in Step 3.
5. **Resource Needs Analysis**: For the response strategies identified through NEBA, the worst-case resource, timing and location requirements are determined using quantitative spill modelling information where applicable. Implementation Guidance is then developed to detail what arrangements and actions are required to be initiated by the Incident Management Team (IMT) to meet the incident requirements up to a worst-case incident.

Through the development of the Implementation Guidance, it may be possible to identify resource, timing and location requirements that could be improved. These areas of improvement should be noted in the ALARP so that additional, alternative or improved control measures can be considered in this context.

A detailed ALARP Assessment Framework for the evaluation of control measures is shown in Figure B-1, Step 6 (in BLUE). Criteria and definitions used to evaluate control measures are shown in Table B-1.

- 6a. Record Control Measures In Effect: The spill response control measures currently in place for Santos are listed here. The environmental outcomes and effectiveness of the in-effect control measures are noted using the Resource Needs Analysis to assess whether there are any areas of improvement. Environmental outcomes include potential harmful effects of control measures.
- 6b. Identify Potential Additional Control Measures: Potential control measures are identified with a focus on any control measures that address areas of improvement identified in Step 6a.
- 6c. Investigate Control Measure Categories: In-effect and potential control measures from Steps 6a and 6b are classified as either additional, alternative or improved, and as either people, system, equipment or procedures. This step serves as a prompt to ensure that potential control measures from all categories are explored.
- 6d. Evaluate Environmental Outcomes and Effectiveness: The environmental outcomes and effectiveness are assessed for all control measures identified and described through Steps 6a, b, and c.
- 6e. Evaluate Feasibility: Time, cost and effort required for implementation are assessed for all control measures identified and described through Steps 6a, b, and c.
- 6f. Accept or Reject: The potential control measure will be accepted or rejected on the basis of environmental outcomes and effectiveness described in Step 6d and whether cost is grossly disproportionate, as described in Step 6e.

When evaluating potential control measures, implementation plans of in-effect control measures are carefully considered to ensure that any accepted control measures will equal or improve Santos' capacity to meet resource needs. Potential control measures are also considered within the context of Santos' current response arrangements to determine if synergies or resource conflicts might occur.

As control measures are evaluated for selection or rejection, they can be compared with industry good practice to ensure that all practicable control measures were implemented. Where unique circumstances exist and further analysis is required, a different evaluation technique may be used, such as technical analysis, detailed cost benefit analysis or combination of approaches.

New information on risks, impacts and response strategies obtained through analysis of operations, exercises and scheduled documentation reviews can be incorporated into the ALARP Assessment Framework cycle in a process of continual improvement.

In Figure B-1, Steps 7 and 8 show the conclusion of the ALARP Assessment Framework:

7. Finalised Control Measure Selection: Outputs from the ALARP Assessment shown in Step 6 comprise finalised control measures (in BLUE).
8. Develop Performance Standards and Measurement Criteria: For each control measure finalised in Step 7, performance standards and measurement criteria are then developed and documented in the OSCP (in GREEN).

Performance standards for all accepted control measures should be written to enable the operator to measure, monitor and test effectiveness. Only the key aspects of any given control will require performance standards and these may include the various measures of effectiveness; functionality, availability, reliability, survivability, dependency and compatibility. Parameters set in the performance standard should be 'SMART'; specific, measurable, appropriate, realistic and timely.

Corrective action based on deviations or trends in performance should be taken by amending either the performance standard or the control measure, as appropriate.

Criteria and definitions

Standardised criteria and definitions are used to bring consistency to the ALARP assessment across diverse activities and response strategies. Criteria and definitions are shown in Table B-1.

Table B-1: Criteria and definitions of ALARP Assessment Framework

Column	Description
Strategy	Response Strategy
Control Measure	Aspect of Response Strategy being evaluated Description of the control measure that is In Effect or description of the potential control measure
In Effect, Alternative, Additional, Improved	In Effect control measures are already in place. Alternative control measures are evaluated as replacements for the control already in effect. Additional control measures are evaluated in terms of their ability to reduce an impact or risk when added to the existing suite of control measures. Improved control measures are evaluated for improvements they could bring to the effectiveness of adopted control measures. Adapted from NOPSEMA Guideline Environment Plan Decision Making N 04750-GL1721 January 2024.
Control Measure Category	A range of different types of controls generally provide effective protection as they provide independence and multiple layers of protection. The OPGGS(S) Regulations refer to technical and 'other' controls where technical control measures involve hardware like shutdown valves and alarms. 'Other' control measures include administrative and procedural control measures such as inductions, a drug and alcohol policy or an inspection regime. Industry practice has further developed this concept of a range of different types of controls based on a POiSTED framework to assess organisational capability: • People – personnel • System – organisation, information/communications, support facilities, training/ competency • Equipment – equipment • Procedures – doctrine Santos aims to implement a range of different types of controls where possible.
Environmental Outcomes	Assessment of environmental benefits, particularly those over and above those environmental benefits documented in the Control Measure that is in effect. Environmental impacts of the Control Measure are also considered here.
Effectiveness	The effectiveness of a Control Measure in reducing the risk to ALARP is evaluated using the following six criteria. **Functionality** • The functional performance of a control measure is what it is required to do. How does the control perform in order to achieve the required risk reduction? **Availability** • Probability that the control measure will be available when required and has not failed or is undergoing a maintenance or repair. **Reliability** • The reliability of a control measure is the probability that at any point in time it will operate correctly for a further specified length of time. Reliability is all to do with the probability that the system will function correctly and is usually measured by the mean time between failure. **Survivability** • Whether or not a control measure is able to survive a potentially damaging event such as fire or explosion is relevant for all control measures that are required to function after an incident has occurred. • To achieve their purpose, oil spill response control measures should have high survivability. However, some control measures, such as those involving equipment deployment from an FPSO would have low survivability in an incident that involves an FPSO explosion or fire. **Dependency** • The dependency of the control measure is its degree of reliance on other systems in order for it to be able to perform its intended function. If several control measures can be disabled by one failure mechanism (common mode failure), or the failure of one control measure is likely to cause the

Column	Description
	failure of others, then the control measures are not independent, and it may not be appropriate to count such measures as separate. • Several control measures are reliant on equipment, people and vessels, hence have high dependence. **Compatibility** • Whether or not a control measure is compatible takes into account how alternative control measures may interact with other controls and the rest of the facility, if introduced. Consideration should be given to whether new control measures are compatible with the facility and any other control measures already in use. Adapted from NOPSEMA Guidance Note Control Measures and Performance Standards N04300-GN0271 Revision No 4 June 2020.
Feasibility	Feasibility describes the time, cost and/or effort required to implement the Control Measure.
Accept/Reject	Outcome of assessment and key reasons for the decision

ALARP assessment summaries

ALARP assessment summary
Source Control
The control measures in place for relief well drilling represent industry best practice and are considered to reduce the timeframe for drilling a relief well to as low as reasonably practicable in the context of the risk of a well release from the Reindeer WHP Operations. The drilling of a relief well is an effective control and relief well planning conducted in the area has demonstrated that a MODU will be on site for relief well drilling by day 47 from the start of a well release. Relief well construction can be completed within 91 days using a MODU, equipment and specialist personnel that Santos has arrangements to gain access to. An additional 2 weeks over the base-case of 77 days was included based on the planning assumption that a suitable jack-up MODU may not be available in Australian waters. As a result, additional time may be required to mobilise the MODU from international waters (i.e. Singapore) to the operational area. However, as it has been demonstrated that the well is anticipated to cease flowing due to the low gas rates and high-water rates corresponding to high water gas ratios, the total worst-case credible loss of well control volume is based on a release over 10 weeks (70 days). One additional, alternative or improved potential control measure was identified and assessed, which was rejected as grossly disproportionate to the potential reduction in environmental risk. The rejected control measure was: • Contract source control personnel through a provider in addition to existing arrangements Performance standards and measurement criteria that have been developed for the in effect control measures are shown in the OPEP. The key performance requirements for relief well drilling are the maintenance, tracking, access and relief well planning arrangements (during times of maintaining preparedness) and the timely mobilisation of resources (during a response). These key areas of effectiveness are reflected in the performance standards.
Monitor and Evaluate
For the monitor and evaluate strategy, various independent inputs from multiple service providers are used to build a detailed Common Operating Picture (COP) during the incident. Three additional, alternative or improved potential control measures were identified and assessed. Three additional, alternative or improved control measures were rejected as grossly disproportionate to the potential reduction in environmental risk: • Purchase of oil spill modelling system and internal personnel trained to use system • Purchase additional satellite tracking buoys • Ensure trained aerial observers based at strategic locations such as Exmouth, Port Hedland and Karratha. Performance standards and measurement criteria that have been developed for the in-effect control measures are shown in Section 10.6. The key areas of effectiveness for the identified control measures, during times of maintaining preparedness, focus on maintaining access to equipment and personnel through contractual arrangements with vessel providers, aircraft providers aerial observers, UAV providers, tracking buoys, oil spill trajectory modelling providers and satellite imagery providers.
Mechanical Dispersion
Mechanical dispersion is a secondary response strategy that could be undertaken by vessels undertaking primary response strategies without the requirement for additional equipment, and no areas of improvement were identified. The use of mechanical dispersion in a response would be assessed as part of an operational NEBA.

ALARP assessment summary
No additional, alternative or improved potential control measures were identified and assessed. Performance standards and measurement criteria that have been developed for the in effect control measures are shown in the OPEP. The key areas of effectiveness for the identified control measures during a response relate to the development of an operational NEBA to confirm suitability and environmental benefit of mechanical dispersion and the mobilisation of vessels. These key areas of effectiveness are reflected in the performance standards.
Shoreline Protection and Deflection
Large quantities of various types of nearshore booms and skimmers from Exmouth and Fremantle ensures that equipment is in place to implement this response strategy within 72 hrs in a wide range of metocean conditions. Trained regional Santos personnel can be quickly mobilised to appropriate locations using helo services, followed by AMOSC staff and AMOSC Core Group from Perth. These regional and state resources ensure that equipment and personnel are not a limiting factor in this response strategy. Three additional, alternative or improved potential control measures were identified and assessed. Three improved additional, alternative or improved potential control measures were rejected as grossly disproportionate to the potential reduction in environmental risk: • Santos to purchase additional shoreline and nearshore booms and ancillary equipment • Access to additional shallow draft boom tow vessels owned by Santos • Ensure trained personnel based at strategic locations such as Port Hedland, Karratha or Exmouth Performance standards and measurement criteria that have been developed for the in-effect and accepted control measures are shown in Section 12.4. The key areas of effectiveness for the identified control measures, during times of preparedness, are around maintaining access to equipment and personnel through contractual arrangements. During response, a key area for ensuring effectiveness is the mobilisation of requirements in order to commence protection and deflection operations and the preparation of an operational NEBA for each operational period that takes into account protection priorities and the ongoing effectiveness of the response strategy.
Shoreline Clean-up
Stockpiles in Fremantle or regional area and locally available supplies provide a range of shoreline clean-up equipment that can be accessed to suit most beach types / required clean-up operations. Trained Santos personnel can be quickly mobilised to appropriate locations using helo. services or vessels, followed by AMOSC staff and AMOSC Core Group from Perth. Equipment and trained personnel are not expected to be limiting factors for this response strategy. Seven potential additional or improved control measures were identified and assessed. All were rejected as grossly disproportionate to the potential reduction in environmental risk. Rejected control measures were: • Mechanical mobile plant equipment for clean-up pre purchased and positioned at strategic locations such as Port Hedland, Karratha or Exmouth • Pre-purchase and storage of additional equipment (decontamination/ staging equipment, clean-up and flushing, PPE) at strategic locations such as Port Hedland, Karratha or Exmouth • Access to additional shallow draft vessels owned by Santos to transport personnel to key sensitive areas on offshore islands • Access to additional team leaders that are locally based at strategic locations (e.g. Port Hedland, Karratha or Exmouth) or can be mobilised within short time frames • Faster access to clean-up personnel via Perth based labour hire contractor • Faster access to clean-up personnel via locally based labour hire companies or emergency response organisations • Faster access to clean-up personnel via Santos employment of local personnel Performance standards and measurement criteria that have been developed for the in effect and accepted control measures are shown in Section 13.6 . The key areas of effectiveness for the identified control measures, during times of preparedness, relate to maintaining access to suitable equipment and personnel through contractual arrangements. During response, a key area of effectiveness is the rapid mobilisation of equipment and personnel and preparation of a Shoreline Clean-up Sub-plan and operational NEBA to ensure that impacts from response activities are minimised and operations are conducted in accordance with protection priorities as confirmed by the Control Agency.
Oiled Wildlife Response
Santos has developed the Santos Oiled Wildlife Response Framework Plan as a control measure to ensure that a procedure is in place for OWR, where Santos is the Control Agency or Support Organisation, in order to provide an effective and coordinated OWR. Oiled wildlife equipment, including first strike kits and containers, can be mobilised from regional locations and Perth. Further equipment is available through national or international resources to implement a timely and sustained response adequate for the scale of worst-case oiled wildlife operations identified in the OPEP. The availability of trained personnel in the initial stages of an incident is a limiting factor for this response strategy.

ALARP assessment summary
Two additional, alternative or improved potential control measures were identified and assessed, however both were rejected as grossly disproportionate to the potential reduction in environmental risk. Rejected control measures were: • Pre-hire and/or prepositioning of staging areas and responders • Direct contracts with service providers Performance standards and measurement criteria that have been developed for the in effect and accepted control measures are shown in Section 15.5. The key areas of effectiveness for the identified control measures, during times of preparedness, are around maintaining access to equipment and personnel through contractual arrangements. During response, the mobilisation of requirements for initial oiled wildlife response operations and the management of the oiled wildlife response in accordance with the WA Oiled Wildlife Response Plan are both key elements for achieving this strategy.
Operational and Scientific monitoring
Oil spill operational and scientific monitoring will be conducted on behalf of Santos by contracted OSM Service Provider, via the OSM Supplementary Services Agreement as detailed in the North West Shelf OSM-BIP (7715-650-ERP-0002). Four additional, alternative or improved control measures were identified and assessed, but were rejected as grossly disproportionate to the potential reduction in environmental risk: • Operational and Scientific monitoring personnel, plant and equipment on standby at the operational location • Ensure trained monitoring specialists are available on site • Just-In-Time training to train personnel for spill response roles • Ensure trained marine mammal/fauna observers based at strategic locations such as Port Hedland, Karratha and Broome. Performance standards and measurement criteria that have been developed for the in effect and accepted control measures are show in Section 16.1. The key areas of effectiveness for the control measures during times of preparedness, are around maintaining contracts for operational and scientific monitoring services and annual reviews of the OSM Bridging Implementation Plans.
Waste Management
The Santos contract with the waste service provider has provisions for waste management operations of the scale estimated to be required in worst-case scenarios detailed in the OPEP. Further detail is captured in the Waste Management Plan – Oil Spill Response Support (SO-91-IF-10053). The waste service provider can mobilise waste receptacles from Karratha within 24hours. Given the waste service provider arrangements and preplanning already undertaken, waste storage facilities, road transport and logistics are not expected to be limiting factors in the response. Areas of improvement were identified regarding the availability of vessels required for waste transport at sea and additional storage tanks. Four potential additional, alternative or improved Control Measures were identified and assessed to reduce these risks. One Control Measure was accepted as reasonably practicable. • Monitoring and hire of additional vessels located in the region, tracked via the WA Vessel Monitoring System (IHS Maritime Portal), and contracted at the time of incident Three additional, alternative or improved Control Measures were rejected as grossly disproportionate to the potential reduction in environmental risk: • Maintain contracts with multiple service providers • Procure temporary waste storage for Santos stockpile • Contract additional vessels on standby for waste transport Performance standards and measurement criteria that have been developed for the in-effect control measures are shown in Section 17.6. The key areas of effectiveness for the identified control measures, during times of preparedness, relate to maintaining access to waste management equipment and services through contractual arrangements. During response, a key area for increasing effectiveness is the timely mobilisation of requirements for initial response operations and defining critical management and reporting services to be provided by the waste service provider.

ALARP assessment worksheets

Strategy	Control Measure	Alternative, Additional, Improved	Control Measure Category	Environmental Outcomes	Effectiveness	Feasibility	Accept/ Reject
Source Control – Adopted control measures in Section 9.6							
Relief well drilling	Santos Drilling and Completions Source Control Team mobilised within 24 hours. Well Control Specialists mobilised within 72 hours. Contract / MOUs for source control personnel. APPEA MoU for mutual assistance for relief well drilling.	In effect	People	Controlling flow of hydrocarbons as quickly as possible will reduce environmental impacts. Limit/prevent hydrocarbon contacting sensitive receptors	This primary source control measure provides functionality, availability, reliability, survivability, compatibility and independence	**Feasible** Cost associated with maintenance of contracts / MOUs	**In effect**
	Contract source control personnel through an alternative provider in addition to existing arrangements	Additional	People	No environmental benefit if additional services are surplus to requirements	Improved availability and reliability	**Not Feasible** Significant additional cost in maintaining two contracts for the same service	**Reject** - No environmental benefit in having access to personnel surplus to requirements
	Source Control Planning and Response Guideline (DR-00-OZ-20001).	In effect	Procedure	Provides a set process to follow in the planning and mobilisation for relief well drilling by Santos Source Control Team thereby reducing the timeframe and increasing the effectiveness of relief well drilling.	Provides functionality, availability, reliability, survivability, compatibility and independence	**Feasible** Cost associated with maintaining document	**In effect**
	MODU Capability Register is monitored monthly	In effect	Procedure	By monitoring MODU availability in the region, it will be possible to gain an understanding of which MODU may be rapidly available for relief well operations. This could reduce MODU mobilisation times thus reducing volume of hydrocarbons released to the environment.	Provides functionality, availability, reliability, survivability, compatibility and independence	**Feasible** Cost associated with monitoring MODU availability	**In effect**
	Relief well design assessment to identify and screen relief well spud locations prior to cessation of production activities	In effect	Procedure	Reduce time taken to plan and execute relief well and reduce environmental impacts	Improved availability and reliability	**Feasible** Cost associated with conducting a relief well design assessment	**In effect**
Source Control – Vessel Collision	Vessel Spill Response Plan (SOPEP/SMPEP)	In effect	Procedure	Provides a set process to follow in the planning and mobilisation for spill response actions by the Vessel Contractor thereby reducing the timeframe and increasing the effectiveness of spill response.	Provides functionality, availability, reliability, survivability, compatibility and independence.	**Feasible** Cost associated with due diligence checks on contractor procedure.	**In effect**
Surface well kill	Direct Surface Intervention Via Well Control Experts	In effect	Procedure	Reduce time taken to control source and reduce environmental impacts	1) Effectiveness of intervention of this type needs to be assessed at the time given that personnel safety considerations may preclude this control measure. 2) Mobilisation procedure for personnel as per Source Control Planning and Response Guideline (DR-00-OZ-20001) 3–4) Contracts and MoUs for well control personnel (WWC)	Ability to implement and effectiveness of this control can only be determined at the time of an incident.	**In effect** Santos has a standing agreement with Wild Well Control for call-out of well control experts. Arrangements already in place to access resources (Source Control Planning and Response Guideline (DR-00-OZ-20001), Contracts) but this control will be applied opportunistically and will be dependent upon safety constraints.
Monitor and Evaluate – Adopted control measures in Section 10.6							
Oil Spill Trajectory Modelling	Maintain contract with Oil Spill Trajectory Modelling service provider.	In effect	System	Knowledge of the spill, provided in a short-time frame, will inform the IMT decisions with the aim of	Provides functionality, availability, reliability, survivability, compatibility and independence	**Feasible** Cost of contract	**In effect**

Strategy	Control Measure	Alternative, Additional, Improved	Control Measure Category	Environmental Outcomes	Effectiveness	Feasibility	Accept/ Reject
	The service provider will be contacted immediately (within 2 hrs) from IMT call-out. Upon activation, the service provider will provide trajectory models within: • 2 hours for OILMAP model for offshore and open ocean • 4 hours for OILMAP operations for near-shore • Detailed modelling service is available for the duration of the incident.			reducing and mitigating environmental impact	Area of improvement; none identified		
	Access to additional spill modelling capability through OSRL	In effect	System	Knowledge of the spill, provided in a short-time frame, will inform the IMT decisions with the aim of reducing and mitigating environmental impact	An additional service provider ensures redundancy (independence) if for some reason the other service provider was unable to fulfil the function or additional capability is needed. There is also the possibility of increased functionality associated with improved certainty of the modelling results if both service providers are activated.	**Feasible** Cost of membership	**In effect**
	Purchase of oil spill modelling system and internal Santos personnel trained to use system	Alternative	System / People	This could result in the faster generation of the initial model which may result in an environmental benefit as a consequence of the IMT making operational decisions quicker	Potentially increases availability Decrease in functionality; in house service may not be across technical advances to same extent as contracted service providers	**Feasible** Purchase of system, training of personnel, and on-call roster	**Reject** The cost of purchasing the system, training and having personnel on-call is disproportionate to any potential gains from potentially being able to deliver initial results quicker than the 2-hour turnaround currently guaranteed by the service provider.
Tracking buoy	Level 1: 4 tracking buoys available from Varanus Island within 24 hours. 2 tracking buoys available from Exmouth. Vessel transit time for Exmouth - Distance from Exmouth to Reindeer is 180nm (18 hours at 10 knots	In effect	Equipment	Tracker buoys provide real-time verification data (particularly beneficial at night and in conditions limiting aerial surveillance)	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; none identified	**Feasible** Cost of equipment	**In effect**
	Level 1: Santos owns and maintains 10 x tracking buoys across its NW facilities.	In effect	Equipment	Tracker buoys provide real-time verification data (particularly beneficial at night and in conditions limiting aerial surveillance)	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; none identified	**Feasible** Cost of equipment	**In effect**
	Level 2: Tracking buoys available from AMOSC and through AMOSC Mutual Aid. Transit times (road freight): Perth to Exmouth ~15 hrs	In effect	Equipment	Tracker buoys provide real-time verification data (particularly beneficial at night and in conditions limiting aerial surveillance)	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; none identified	**Feasible** Cost of membership	**In effect**
	Level 3: Tracking buoys available from OSRL. Transit times (air) Singapore to Karratha = 3–5 days.	In effect	Equipment	Tracker buoys provide real-time verification data (particularly beneficial at night and in conditions limiting aerial surveillance)	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; none identified	**Feasible** Cost of membership	**In effect**
	Santos purchase additional satellite tracking buoys	Additional	Equipment	There is no expected environmental benefit from having	Increase in availability and reliability	**Feasible**	**Reject**

Strategy	Control Measure	Alternative, Additional, Improved	Control Measure Category	Environmental Outcomes	Effectiveness	Feasibility	Accept/ Reject
				additional tracking buoys, as there are already tracking buoys located across Santos NW facilities ready for deployment 24/7 and any additional needs can be provided by these Santos owned stocks. Additional buoys can be accessed from AMSA, AMOSC and OSRL within days with no additional upfront cost.		Cost of purchasing additional tracking buoys	Does not provide any additional environmental benefit and the cost associated is therefore not warranted.
Aerial surveillance – aircraft and crew	Maintain contract with service provider for dedicated aerial platform operating out of Karratha. Helicopter services available through Santos primary contracted supplier. Activation of aerial surveillance using helicopter pilots will occur in 3 hours of notification of the spill. Helicopter on site for surveillance within 6 hrs. Surveillance and recording using helicopter pilots is considered adequate for situational awareness.	In effect	System	Knowledge of the spill, provided in a short-time frame, will inform the IMT decisions with the aim of reducing and mitigating environmental impact	Provides functionality, availability, reliability, survivability, compatibility and independence	**Feasible** Cost of contract	**In effect**
Aerial surveillance – observers	Level 1: Trained Santos aerial observers will be available from Day 2 of the incident, following activation	In effect	People	Knowledge of the spill, provided in a short-time frame, will inform the IMT decisions with the aim of reducing and mitigating environmental impact.	Provides functionality, availability, reliability, survivability, compatibility and independence	**Feasible** Cost of training and maintaining trained staff	**In effect**
	Level 2: Access to additional aerial observers through AMOSC Staff and Industry Mutual Aid Core Group Responders. Available from Day 2 of the incident.	In effect	People	Knowledge of the spill, provided in a short-time frame, will inform the IMT decisions with the aim of reducing and mitigating environmental impact	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; none identified	**Feasible** Cost of AMOSC membership	**In effect**
	Level 3 : Access to additional aerial observers through OSRL (18 people). OSRL staff initial 5 technical advisors available from 2–3 days, remaining personnel available from 4–5 days, subject to approvals/clearances.	In effect	People	Knowledge of the spill, provided in a short-time frame, will inform the IMT decisions with the aim of reducing and mitigating environmental impact.	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; none identified	**Feasible** Cost of OSRL membership	**In effect**
	Ensure trained aerial observers based at strategic locations such as Exmouth, Port Hedland and Karratha	Additional	People	Current capability meets need and therefore environmental benefit would be incremental. Having trained observers living locally and on short notice to mobilise would result in trained aerial observers available from Day 1 (current arrangements are that the helicopter pilot would provide the initial observations and recording on Day 1 with trained aerial observers from Perth and VI mobilised and operational by Day 2).	Improved availability and reliability	**Feasible** Costs associated with staff employment and training	**Reject** Cost is considered disproportionate to the incremental benefit given surveillance on Day 1 by pilots is considered sufficient
Aerial surveillance – unmanned aerial vehicles	Level 2: Unmanned Aerial Vehicle for aerial surveillance available through AMOSC (UAV and pilots can be accessed through AMOSC with a mobilisation time of <48 hours)	In effect	System	Use of UAVs may provide an environmental benefit compared to alternative options (such as helicopters and fixed wing aircraft) given their ability to assess more difficult areas.	Provides functionality and availability Area of improvement; none identified	**Feasible** Cost of membership with AMOSC	**In effect**
	Level 3: Unmanned Aerial Vehicles for aerial surveillance available through OSRL	In effect	System	Use of UAVs may provide an environmental benefit compared to alternative options (such as helicopters and fixed wing aircraft)	Provides functionality and availability Area of improvement; none identified	**Feasible** Cost of membership with OSRL	**In effect**

Strategy	Control Measure	Alternative, Additional, Improved	Control Measure Category	Environmental Outcomes	Effectiveness	Feasibility	Accept/ Reject
				given their ability to assess difficult areas.			
Vessel surveillance	Vessels and aircraft compliant with Santos's Protected Marine Fauna Interaction and Sighting Procedure (EA-91-11-00003)	In effect	Procedure	Provides the procedure for interaction and sighting of protected marine fauna from vessel or aircraft to ensure compliance with EPBC Regulations.	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; none identified	**Feasible** Cost of maintaining and implementing procedure	**In effect**
	Level 1: Vessels already on hire and in use in WA and located at (or in transit to) Exmouth, Dampier or Varanus Island could be used for surveillance purposes in the event of a spill. The Santos IMT begins sourcing Santos contracted vessel or VOO for on-water surveillance within 90 minutes from IMT call-out. Santos has access to on-hire vessels supporting WA's VI and NV facilities. WA Vessel Monitoring System (IHS Maritime Portal) has access to automatic identification system (AIS) live-vessel tracking portal to establish vessel availability.	In effect	Equipment	Knowledge of the spill, provided in a short-time frame, will inform the IMT decisions with the aim of reducing and mitigating environmental impact. In comparison to aerial surveillance, vessel surveillance provides localised close-up observation.	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; none identified	**Feasible** Cost of existing contracts with vessel providers	**In effect**
	Level 2: Monitoring and hire of additional vessels located in the region tracked via the WA Vessel Monitoring System (IHS Maritime Portal) and contracted through the existing Master Service Agreements.	In effect	Equipment	Knowledge of the spill, provided in a short-time frame, will inform the IMT decisions with the aim of reducing and mitigating environmental impact. In comparison to aerial surveillance, vessel surveillance provides localised close-up observation.	Improves availability and reliability Area of improvement; none identified	**Feasible** Cost of vessel monitoring system (IHS Maritime Portal subscription) Cost of contracts at the time of spill event	**In effect**
	Level 3: Vessels sourced without existing contracts from any location	In effect	Equipment	Knowledge of the spill, provided in a short-time frame, will inform the IMT decisions with the aim of reducing and mitigating environmental impact. In comparison to aerial surveillance, vessel surveillance provides localised close-up observation.	Improves availability and reliability Area of improvement; none identified	**Feasible** Cost of contracts at the time of requirement.	**In effect**
Satellite Imagery	Maintain membership with AMOSC provider to enable access and analysis of satellite imagery	In effect	Systems	Satellite imagery is considered a supplementary source of information that can improve awareness but is not critical to the response and usage is at the discretion of the IMT.	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; none identified	**Feasible** Cost of membership with AMOSC	**In effect**
	Maintain membership with OSRL provider to enable access to and analysis of satellite imagery	In effect	System	Satellite imagery is considered a supplementary source of information that can improve awareness but is not critical to the response and usage is at the discretion of the IMT.	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; none identified	**Feasible** Cost of membership with OSRL	**In effect**
Mechanical Dispersion - Adopted control measures in Section 11.3							
Mechanical Dispersion	Use of vessel crews, contract vessels and vessels of opportunity to disperse small areas of amenable hydrocarbon types such as marine diesel.	In effect	People / Equipment	Enhanced dispersion and biodegradation of released hydrocarbons.	Provides availability, reliability, survivability,	**Feasible** - Cost associated with vessel hire	**In effect**

Strategy	Control Measure	Alternative, Additional, Improved	Control Measure Category	Environmental Outcomes	Effectiveness	Feasibility	Accept/ Reject
				The potential disadvantage of mechanical dispersion is that it could temporarily increase the concentration of entrained and dissolved oil in the vicinity of submerged shallow water receptors (e.g. corals, seagrass and macroalgae).	compatibility and independence. Limited functionality as mechanical dispersion is a secondary response strategy limited by weather conditions, hydrocarbon type and hydrocarbon volume.	- Safety is a key factor and slicks with potential for high volatile organic compound (VOC) emission are not suitable.	
	No alternate, additional or improved control measures identified						N/A
Protection and Deflection – Adopted Control measures in Section 12.4							
Protection and deflection-booms and ancillary equipment	Level 2: Shoreline and nearshore booms plus ancillary equipment from: Varanus Island (Santos, 4*Beach Guardian, 8*25 m Zoom Boom, 1*skimmer), Exmouth (AMOSC, 20*25 m Beach Guardian, 19*25 m Zoom Boom, 6* skimmers), Santos 2*Beach Guardian, 5*25 m Zoom Boom, 1*skimmer Dampier (AMSA, 5* Canadyne Inflatable, 10* Structureflex Inflatable, 5* Versatech Zoom Inflatable, 2 Slickbar Solid Buoyancy, 3*Structureflex Solid Buoyancy, 30* Structureflex Land Sea), Fremantle (AMOSC, 19*25 m Beach Guardian, 34*25 m Zoom Boom, 1* HDB 1500 Boom, 18* Curtain Boom, 9*skimmer; AMSA, 15*Structureflex Inflatable, 13*Versatech Zoom Inflatable, 10*Structureflex Solid Buoyancy, 30* Structureflex Land Sea), Broome (AMOSC, 4*25 m Beach Guardian boom, 8*25 m Zoom boom, 2*HDB 1300 boom, 1*skimmer). Vehicles sourced from local hire companies. Transit times (vessel): • Varanus Island to Dampier = 7 hrs • Varanus Island to Exmouth = 18 hrs • Exmouth to Lowendal Island = 12 hrs • Exmouth to Montebello Islands = 13 hrs • Exmouth to Barrow Island = 10 hrs Transit times (road) • Fremantle to Exmouth = ~24 hrs • Fremantle to Karratha/Dampier = ~24 hrs • Exmouth to Dampier/ Karratha= 7 hrs • Exmouth to North West Cape = 0.5 hr. Protection booming equipment mobilised to FOB location within 24 hrs.	In effect	Equipment	Reduce hydrocarbon contact with coastal protection priorities. Consideration given to harmful impacts of booms, vessels, vehicles and personnel on sensitive coastal ecology	Provides functionality, availability, reliability, survivability, compatibility and independence Area for improvement; none identified	**Feasible** Costs associated with equipment purchase and maintenance Costs of contracts, MOUs with AMOSC and AMSA	**In effect**
	Level 3: Shoreline and nearshore booms plus ancillary equipment from Geelong (AMOSC), interstate (AMSA) and Singapore (OSRL). Transit times (road/air) Geelong or Singapore to Exmouth or Karratha = 3–5 days. These resources in place to commence protection and deflection within 3–10 days.	In effect	Equipment	Reduce hydrocarbon contact with coastal protection priorities. Consideration given to harmful impacts of boom, vessels, vehicles and personnel on sensitive coastal ecology	Provides functionality, availability, reliability, survivability, compatibility and independence Area for improvement; none identified	**Feasible** Costs associated with equipment purchase and maintenance Costs of contracts, MOUs Costs associated with staff training	**In effect**
	Santos to purchase additional shoreline and nearshore booms and ancillary equipment	Additional	Equipment	Enable more protection and deflection operations to occur simultaneously to protect more key areas	Improved availability and reliability	**Feasible**	**Reject** Protect and deflect is a secondary response strategy for the LOWC scenario, given the modelling

Strategy	Control Measure	Alternative, Additional, Improved	Control Measure Category	Environmental Outcomes	Effectiveness	Feasibility	Accept/ Reject
						Costs associated with equipment purchase and maintenance	predicts floating oil will not reach 50 g/m^2 and there is no shoreline accumulation predicted at or above the response threshold (100 g/m^2). Sufficient quantities of equipment located in the region.
Protection and deflection-vessels	Level 1: Shallow draft vessels in use by Santos and located at (or in transit to) Exmouth, Dampier or Varanus Island. Boom deployment vessel / remote island transfer vessel mobilised to FOB location / deployment port within 24 hrs.	In effect	Equipment	Reduce hydrocarbon contact with coastal protection priorities. Consideration given to harmful impacts of boom, vessels, vehicles and personnel on sensitive coastal ecology.	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; early vessel availability	**Feasible** Cost of existing contracts with vessel providers	**In effect**
	Level 2: Shallow draft vessels sourced through Master Service Agreement, located in region, tracked (where possible, if fitted with AIS) via the WA Vessel Monitoring System (IHS Maritime Portal) and contracted through a Master Service Agreement.	In effect	Equipment	Reduce hydrocarbon contact with coastal protection priorities. Consideration given to harmful impacts of boom, vessels, vehicles and personnel on sensitive coastal ecology.	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; vessel availability	**Feasible** Cost of vessel monitoring system (IHS Maritime Portal subscription)	**In effect**
	Level 3: Shallow draft vessels sourced without existing contracts from any location	In effect	Equipment	Reduce hydrocarbon contact with coastal protection priorities. Consideration given to harmful impacts of boom, vessels, vehicles and personnel on sensitive coastal ecology.	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; vessel availability	**Feasible** Cost of contracts at the time of requirement.	**In effect**
	Maintain a list of small vessel providers that could be used for nearshore booming	In effect	Equipment	Reduce hydrocarbon contact with coastal protection priorities. Consideration given to harmful impacts of boom, vessels, vehicles and personnel on sensitive coastal ecology.	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; vessel availability	**Feasible** Cost of maintaining a list of small vessel providers	**In effect**
	Access to additional shallow draft boom tow vessels owned by Santos	Additional	Equipment	Faster response times to facilitate protection of key sensitive areas.	Improved availability and reliability	**Feasible** Costs of vessel purchase and maintenance	**Reject** Protect and deflect is a secondary response strategy for the LOWC scenario, given the modelling predicts floating oil will not reach 50 g/m^2 and there is no shoreline accumulation predicted at or above the response threshold (100 g/m^2). High numbers of shallow draft vessels located in the region. One vessel can help to set boom at multiple locations.
Protection and deflection-personnel	Level 2: Spill responders from Varanus Island, Devil Creek, Perth (Santos), Fremantle (AMOSC), Perth (AMOSC Core Group). Santos Offshore Core Group mobilised to Exmouth within 24 hrs. AMOSC Staff and Industry Core Group mobilised to deployment port location within 24–48 hrs.	In effect	Personnel	Reduce hydrocarbon contact with coastal protection priorities. Consideration given to harmful impacts of boom, vessels, vehicles and personnel on sensitive coastal ecology.	Provides functionality, availability, reliability, survivability, compatibility and independence Availability – Santos access to helo services ensures that regional personnel can be quickly mobilised to the appropriate location. Area for improvement; none identified	**Feasible** Costs of contracts, MOUs with AMOSC, AMSA Costs associated with staff training	**In effect**
	Level 3: Spill responders from Geelong (AMOSC staff, 12 people), interstate (AMOSC Core Group, up to 84 people;	In effect	Personnel	Reduce hydrocarbon contact with coastal protection priorities	Provides functionality, availability, reliability,	**Feasible**	**In effect**

Strategy	Control Measure	Alternative, Additional, Improved	Control Measure Category	Environmental Outcomes	Effectiveness	Feasibility	Accept/ Reject
	AMSA National Response Team, unspecified) and international (OSRL, 18 people). Interstate staff available from 2–3 days. OSRL staff initial 5 technical advisors available from 2–3 days, remaining personnel available from 4–5 days, subject to approvals/ clearances.			Consideration given to harmful impacts of boom, vessels, vehicles and personnel on sensitive coastal ecology	survivability, compatibility and independence Area for improvement; none identified	Costs of contracts, MOUs with AMOSC, AMSA, OSRL Costs associated with staff training	
	Ensure trained personnel based at strategic locations such as Dampier, Karratha or Exmouth	Improved	Personnel	Faster response times to facilitate protection of key sensitive areas	Improved availability and reliability	**Feasible** Costs associated with staff employment and training	**Reject** No Santos personnel currently based at Karratha or Exmouth so employment costs would be significant and not justified given that helicopters enable rapid transportation of Santos staff within the region.
Protection and deflection-planning	Regional shoreline sensitivity and access data/maps and TRPs for key locations	In effect	Procedures	Reduce hydrocarbon contact with coastal protection priorities. Consideration given to harmful impacts of boom, vessels, vehicles and personnel on sensitive coastal ecology.	Provides functionality, availability, reliability, survivability, compatibility and independence	**Feasible** Cost of document preparation and maintenance	**In effect**
Shoreline Clean-up – Adopted control measures in Section 13.6							
Shoreline Clean-up – equipment	Level 2: Manual clean-up and flushing equipment from: Varanus Island (Santos WA, 1*container) Fremantle (AMOSC, 2*Boom Accessories Beach Guardian Deployment kit, 1*flushing kit) State hardware outlets. Decontamination/staging equipment from: Karratha (AMSA; 2*decon stations) Fremantle (AMOSC, 1*decon kit; AMSA, 2* decon stations). Mobile plant from state hire companies. PPE from: Exmouth and Varanus Island (Santos WA, 2*containers) Fremantle (AMOSC, 1*decon kit, 2*gas detectors). Transit times (vessel): • Varanus Island to Dampier = 7 hrs • Varanus Island to Exmouth = 18 hrs • Exmouth to Lowendal Island = 12 hrs • Exmouth to Montebello Islands = 13 hrs • Exmouth to Barrow Island = 10 hrs Transit times (road) • Fremantle to Exmouth = ~24 hrs • Fremantle to Karratha/Dampier = ~24 hours • Exmouth to Dampier/ Karratha= 7 hrs • Exmouth to North West Cape = 0.5 hr. Clean-up equipment mobilised to deployment port location <48 hours	In effect	Equipment	Remove stranded hydrocarbons from shorelines in order to reduce impact on coastal protection priorities and facilitate habitat recovery. Consideration given to negative impacts of equipment and personnel on sensitive coastal ecology.	Provides functionality, availability, reliability, survivability, compatibility and independence Area for improvement – availability – procurement and mobilisation of equipment	**Feasible** Cost of membership with AMOSC Cost of equipment purchase/ hire and maintenance at the time of incident	**In effect**

Strategy	Control Measure	Alternative, Additional, Improved	Control Measure Category	Environmental Outcomes	Effectiveness	Feasibility	Accept/ Reject
	Resources in place to commence shoreline clean-up within 60–72 hours (weather/daylight dependent)						
	Level 3: Manual clean-up and flushing equipment from: Geelong (AMOSC, 1*shoreline support kit, 2* flushing kits, 1*shoreline impact lance kit) Singapore (OSRL) and national hardware outlets. Decontamination/ staging equipment from: Geelong (AMOSC, 1*decon kit). Mobile plant sourced from national hire companies. PPE from Geelong (AMOSC, 1*container, 4*gas detectors). Transit time (road/ air) • Geelong or Singapore to Exmouth or Karratha = 3–5 days	In effect	Equipment	Remove stranded hydrocarbons from shorelines in order to reduce impact on coastal protection priorities and facilitate habitat recovery. Consideration given to negative impacts of equipment and personnel on sensitive coastal ecology	Provides functionality, availability, reliability, survivability, compatibility and independence Area for improvement – availability – procurement and mobilisation of equipment	**Feasible** Cost of membership with AMOSC and OSRL Cost of equipment purchase/ hire and maintenance at the time of incident	**In effect**
	Mechanical mobile plant equipment for clean-up pre-purchased and positioned at strategic locations (Exmouth)	Additional	Equipment	Environmental benefits and impacts are dependent on hydrocarbon fate and local ecology. Reduced mobilisation times and improved access would assist, should mobile plant be deemed advantageous.	Improved availability and reliability	**Feasible** Costs associated with equipment purchase and maintenance	**Reject** Shoreline clean-up is a secondary response strategy for the LOWC scenario, given the modelling predicts no shoreline accumulation predicted at or above the response threshold (100 g/m^2). There is a high likelihood that mobile plant equipment is not used due to negative environmental impacts, leaving purchased equipment unutilised and costs disproportionate. Locally available hire plant can be used. Additional plant could be mobilised from Perth if required.
	Pre-purchase and storage of equipment (decontamination/staging equipment, clean-up and flushing, PPE) at strategic locations (e.g. Exmouth, Dampier)	Additional	Equipment	Improve mobilisation time, potential for more response locations	Improved availability and reliability	**Feasible** Cost in purchase and maintenance of equipment	**Reject** Equipment for first strike available at Exmouth. Additional equipment can be mobilised from Dampier.
Shoreline Clean-up – vessels	Level 1: Shallow draft vessels in use by Santos and located at (or in transit to) Exmouth, Dampier or Varanus Island. Remote island transfer vessel mobilised to deployment port location within 24 hrs.	In effect	Equipment	Remove stranded hydrocarbons from shorelines in order to reduce impact on coastal protection priorities and facilitate habitat recovery. Consideration given to negative impacts of equipment and personnel on sensitive coastal ecology	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; early vessel availability	**Feasible** Cost of existing contracts with vessel providers	**In effect**
	Level 2: Shallow draft vessels sourced through Master Service Agreement, located in region, tracked (where possible, if fitted with AIS) via the WA Vessel Monitoring System (IHS Maritime Portal) and contracted through a Master Service Agreement.	In effect	Equipment	Remove stranded hydrocarbons from shorelines in order to reduce impact on coastal protection priorities and facilitate habitat recovery. Consideration given to negative impacts of equipment and personnel on sensitive coastal ecology	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; vessel availability	**Feasible** Cost of vessel monitoring system (IHS Maritime Portal subscription) Cost of contracts at the time of spill event	**In effect**

Strategy	Control Measure	Alternative, Additional, Improved	Control Measure Category	Environmental Outcomes	Effectiveness	Feasibility	Accept/ Reject
	Level 3: Shallow draft vessels sourced without existing contracts from any location	In effect	Equipment	Remove stranded hydrocarbons from shorelines in order to reduce impact on coastal protection priorities and facilitate habitat recovery. Consideration given to negative impacts of equipment and personnel on sensitive coastal ecology	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; vessel availability	**Feasible** Cost of contracts at the time of requirement.	**In effect**
	Access to additional shallow draft vessels owned by Santos WA to transport personnel to key sensitive areas on offshore islands	Additional	Equipment	Faster response times to facilitate protection of key sensitive areas on offshore islands	Improved availability and reliability	**Feasible** Costs of vessel purchase and maintenance	**Reject** Shoreline clean-up is a secondary response strategy for the LOWC scenario, given the modelling predicts no shoreline accumulation predicted at or above the response threshold (100 g/m^2). High numbers of shallow draft vessels located in the region. One vessel can help to set boom at multiple locations.
Shoreline Clean-up personnel	Level 2: Clean-up team leaders from Varanus Island, Devil Creek, Perth (Santos WA), Fremantle (AMOSC staff), Perth (AMOSC Core Group). Santos Offshore Core Group mobilised to deployment port location within 24 hrs. AMOSC Staff and Industry Core Group mobilised to site/deployment port location within 48 hrs.	In effect	People	Remove stranded hydrocarbons from shorelines in order to reduce impact on coastal protection priorities and facilitate habitat recovery. Consideration given to negative impacts of equipment and personnel on sensitive coastal ecology	Provides functionality, availability, reliability, survivability, compatibility and independence Area for improvement – availability – rapid mobilisation of personnel in initial 48 hours of incident	**Feasible** Costs associated with staff training. Costs of membership, MoU with AMOSC, AMSA through the National Plan.	**In effect**
	Level 3: Clean-up team leaders from Geelong (AMOSC staff), interstate (AMOSC Core Group; AMSA) and international (OSRL). Interstate staff available from 2–3 days. OSRL available from 2–3 days, remaining personnel available from 4–5 days, subject to approvals/ clearances.	In effect	People	Remove stranded hydrocarbons from shorelines in order to reduce impact on coastal protection priorities and facilitate habitat recovery. Consideration given to negative impacts of equipment and personnel on sensitive coastal ecology.	Provides functionality, availability, reliability, survivability, compatibility and independence Area for improvement – availability – rapid mobilisation of personnel	**Feasible** Costs associated with staff training Costs of membership, MoUs with AMOSC, AMSA	**In effect**
	Access to additional team leaders that are locally based at strategic locations (e.g. Exmouth, Dampier) or can be mobilised within short time frames.	Additional	People	Improve mobilisation time, potential for more response locations.	Improved availability and reliability.	**Feasible** Cost of employment and training of staff Cost of being locally based or on a rapid mobilisation plan	**Reject** Santos WA already employs trained oil spill responders in the region that can be mobilised to key areas by helicopter
	Access to clean-up labour personnel (predominantly based in Perth).	In effect	People	Remove stranded hydrocarbons from shorelines in order to reduce impact on coastal protection priorities and facilitate habitat recovery. Consideration given to negative impacts of equipment and personnel on sensitive coastal ecology	Provides functionality, availability, reliability, survivability, compatibility and independence Area for improvement – availability – rapid mobilisation of personnel in initial 48 hours of incident	**Feasible** Costs of labour hire through existing service provider	**In effect**
	Faster access to clean-up personnel via Perth based labour hire contractor	Improved	People	Improve mobilisation time, potential for response operations at more locations	Improved availability and reliability	**Not Feasible** Not feasible to mobilise labour hire personnel in less than 72 hours	**Reject** Shoreline clean-up is a secondary response strategy for the LOWC scenario, given the modelling predicts no shoreline accumulation predicted at or above the response threshold (100 g/m^2).

Strategy	Control Measure	Alternative, Additional, Improved	Control Measure Category	Environmental Outcomes	Effectiveness	Feasibility	Accept/ Reject
							Would not result in access to clean-up personnel any faster than what can be provided via AMOSC Core Group and mutual aid.
	Faster access to clean-up personnel via locally based labour hire companies or emergency response organisations	Improved	People	Improve mobilisation time, potential for response operations at more locations	Improved availability and reliability	**Not Feasible** No identified regional labour hire companies	**Reject** Shoreline clean-up is a secondary response strategy for the LOWC scenario, given the modelling predicts no shoreline accumulation predicted at or above the response threshold (100 g/m^2). Would not result in access to clean-up personnel any faster than what can be provided via AMOSC Core Group and mutual aid.
	Faster access to clean-up personnel via Santos employment of local personnel	Improved	People	Improve mobilisation time, potential for response operations at more locations	Improved availability and reliability	**Feasible** Costs associated with personnel employment and training	**Reject** Shoreline clean-up is a secondary response strategy for the LOWC scenario, given the modelling predicts no shoreline accumulation predicted at or above the response threshold (100 g/m^2). Cost of permanently employing personnel is grossly disproportionate to benefits of availability in initial phase of response.
Shoreline Clean-up – planning	Shoreline sensitivity mapping and Tactical Response Plans (TRP) for key locations	In effect	Procedures	Remove stranded hydrocarbons from shorelines in order to reduce impact on coastal protection priorities and facilitate habitat recovery. Consideration given to negative impacts of equipment and personnel on sensitive coastal ecology	Provides functionality, availability, reliability, survivability, compatibility and independence Area for improvement – availability – rapid mobilisation in initial 48 hours of incident	**Feasible** Cost associated with development and maintenance of mapping and Tactical Response Plans	**In effect**
Shoreline Clean-up response	Prioritise use of existing roads and tracks	In effect	Procedures	Reduced environmental impact as a result of shoreline access activities, improve response time and efficiency			**In effect**
	Soil profile assessment prior to earthworks	In effect	Procedures	Improved baseline information for shoreline condition			**In effect**
	Pre-cleaning and inspection of equipment (quarantine)	In effect	Procedures	Reduced potential for contaminating environment during response activities			**In effect**
	Use of Heritage Advisor if spill response activities overlap with potential areas of cultural significance	In effect	Procedures	Improved capacity to respond appropriately to areas of potential cultural significance			**In effect**
	Select temporary base camps in consultation with DoT and DBCA	In effect	Procedures	Optimise response based on camp location, reduce environmental impact of camps			**In effect**
	Shoreline Response Programme Manager assessment/selection of vehicle appropriate to shoreline conditions	In effect	Procedures	Improved response efficiency			**In effect**
	Establish demarcation zones for vehicle and personnel movement considering sensitive vegetation, bird nesting/roosting areas and turtle nesting habitat.	In effect	Procedures	Reduced environmental impact as a result of shoreline access activities			**In effect**

Strategy	Control Measure	Alternative, Additional, Improved	Control Measure Category	Environmental Outcomes	Effectiveness	Feasibility	Accept/ Reject
	Operational restriction of vehicle and personnel movement to limit erosion and compaction	In effect	Procedures	Reduced environmental impact as a result of shoreline access activities			**In effect**
	Stakeholder consultation	In effect	Procedures				**In effect**
Oiled Wildlife Response – Adopted control measures in Section 15.5							
Oiled wildlife response – planning	Implementation of the Western Australian Oiled Wildlife Response Plan (WAOWRP) and Pilbara Region Oiled Wildlife Response Plan	In effect	Procedure	Working within the guidelines of the WAOWRP and Pilbara OWRP will ensure a coordinated response and that the expectations of the Control Agency are met with the overall aim to increase the likelihood of success of the OWR (success in terms of wildlife survivorship and rates for release back into the wild).	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement- framework for how Santos will integrate with Control Agencies for OWR	**Feasible** Effort and time involved in developing OWR implementation plan within OSCP based on guidance from WAOWRP and Pilbara OWRP	**In effect**
	Santos Oiled Wildlife Response Framework Plan (7700-650-PLA-0017); sets the corporate guidance for OWR preparedness and response and defines how Santos will integrate with Control Agencies to provide a coordinated response	In effect	Procedure	The framework is complementary to the WAOWRP and Pilbara OWRP and facilitates a rapid coordinated response, and the provision of resources by Santos in order to increase the likelihood of success of the OWR.	Improved functionality and reliability	**Feasible** Cost of document development and maintenance	**In effect**
Oiled wildlife response – equipment	Level 2 OWR kits and containers available from AMOSC, AMSA, DBCA or DoT in Exmouth, Broome, Karratha, Fremantle or Kensington. WA equipment mobilised to Exmouth region forward staging area within 48 hrs from oiled wildlife contact (predicted or observed).	In effect	Equipment	Timely access to appropriate equipment is needed for the effective treatment of wildlife in order to increase the likelihood of success of the OWR.	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; none identified	**Feasible** Cost of membership with AMOSC	**In effect**
	Level 3 OWR equipment available from OSRL. Transit times (road/ air) • Singapore to Exmouth = 3–5 days.	In effect	Equipment	Appropriate equipment is needed for the effective treatment of wildlife in order to increase the likelihood of success of the OWR	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; none identified	**Feasible** Cost of membership with OSRL	**In effect**
Oiled wildlife response – personnel	Level 1/2 Santos personnel trained in OWR. OWR trained personnel mobilised to Exmouth region within 24 hrs from oiled wildlife contact (predicted or observed)	In effect	People	Timely access to skilled personnel will enhance the likelihood of success of an OWR.	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; ensure personnel are based not just in the Perth Office but also at VI and DC facilities	**Feasible** Cost of training and maintaining training	**In effect**
	Level 2 OWR personnel from AMOSC, AMOSC-activated Wildlife Response contractor and Industry Mutual Aid. Mobilisation of OWR personnel to site will start to occur in 24-48 hours following notification of actual or imminent impact to wildlife.	In effect	People	Timely access to skilled personnel will enhance the likelihood of success of an OWR.	Provides functionality, availability, reliability, survivability, compatibility and independence Area for improvement – availability – rapid mobilisation of personnel in initial 48 hours of incident	**Feasible** Cost of membership with AMOSC	**In effect**
	Level 3 OWR personnel available through OSRL. OSRL have 5 technical advisors initially available within 2–3 days, remaining personnel available within 4–5 days, subject to approvals/clearances.	In effect	People	Access to skilled personnel will enhance the likelihood of success of an OWR.	Provides functionality, availability, reliability, survivability, compatibility and independence	**Feasible** Cost of membership with OSRL	**In effect**

Strategy	Control Measure	Alternative, Additional, Improved	Control Measure Category	Environmental Outcomes	Effectiveness	Feasibility	Accept/ Reject
					Area of improvement; none identified		
	Maintain labour hire arrangements for access to untrained personnel. Untrained personnel to receive an induction, on-the-job training and work under the supervision of an experienced supervisor.	In effect	People	During a large scale OWR the ability to access large numbers of personnel through labour hire arrangements is imperative in terms of capability for conducting an OWR.	Provides functionality, availability, reliability, survivability, compatibility and independence	**Feasible** Cost of labour hire at time of incident	**In effect**
	Additional Santos OWR trained personnel positioned at VI and Perth	In effect	People	Additional personnel trained in OWR and whom are located at facilities will enhance the first strike capability of Santos and therefore enhance the likelihood of success of the OWR.	Improved functionality, availability, reliability and independence.	**Feasible** Cost of training staff	**In effect**
	Pre-hire and/or pre-positioning of staging areas and responders	Additional	System	This may enhance response times and first strike capability and hence improve the likelihood of success of the OWR. Conversely, pre-positioned personnel and staging areas may result in negative impacts to the environment and wildlife. The common operating picture (COP) and operational NEBA will inform the best response strategies at the time of the spill event.	Improved functionality, availability, reliability and independence.	**Feasible** Additional wildlife resources could total $1,500 per operational site per day. This is a guaranteed cost regardless of whether a spill occurs or not.	**Reject** The cost of setting up staging areas and having responders on standby is considered disproportionate to the environmental benefit gained. Further, pre-positioned personnel and staging sites may have negative impacts on the environment and wildlife. The overall OWR capability Santos can access through Santos staff, AMOSC, AMOSC mutual aid, Santos labour force hire arrangements, DBCA and wildlife carer network are considered adequate, with further advice and international resources available through OSRL.
	Direct contracts with service providers	Alternative	System	This option duplicates the capability accessed through AMOSC and OSRL and would complete for the same resources without providing a significant environmental benefit	Does not improve effectiveness	**Feasible** Cost of contract	**Reject** This option is not adopted as the existing capability / contractual arrangements meets the anticipated need.
Waste Management – Adopted control measures in Section 17.6							
Waste Management	Waste management sourced through contract with waste service provider. Contract with waste service provider maintained and periodically reviewed. Waste receptacles mobilised from Karratha within 24 hrs for containment and recovery, protection and deflection and shoreline clean-up response strategies.	In effect	System	Timely and efficient handling of waste will reduce environmental impacts of waste and waste management. Consideration given to risks of secondary contamination.	Provides functionality, availability, reliability, survivability, compatibility and independence. Area of improvement; none identified	**Feasible** Cost of contract	**In effect**
	Maintain contracts with multiple waste service providers	Additional	System	Contract with additional waste service provider will not provide an additional environmental benefit as there are two major service providers in the region and reciprocal arrangements facilitate access to equipment of both.	Provides functionality, availability, reliability, survivability, compatibility and independence.	**Feasible** Significant additional cost in maintaining two contracts for the same service	**Reject** Capacity of existing arrangements exceeds the worst-case resourcing requirements.
	Temporary waste storage capacity available through waste service provider, AMOSC, AMSA, OSRL stockpiles	In effect	Equipment	Timely and efficient handling of waste will reduce environmental impacts of waste and waste management. Consideration given to risks of secondary contamination.	Provides functionality, availability, reliability, survivability, compatibility and independence. Area of improvement; none identified	**Feasible** Costs of contracts, MOU with waste service provider, AMOSC and OSRL, access to National Plan Resources through AMSA	**In effect**

Strategy	Control Measure	Alternative, Additional, Improved	Control Measure Category	Environmental Outcomes	Effectiveness	Feasibility	Accept/ Reject
	Procure temporary waste storage for Santos stockpile	Additional	Equipment	Additional storage available if required. Tanks may be stored in geographic locations that may reduce mobilisation times and allow faster collection and storage of waste. Additional storage may facilitate continuous collection operations to occur.	Provides functionality, availability, reliability, survivability, compatibility and independence	**Feasible** Additional cost in purchase and maintenance of tanks	**Reject** Capacity of existing arrangements exceeds the worst-case resourcing requirements. Purchasing this equipment for Santos stockpile is surplus to Santos requirements as AMOSC, AMSA and OSRL provides this equipment in strategic locations. Reduced mobilisation time is not an advantage, as waste storage can be mobilised at the same time as collection response strategies, and no waste needs to be stored prior to collection commencing.
	Vessels for waste transport through Santos contracted providers. To minimise vessel decontamination requirements, larger vessel will remain on station whilst smaller vessel will transport waste to Dampier or Exmouth.	In effect	Equipment	Timely and efficient handling of waste will reduce environmental impacts of waste and waste management. Consideration given to risks of secondary contamination.	Provides functionality, availability, reliability, survivability and compatibility. Area of improvement; dependence and availability of vessels	**Feasible** Cost of contract with vessel providers	**In effect**
	Monitoring and hire of additional vessels located in the region, tracked via the WA Vessel Monitoring System (IHS Maritime Portal). Vessels contracted at the time of incident (i.e. no master services agreement already in place).	Additional	Equipment	Timely and efficient handling of waste will reduce environmental impacts of waste and waste management. Consideration given to risks of secondary contamination.	Provides functionality, availability, reliability, survivability and compatibility.	**Feasible** Cost of vessel monitoring system (IHS Maritime Portal subscription) Cost of contracts at the time of requirement.	**Accept**
	Contract additional vessels on standby for waste transport	Additional	Equipment	Reduce delays in transportation of waste, particularly greater capacity for containment and recovery in the initial 2-5 days of response	Provides functionality, availability, reliability, survivability, compatibility and dependence	**Feasible** Cost in contracting vessels to remain on standby for incident waste requirements	**Reject** Capacity of existing arrangements exceeds the worst-case resourcing requirements. Expense of maintaining vessels on standby that are surplus to day-to-day requirements is disproportionate to environmental benefit. Santos is accustomed to coordinating logistics for tasks around finite resources. Santos monitors vessel availability through Santos Vessel Tracking System. Regularly contracted vessels could be supplemented with vessels of opportunity.
Operational and Scientific Monitoring – Adopted control measures in Section 16.1							
Operational & Scientific Monitoring (OSM) service provider and equipment	Maintenance of contract for operational and scientific monitoring services (OSM) and annual review of OSM Bridging Implementation Plans (BIPs). OSM Service Provider and monitoring equipment mobilised to site 72 hrs from OSM Activation.	In effect	System	This is the main tool for determining the extent, severity and persistence of environmental impacts from an oil spill and allows operators to determine whether their environmental protection outcomes have been met (via scientific monitoring activities). It is used to inform areas requiring rehabilitation. This strategy also evaluates the recovery from the spill.	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; none identified	**Feasible** Cost of contract with Operational and Scientific Monitoring (OSM) Service Provider	**In effect**
	Regular capability reports from OSM Services Provider shows personnel availability and annual reviews OSM BIPs	In effect	System	This ensures the SMSP has the capability to undertake scientific monitoring, including, post-spill pre-impact surveys within the	Improves functionality, availability and reliability	**Feasible** Cost of contract with OSM Service Provider	**In effect**

Strategy	Control Measure	Alternative, Additional, Improved	Control Measure Category	Environmental Outcomes	Effectiveness	Feasibility	Accept/ Reject
				EMBA of receptors with deficient baseline data.			
	Conduct periodical review of existing baseline data sources across the Santos combined EMBA	In effect	System	This ensures that receptors within the EMBA with deficient baseline data are identified	Improves functionality and provides compatibility	**Feasible** Cost of contract with OSM Service Provider	**In effect**
	Operational and Scientific monitoring personnel, plant and equipment on standby at the operational location	Additional	People / Equipment	Improve mobilisation time	Improved availability and reliability	**Feasible** Cost would be in excess of $1 mil. annually	**Reject** Cost of control measure is disproportionate to the environmental benefit
	Maintain equipment list and list of suppliers for implementation of Operational and Scientific Monitoring Plans	In effect	Procedure	Improve response time	Improved functionality, availability and reliability	**Feasible** Cost of contract with OSM Service Provider	**In effect**
	Oil sampling kits for operational and scientific monitoring personnel to be positioned at Varanus Island, Exmouth and Dampier	In effect	Equipment	Improve response time	Improved availability and reliability	**Feasible** Cost associated with purchase of equipment and maintenance	**In effect**
Operational and Scientific Monitoring – vessels	Level 2: Hire of vessels located in the region tracked via the WA Vessel Monitoring System (IHS Maritime Portal) and contracted through a Master Service Agreement. Santos to mobilise monitoring vessels to deployment location within 72 hrs from OSM activation	In effect	Equipment	Improve response time	Provides availability and reliability	**Feasible** Cost of vessel monitoring system (IHS Maritime Portal subscription) Cost of contracts at the time of spill event	**In effect**
	Level 3: Vessels sourced without existing contracts from any location	In effect	Equipment	Reduce the volume of surface hydrocarbons to reduce contact with protection priorities.	Provides survivability, compatibility and independence. Area of improvement; functionality, availability and reliability of tow vessels.	**Feasible** Cost of contracts at the time of requirement.	**In effect**
	Determine required vessel specifications according to the IAP, with the aid of the Santos Vessel Requirements for Oil Spill Response (7710-650-ERP-0001) and source vessels through Master Service Agreement, located in region, tracked via the WA Vessel Monitoring System (IHS Maritime Portal) and contracted through a Master Service Agreement.	In effect	Procedure	Improve mobilisation time	Increase in availability and reliability	**Feasible** Cost to determine vessel specifications	**In Effect**
Operational & Scientific Monitoring (Water Quality Monitoring)	Maintain water quality monitoring services through OSM Supplementary Services contract with OSRL. Water quality monitoring personnel, equipment and vessel deployed to spill site within 72 hours of OSM activation.	In effect	System	This monitoring will confirm the distribution and concentration of oil, validating spill trajectory modelling and inform the IMT decisions with the aim of reducing and mitigating environmental impact	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; availability of vessels	**Feasible** Cost of contracts with OSM Service Provider	**In effect**
	Access to additional water quality monitoring services through AMOSC	In effect	System	This monitoring will confirm the distribution and concentration of oil, validating spill trajectory modelling and inform the IMT decisions with the aim of reducing and mitigating environmental impact	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; availability of vessels	**Feasible** Cost of OSRL membership	**In effect**
	Determine required vessel specifications according to the IAP, with the aid of the Santos Vessel Requirements for Oil Spill Response (7710-650-ERP-0001) and source vessels through Master Service Agreement, located in region, tracked via the WA Vessel Monitoring System (IHS Maritime Portal) and contracted through a Master Service Agreement.	In effect	Procedure	Improve mobilisation time	Improved availability and reliability	**Feasible** Cost to determine vessel specifications	In effect

Strategy	Control Measure	Alternative, Additional, Improved	Control Measure Category	Environmental Outcomes	Effectiveness	Feasibility	Accept/ Reject
	Purchase of first strike oil/water quality monitoring kits to be positioned at Exmouth and VI. Technical procedure for sample collection developed (Santos Oil and Water Sampling Procedures – 7710-650-PRO-0008).	In effect	Equipment / Procedure	Will enable oil fingerprinting and initial measurements of oil concentrations	Improve function, availability, survivability and compatibility	**Feasible** Cost of purchasing equipment and developing procedure	**In effect**
	Trained monitoring specialists on standby at site	Additional	People	Ensure sampling is conducted correctly	Improves reliability	**Feasible** Costs associated with staff employment	**Reject** This is not necessary as a procedure for sample collection is in place (Santos Oil and Water Sampling Procedures – 7710-650-PRO-0008)
Operational & Scientific Monitoring (Shoreline Assessment)	Level 1/2: WA-based AMOSC staff and core group operations personnel (WA industry has arrangements through AMOSC to mobilise shoreline assessment team leader personnel to site 24–72 hours from time of shoreline contact prediction)	In effect	People / Procedures	To assist in determining which response methods are most appropriate for shorelines, it is necessary to obtain information about shoreline character, degree and distribution of oiling (if present), presence of sensitive receptors (habitats, fauna etc.) and information on shoreline processes and access routes that could aid or hamper response efforts.	Provides functionality, availability, reliability, survivability, compatibility and independence Area of improvement; none identified	**Feasible** Cost of AMOSC membership	**In effect**
	Level 3: Maintain membership with OSRL to access SCAT trained responders (OSRL, 18 people). OSRL staff initial 5 technical advisors available from 2–3 days, remaining personnel available from 4–5 days, subject to approvals/clearances.	In effect	People / Procedures	To assist in determining which response methods are most appropriate for shorelines, it is necessary to obtain information about shoreline character, degree and distribution of oiling (if present), presence of sensitive receptors (habitats, fauna etc.) and information on shoreline processes and access routes that could aid or hamper response efforts.	Provides additional functionality, availability, reliability, survivability, compatibility and independence Area of improvement; none identified	**Feasible** Cost of OSRL membership	**In effect**
	Just-In-Time training to train personnel for spill response roles	Additional	People	Greater capacity for shoreline clean-up assessment in the later stages of response	Improved availability and reliability, lower dependence	**Feasible** High cost of training at the time of requirement. Minimum shoreline contact window of opportunity to train workforce is limited. Trainees require minimal prior skills and will be easily sourced.	**Rejected** Existing resources are sufficient to resource the response requirements.
Operational and Scientific Monitoring (Wildlife Reconnaissance – aerial/vessel surveillance, shoreline and coastal habitat assessment)	Maintain contract with operational and scientific monitoring service provider for access to fauna aerial observers and personnel experienced in conducting relevant fauna surveys through OSM Supplementary Services contract with OSRL.	In effect	People / Procedures	Wildlife reconnaissance aids the IMT to plan and make decisions for executing an oiled wildlife response and for minimising impacts to wildlife associated with the clean-up response	Provides functionality, availability and compatibility Area for improvement; availability – reduce time to mobilise personnel to strategic locations	**Feasible** Cost of contract	**In effect**
	Maintain a list of providers that could assist with fauna aerial observations, e.g. whale shark spotting planes	In effect	People	Wildlife reconnaissance aids the IMT to plan and make decisions for executing an oiled wildlife response and for minimising impacts to wildlife associated with the clean-up response	Improves availability and reliability Area of improvement; none identified	**Feasible** Cost of developing and maintaining list	**In effect**
	Ensure trained marine mammal/fauna observers based at strategic locations such as Port Hedland, Karratha and Broome	Additional	People	Having trained marine mammal/fauna observers living locally and on short notice to mobilise would result in trained marine mammal/fauna aerial observers available from Day 1	Improved availability and reliability	**Feasible** Costs associated with staff employment and training	**Reject** Maintaining trained fauna observers at location is considered grossly disproportionate as they can be mobilised from scientific monitoring provider.

Appendix C Pollution report

Government of **Western Australia**
Department of **Transport**

Marine Pollution Report (POLREP)
MEER

When blank, this form is classed as **OFFICIAL**, when filled out, this form is classed as **OFFICIAL-SENSITIVE.**

BEFORE completing this form please contact the MEER duty officer on (08) 9480 9924 (24hrs). Immediate reporting will enable a rapid response.

Return completed form to:
Maritime Environmental Emergency Response
Department of Transport
Email: marine.pollution@transport.wa.gov.au and rccaus@amsa.gov.au
Phone (08) 9480 9924

INCIDENT DESCRIPTION

Incident Name: _____ Date and Time of Incident (24 hr format): _____

Location name/description: _____

Incident Coordinates: Latitude of spill _____ Longitude of spill _____

Description of Incident: _____

Weather conditions at site: _____

OIL DETAILS

Pollutant source

Amount of fuel/pollutant on board: _____

☐ Vessel ☐ Land (Specify) _____ ☐ Other (Specify) _____ ☐ Unknown

Vessel type (if known) ☐ Tanker ☐ Container ☐ Bulk ☐ Cargo

☐ Fishing ☐ Defence ☐ Recreational ☐ Other (Specify) _____

Vessel name: _____ Flag State / Callsign: _____ Australian vessel? ☐ Yes ☐ No

Pollutant

☐ Oil (type) ☐ Bilge ☐ Diesel ☐ HFO bunker ☐ Crude ☐ Unknown ☐ Other (Specify)_____

☐ Chemical Name: _____ MARPOL cat / UN Nos:_____

☐ Garbage Details/description: _____

☐ Packaged Details/description: _____

☐ Sewage Details/description: _____

☐ Other Details/description: _____

Extent

Size of spill (length & width in metres): _____

Amount of pollutant spilt, if known (litres): _____

Has the discharge stopped? ☐ Yes ☐ No ☐ Unknown

☐ Photos taken Details: _____ held by:_____

☐ Video taken Details: _____ held by:_____

☐ Samples taken Description: _____ held by:_____

☐ Items retrieved Description: _____ held by:_____

To attach photos, this form must be opened in acrobat, or alternatively, photos can be attached to the submission email before sending.

ADDITIONAL INFORMATION

Response action undertaken? ☐ Yes ☐ No If yes, provide details below, please include any environmental impact.

Equipment used? ☐ AMSA ☐ State ☐ Industry

Is assistance for an investigation required from DoT ☐ Yes ☐ No

KEY CONTACT DETAILS

Name:_____ Position: _____ Phone: _____

Control Agency: Select the Control Agency _____ Jurisdictional Authority: Select the Jurisdictional Authority _____

PRIVACY STATEMENT

The Department of Transport is collecting the information on this form to enable it to carry out its role as Jurisdictional Authority as per State Hazard Plan - Maritime Environmental Emergency.
The Department of Transport and/or AMSA may give some or all of this information to other government bodies, non-government organisations who have responsibilities under the National Plan, and law enforcement agencies.

Pollution Report (POLREP)		
Reporter's Signature:		
Name:	Agency:	Role:

Once you have completed the form please check that all relevant fields have been filled with accurate data.
Please email completed form to marine.pollution@transport.wa.gov.au

Appendix D Situation report

Government of **Western Australia**
Department of **Transport**

Maritime Environmental Emergency Situation Report (SITREP)
MEER

When blank, this form is classed as **OFFICIAL**, when filled out, this form is classed as **OFFICIAL-SENSITIVE.**

Return completed form to:
Maritime Environmental Emergency Response
Department of Transport
Email: marine.pollution@transport.wa.gov.au and rccaus@amsa.gov.au
Phone (08) 9480 9924

MARITIME ENVIRONMENTAL EMERGENCY SITUATION REPORT (SITREP)

This is advice from the Control Agency of the current status of the incident and the response.
This form is transmitted to all relevant agencies including:

- Jurisdictional Authority
- Support Agencies

INCIDENT DESCRIPTION

Incident Name: _____ Ref. No. _____

Incident Controller: _____

Incident Declaration Level: Please select _____ Controlling Agency: Please select _____

Priority ☐ Urgent ☐ Immediate ☐ Standard

Final SITREP? ☐ Yes ☐ No

Next SITREP on: _____

Date and Time of Incident (24 hr format): _____

POLREP or AMSA Form 18 Reference : _____

Incident location: _____ Latitude: _____ Longitude: _____

Brief description of incident and impact: _____

Overall weather conditions: _____

Summary of response actions to date: _____

Current Strategies: _____

Summary of resources available/deployed:_____

Expected developments: _____

Other Information:_____

Maritime Environmental Emergency Situation Report (SITREP)		
Reporter's Signature:		
Name:	**Agency:**	**Role:**

Once you have completed the form please check that all relevant fields have been filled with accurate data.
Please email completed form to marine.pollution@transport.wa.gov.au

Appendix E Vessel surveillance observer log

Vessel Surveillance Observer Log – Oil Spill

Survey Details			
Date	Start time:	End Time:	Observers:
Incident:			Area of Survey:
Vessel:			Master:

Weather Conditions	
Wind speed (knots):	Wind direction:
Time high water and height (LAT):	Current direction:
Time low water and height (LAT):	Current speed (nM):
Tide during observations:	Sea state:
Stage of tide during observations (incoming/falling):	Other weather observations:

Slick Details											
Slick grid parameters by lat/long:					Slick grid parameters (vessel speed)			Slick grid dimensions: N/A			
Length Axis:		Width Axis:			Length Axis: N/A			Width Axis	Length		nm
Start Latitude		Start Latitude			Time (seconds)			Time (seconds)	Width		nm
Start Longitude		Start Longitude							Length		nm
End Latitude		End Latitude			Speed (knots)			Speed (knots)	Width		nm
End Longitude		End Longitude							Grid area		km^2
Code	Colour	%age cover observed	Total grid area		Area per oil code			Factor	Oil volume		
1	Silver			km^2		km^2		40-300 L/ km^2		L	
2	Iridescent (rainbow)			km^2		km^2		300-5,000 L/ km^2		L	
3	Discontinuous true oil colour (Brown to black)			km^2		km^2		5,000-50,000L/ km^2		L	
4	Continuous true oil colour (Brown to black)			km^2		km^2		50,000 – 200,000 L/ km^2		L	
5	Brown / orange			km^2		km^2		>200,000 L/ km^2		L	

Timeline of observations:

Time	Description

Appendix F Aerial surveillance observer log

Santos

Aerial Surveillance Observer Log – Oil Spill

Survey Details				
Date:	Start time:	End Time:	Observer/s:	
Incident:			Area of Survey:	
Aircraft type:	Call sign:		Average Altitude:	Remote sensing used:

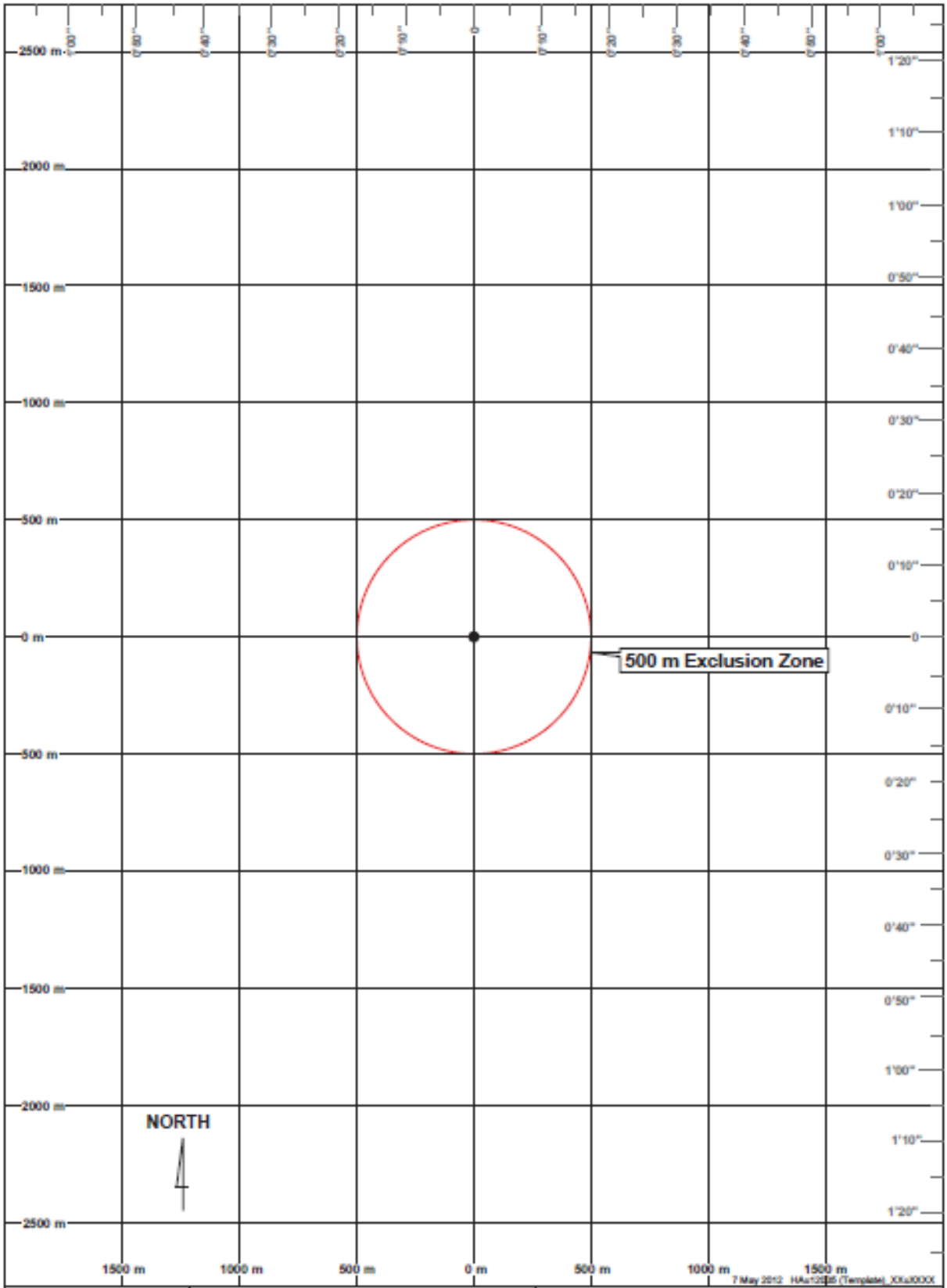
Weather Conditions	
Wind speed (knots)	Wind direction
Cloud base (feet)	Visibility
Time high water	Current direction
Time low water	Current speed (nM)

Slick Details											
Slick grid parameters (lat/long)				Slick grid parameters (air speed)		Slick grid dimensions					
Length Axis		Width Axis		Length Axis		Width Axis	Length	nm			
Start Latitude		Start Latitude		Time (seconds)		Time (seconds)	Width	nm			
Start Longitude		Start Longitude					Length	nm			
End Latitude		End Latitude		Air Speed (knots)		Air Speed (knots)	Width	nm			
End Longitude		End Longitude					Grid area	km^2			

Code	**Colour**	**% cover observed**	**Total grid area**		**Area per oil code**		**Factor**	**Oil volume**	
1	Silver			km^2		km^2	40-300 L/ km^2		L
2	Iridescent (rainbow)			km^2		km^2	300-5,000 L/ km^2		L
3	Discontinuous true oil colour (Brown to black)			km^2		km^2	5,000-50,000L/ km^2		L
4	Continuous true oil colour (Brown to black)			km^2		km^2	50,000 – 200,000 L/ km^2		L
5	Brown / orange			km^2		km^2	>200,000 L/ km^2		L

Appendix G Aerial surveillance surface slick monitoring template

AERIAL SURVEILLANCE SURFACE SLICK MONITORING TEMPLATE



	NAME:	VESSEL / AIRCRAFT:
	DATE / HOUR:	OTHER REFERENCE:

Appendix H Aerial surveillance marine fauna sighting record

Santos

OIL SPILL SURVIELLANCE - MARINE FAUNA SIGHTING RECORD SHEET

Date:		**Time:**	
Latitude:		**Longitude:**	

MARINE FAUNA ID GUIDE

○ Humpback whale

○ Blue whale

○ Minke whale

○ Sperm whale

○ Killer whale

○ Bryde's whale

○ Whale species unknown

○ Whale shark

○ Dugong

○ Hawksbill turtle

○ Loggerhead turtle

○ Green turtle

○ Flatback turtle

○ Bottlenose dolphin

○ Spinner dolphin

○ Dolphin species unknown

○ Leatherback turtle

○ Turtle species unknown

FAUNA DETAILS					
Category	**Type/species?** **Adult/juvenile?** **ID confidence?**	**Number**	**Date/Time**	**Photo/ video taken?** **Reference No.**	**Behaviour / Comments.** **Proximity to oil? Oiled?** **Milling? Feeding? Transiting?**
Cetaceans (Whales/ Dolphins)					
Turtles					
Birds					
Dugongs					
Sharks					
Other					

Other details for each observation location

WEATHER DETAILS

Sea State ◯ Mirror calm ◯ Small waves ◯ Slight ripples ◯ Large waves some whitecaps ◯ Large waves, many whitecaps

Visibility ◯ Excellent ◯ Good ◯ Moderate ◯ Poor ◯ Very Poor

OBSERVER DETAILS

Observer Name	Observer signature	**Observer** ◯ Inexperienced ◯ Experienced

Appendix I Aerial surveillance shoreline observation log

Aerial Surveillance Reconnaissance Log – Oil Spill

Survey Details				
Incident:	Date:	Start time:	End Time:	Observer/s:

Area of Survey	
Start GPS LATITUDE: LONGITUDE:	End GPS LATITUDE: LONGITUDE:

Aircraft type	Call sign	Average Altitude	Remote sensing used (if any)

Weather Conditions		
Sun/Cloud/Rain/Windy	Visibility	Tide Height L/M/H
Time high water	Time low water	Other

Shoreline Type - Select only ONE primary (P) and ANY secondary (S) types present					
	Rocky Cliffs		Boulder and cobble beaches		Sheltered tidal flats
	Exposed artificial structures		Riprap		Mixed sand and gravel beaches
	Inter-tidal platforms		Exposed tidal flats		Fine-Medium sand grained beaches
	Mangroves		Sheltered rocky shores		Other
	Wetlands		Sheltered artificial structures		

Operational Features (tick appropriate box)					
	Direct backshore access		Alongshore access		Suitable backshore staging
Other					

Appendix J Shoreline clean-up equipment

Table J-1: Recommended equipment for an initial deployment of a 6-person shoreline clean-up team

Shore clean-up Tools	Quantity
Disposal Bag Labelled, 140 cm x50cm x 100µm	1,000
Disposal Bag large fit 205ltr drum, 100cm x 150cm x 100µm	50
Polyethylene Safety Shovel 247mm z 978mm	2
Steel Shovel	4
Steel Rake	2
Landscapers Rake	2
Barrier Tape – “Caution Spill Area”	10
Pool scoop with extendable handle – flat solid	2
Poly Mop Handle	2
Safety Retractable Blade Knife	2
Poly Rope 20m	6
Star Pickets	24
Star Picket driver	1
Hand Cleaner	1
Cable ties – general use	1,000
Wheel Barrow	2
Galvanised Bucket	4
Pruning secateurs	2
Hedge Shears	1
Personal Protection Equipment (PPE) – Team of 6	
Spill Crew Hazguard water resistant coveralls (assorted sizes)	36
Respirator dust/mist/fume and valve	40
Disposable box light nitrile gloves (100bx)	2
Alpha Tec gloves (assort size)	24
Ear Plugs (200bx)	1
Safety Glasses	18
Safety Goggles non vented	6
Gum Boots (assort size)	18
Rigger Gloves (assort size)	18
Day/Night Vest	6
Storage Equipment	
Collapsible Bund 1.6m x 1.2m	2
Collapsible bund 4m x 2.4m	1
Misc. sizes of ground sheets / tarps.	6
Absorbents	
Absorbent Roll ‘oil and fuel only’ 40m x 9m	6
Absorbent Pad “oil and fuel only” 45cm x 45cm	400
Poly Mops (snags)	150
Poly Absorbent Wipes	10
Additional Items	
Folding Deck Chair 6	6
Folding Table 1	1
Shelter open side 1	1
6 Person first aid kit 1	1
Wide Brim Hat with cord 6	6
Sunburn Cream 1 litre pump bottle 1	1
Personal Eyewash bottle 500mls 6	6
Personal Drink bottle 750mls 6	6
Boxes, Bin and Lid Storage/transport assorted	-
Optional items	
Inflatable tent 9 square metres	1

Table J-2: Recommended equipment list for a decontamination unit for a shoreline clean-up team

Shore clean-up Tools	Quantity
Inflatable Decon Tent	1
Inflatable Tent 9 square metres – Modesty or Control tent	1
Misc sizes of ground sheets/tarps	4
Collapsible Bund 1.6m x 1.2m (two stages)	2
2 stools in each bund	4
Collapsible Bund 4m x 2.4m (for used PPE and clothing into DB's)	1
Long Handled Scrub brush	2
Scrub Brush	2
Simple Green 20 ltr	2
Poly Absorbent Wipes	10
Wet Wipe Canister	6
Disposal Bag for Clothing, 140cm x 50cm x 100µm	100
Bath towel	6
Liquid soap in push dispenser (citrus based)	1
Track mat – Absorbent for Corridor/walkway	1
Star pickets	16
Star picket driver	1
Barrier tape to create corridors	4
Safety Goggles non vented (used during decon)	6
Additional items	
Folding Deck Chair	6
Folding Table	1
Shelter open side	1
6 Person first aid kit	1
Wide Brim Hat with cord	6
Sunburn Cream 1 litre pump bottle	1
Personal Eyewash bottle 500mls	6
Personal Drink bottle 750mls	6
Boxes, Bin and Lid Storage/transport assorted	-

Table J-3: Recommended equipment list for deployment of a 6-person team for shoreline flushing or recovery

Flushing Equipment	Quantity
Diesel self prime semi trash pump, 25-35 psi, 4.8hp	1
Perforated 2" lay flat hose, 20 m sections	2
Section Hose 2", 20m sections	5
Hose End Strainer	1
Recovery Equipment	
Tidal Boom (shoreline boom) 25m lengths	2 (50m)
Tidal Boom Accessories pack 1	1
Versatech Zoom Curtin Boom 300mm chamber, 450mm skirt 25m section 2 (50m)	2 (50m)
Towing Bridle 2	2
Danforth Sand Anchor Kit, 30m lines, 15m trip lines 3	3
Diesel Powered pump with hose 1	1
Manta Ray skimmer 1	1
Personal Protection Equipment (PPE) – Team of 6	
Spill Crew Hazguard water resistant coveralls (assorted sizes)	36
Respirator dust/mist/fume and valve	40
Disposable box light nitrile gloves (100 box)	2
Ear Plugs (200 box)	1
Safety Glasses	18
Gum Boots (assorted sizes)	18
Hyflex Oil Restraint Gloves (assorted sizes)	18
Day/Night Vest	6
Storage Equipment	
Collapsible Bund 1.6m x1.2m	1
Misc sizes of ground sheets/tarps	6
Collapsible Tank 5,000 litres	2
Absorbents	
Absorbent Boom 'oil and fuel only' 3 or 6m x 180,mm	200 m
Absorbent Roll 'oil and fuel only' 40m x 9m	10
Absorbent Pad "oil and fuel only" 45cm x 45cm	1,000
Poly Absorbent Wipes	10
Additional Items	
Folding Deck Chair	6
Folding Table	1
Shelter open side	1
6 Person first aid kit	1
Wide Brim Hat with cord	6
Sunburn Cream 1 litre pump bottle	1
Personal Eyewash bottle 500mls	6
Personal Drink bottle 750mls	6
Boxes, Bin and Lid Storage/transport assorted	-
Inflatable Tent 9 square metres	1

Table J-4: Recommended equipment list for a 6-person team for near shore clean-up

Absorbents	Quantity
Absorbent Roll ‘oil and fuel only’ 40m x 9m	20
Absorbent Pad “oil and fuel only” 45cm x 45cm	2,000
Absorbent Boom “oil and fuel only” 3or6m z 180mm	200 m
Poly Mops (snags)	150
Poly Absorbent Wipes	20
Recovery Equipment	
Tidal Boom (shoreline boom) 25m lengths	4 (100 m)
Tidal Boom Accessories pack	2
Versatech Zoom Curtin Boom 300mm chamber, 450mm skirt 25m section	8 (200 m)
Towing Bridle	2
Danforth Sand Anchor Kit 15kg 30m lines, 15m trip lines	10
Weir Skimmer 30T hr	1
Trash Screen for above	1
Diesel Powered pump with hose	1
Manta Ray skimmer	1
Shore Clean-up Tools	
Disposal Bag large fit 205ltr drum, 100cm x 150cm x 100µm	200
Pool scoop with extendable handle – flat solid	2
Poly Mop Handle	2
Poly Rope 20m	10
Star Pickets	24
Star Picket driver	1
Intrinsic Safe Torch	6
Hand Cleaner	1
Cable ties (to add extra join to absorbent booms)	150
Personal Protective Equipment (PPE) Team of 6	
Spill Crew Hazguard water resistant coveralls (assorted sizes)	36
Disposable box light nitrile gloves (100 box)	2
Alpha Tec gloves (assorted sizes)	24
Ear Plugs (200bx)	1
Safety Glasses – with head strap	18
Gum Boots (worn extra large or as advised by skipper)	18
Steel cap waders	2
Personal Flotation Device	6
Rigger Gloves (assort size)	18
Storage equipment	
Collapsible Bund 1.6 m x 1.2 m	2
Collapsible bund 4 m x 2.4 m	1
Collapsible Tank 5,000 litres	2
Alum box, Bin & lid Storage/transport cases	10
Misc. sizes of ground sheets/tarps	6
Additional Items	
6 Person first aid kit 1	1
Wide Brim Hat with cord 6	6
Sunburn Cream 1 litre pump bottle 1	1
Personal Eyewash bottle 500mls 6	6
Personal Drink bottle 750mls 6	6

Appendix K Shoreline response strategy guidance

Guidance on response methods for sensitive coastal habitats is provided in Table K-1.

Guidance on applicable shoreline clean-up techniques based on shoreline substrate and degree of oiling are presented in Figure K-1 to Figure K-4.

Table K-1: Strategy Guidance for shoreline response at coastal sensitivities

Sensitive receptors	Strategy guidance
Mangroves	• All efforts should be mounted to prevent any oil from moving towards this area by using booms to divert the oil away from this area. • However, if oil is expected to move into this area, multiple rows of booms, or earthen booms can be deployed at the entrance of creeks or along the mangrove fringe to prevent/minimise oiling. • Sorbents can be used to wipe heavy oil coating from roots in areas of firm substrate. Close supervision of clean-up is required. • Where thick oil accumulations are not being naturally removed, low-pressure flushing may be attempted at the outer fringe – sorbent pads and sorbent sweeps can be used to recover the sheen. • No attempt should be made to clean interior mangroves, except where access to the oil is possible from terrestrial areas. • Oily debris should be removed; it is extremely important to prevent disturbance of the substrate by foot traffic; thus most activities should be conducted from boats. • Live vegetation should not be cut or otherwise removed.
Mudflats	• All efforts should be mounted to prevent any oil from moving towards this area by using booms to divert the oil away from this area. • However, if oil is expected to move into this area, multiple rows of booms, or earthen booms can be deployed at the entrance of channels filling/ draining mudflats. • Efforts to manually clean mudflats may result in further damage due to trampling of the oil into sediments which typically rich in biota and provide a food source for fish and birds. • Therefore, natural remediation may be the preferred approach and if removal is required, the flushing of oil into open water, if feasible, may be preferred to manual collection • The presence of wildlife (e.g. shorebirds) and sensitive flora (e.g. mangroves) which are often associated with mudflats needs to be considered in determining the best approach.
Sandy beaches	• Clean-up techniques will depend upon the degree of infiltration into sand or and degree of burial which will require surveying/mapping • Clean-up will also depend upon sensitivity of environment (existing ecological features), access to the beach and potential for additional erosion. • Oil and oiled sediments can be physically removed offsite, moved to surf zone for surf washing of sediment or assisted to move to water edge by ploughing of channels or flushing. • Recovery of oil can be by manual means (hand tools) or mechanical means (earth moving, pumping equipment). • The sensitivity of the environment is a key factor, with manual removal creating less waste and disturbance but more consuming in time and resources.
Seabirds, shorebirds and migratory waders	• All efforts should focus on deflecting oil away from this area or dispersing the oil offshore or using booms offshore to divert the oil away from this area. • If oil is expected to move into the coastal colonies and roosting areas, multiple booms can be deployed along the reserve to prevent/minimise oiling.
Turtle nesting beaches during or near nesting season	• All efforts should be mounted to prevent any oil from moving towards this area by using booms to divert the oil away from this area. • However, if oil is expected to move into this area, booms can be deployed along the reserve to prevent/minimise oiling.
Fringing coral reef communities	• Little can be done to protect coral reef beds along exposed sections of shoreline. • Floating oil would potentially coat living reef communities, which are usually slightly elevated and are consequently exposed at low tide.

Sensitive receptors	Strategy guidance
(Note: submerged coral reef communities are less susceptible to oiling)	• Natural recovery with a close monitoring program is the preferred clean-up technique. Clean-up of the reef itself by natural processes is expected to be rapid. • As much as practicable, oil should be removed from adjacent intertidal areas to prevent chronic exposure of the corals to oil leaching from these sites. • Use of sorbents should be limited to those that can be contained and recovered.
Macroalgal and seagrass beds	• All efforts should focus on deflecting oil away from this area, dispersing the oil offshore, or using booms to divert the oil away from this area. • Extreme care should be taken not to disturb the sediments during clean-up operations in the vicinity of macroalgal and seagrass beds, which could result in total loss of the macroalgal and seagrass beds. • Removal of oiled parts of the macroalgal and seagrass beds should only be considered when it can be demonstrated that special species are at significant risk of injury from contact or grazing on the macroalgal and seagrass beds. • Otherwise, the best strategy for oiled seaweed is to allow natural recovery.
Rocky coast	• Where practicable, booms can be deployed parallel to the rocky coasts to prevent/minimise oiling. • Flushing rocky shoreline is considered the most effective method of cleaning. Care must be taken to assess the fate and transport of the flushed oil and sorbent snares can be used to recover if deemed necessary to reduce impacts to ALARP. • For small areas of contamination, rocky structure can be manually wiped with sorbent pads or scraped to remove oil.

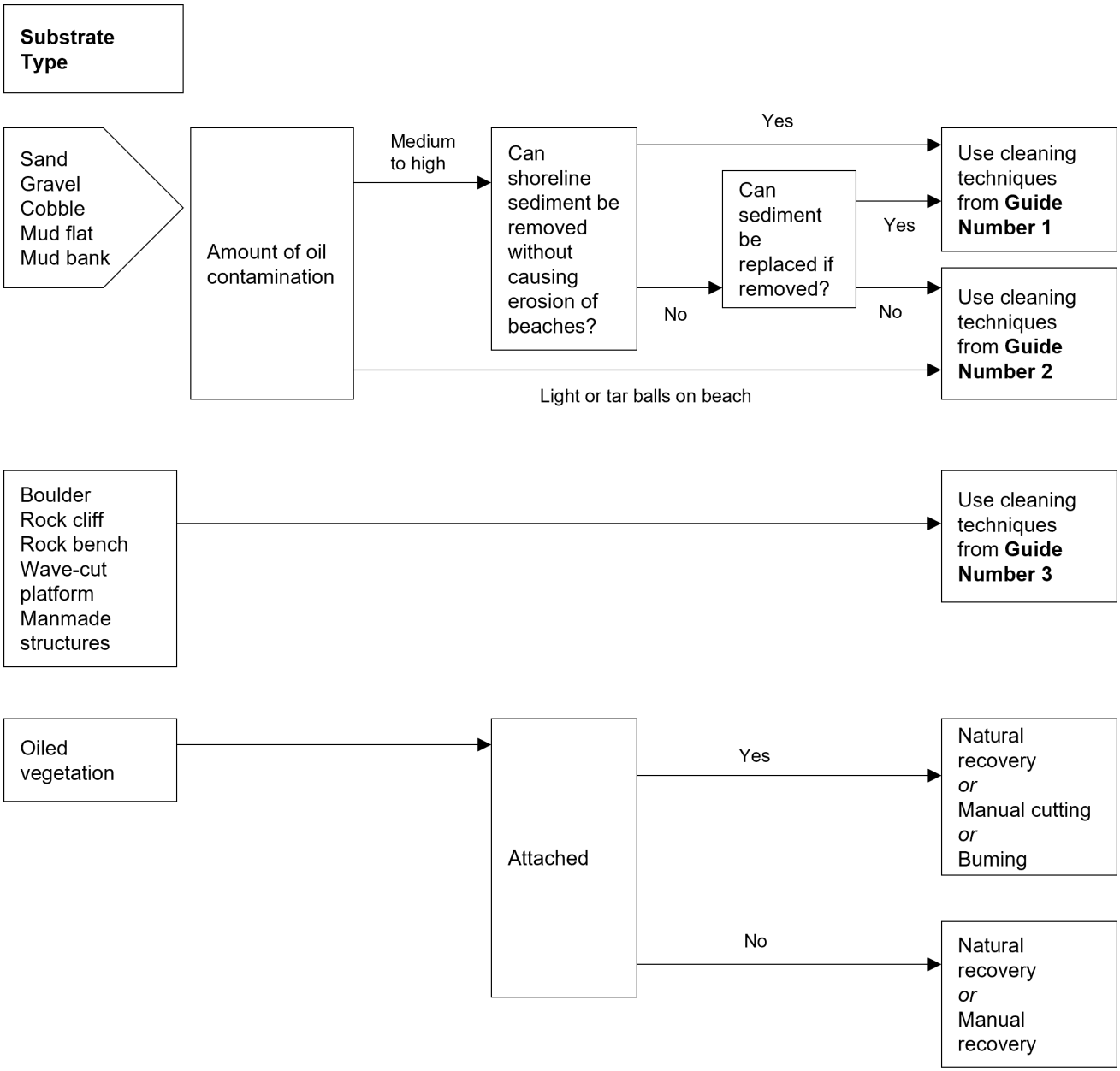


Figure K-1: Shoreline Clean-up Master Decision Guide

Trafficability		Substrate type	Depth of penetration	Clean-up techniques in order of preference	Access	
1. Can rubber-tyred equipment operate on beach?	→ Yes	Sand, Gravel. Mud	Less than 3 cm	Motor-grader and elevated scraper combination. Elevated Scraper, Motor-grader and Front-end loader (Rubber-tyred) combination.	**3. Is there access to beach for heavy equipment or can access be constructed?**	→ Yes ↓
			Greater than 3 cm	Elevated Scraper. Front-end loader (Rubber-tyred). Bulldozer and Front-end loader (Rubber-tyred) combination.		Select most preferable technique
		Cobble	Less than 30 cm	Front-end loader (Rubber-tyred).		
			Greater than 30 cm	Bulldozer and Front-end loader (Rubber-tyred) combination. Front-end loader (Rubber-tyred).		
		Mud bank	Not applicable	Backhoe. Front-end loader (Rubber-tyred).		
↓ No						
2. Can tracked equipment operate on beach?	→ Yes	Sand, Gravel, Mud, Cobble	Less than 30 cm	Front-end loader (Tracked). Bulldozer and Front-end loader (Tracked) combination.		
			Greater than 30 cm	Bulldozer and Front-end loader (Tracked) combination. Front-end loader (Tracked).		
↓ No					↓ No	
Use dragline or hydraulic grader or leave to natural recovery				Go to next Figure – Decision guide No. 2, Question 4.		

Figure K-2: Shoreline Clean-Up Decision Guide 1

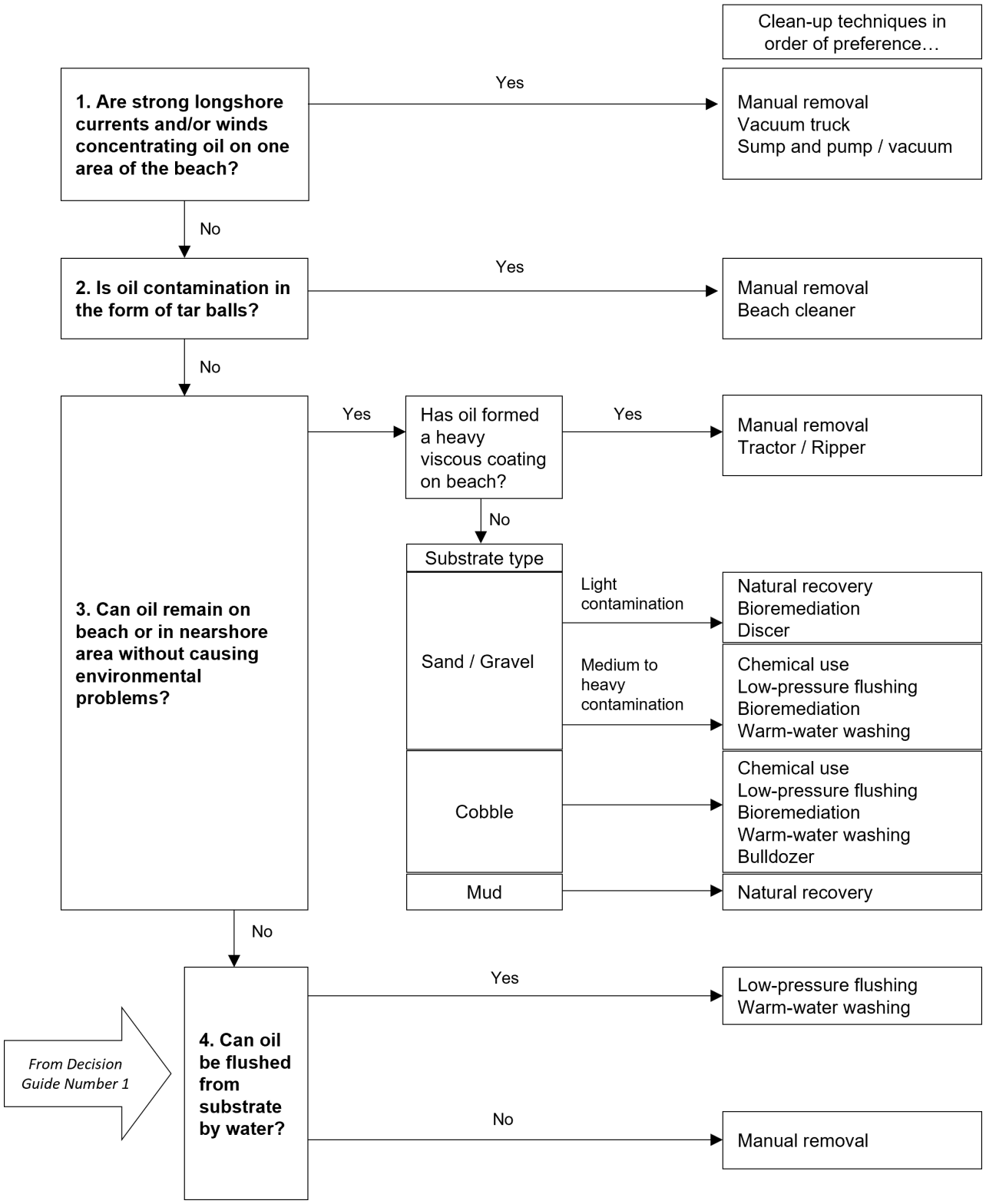


Figure K-3: Shoreline Clean-Up Decision Guide 2

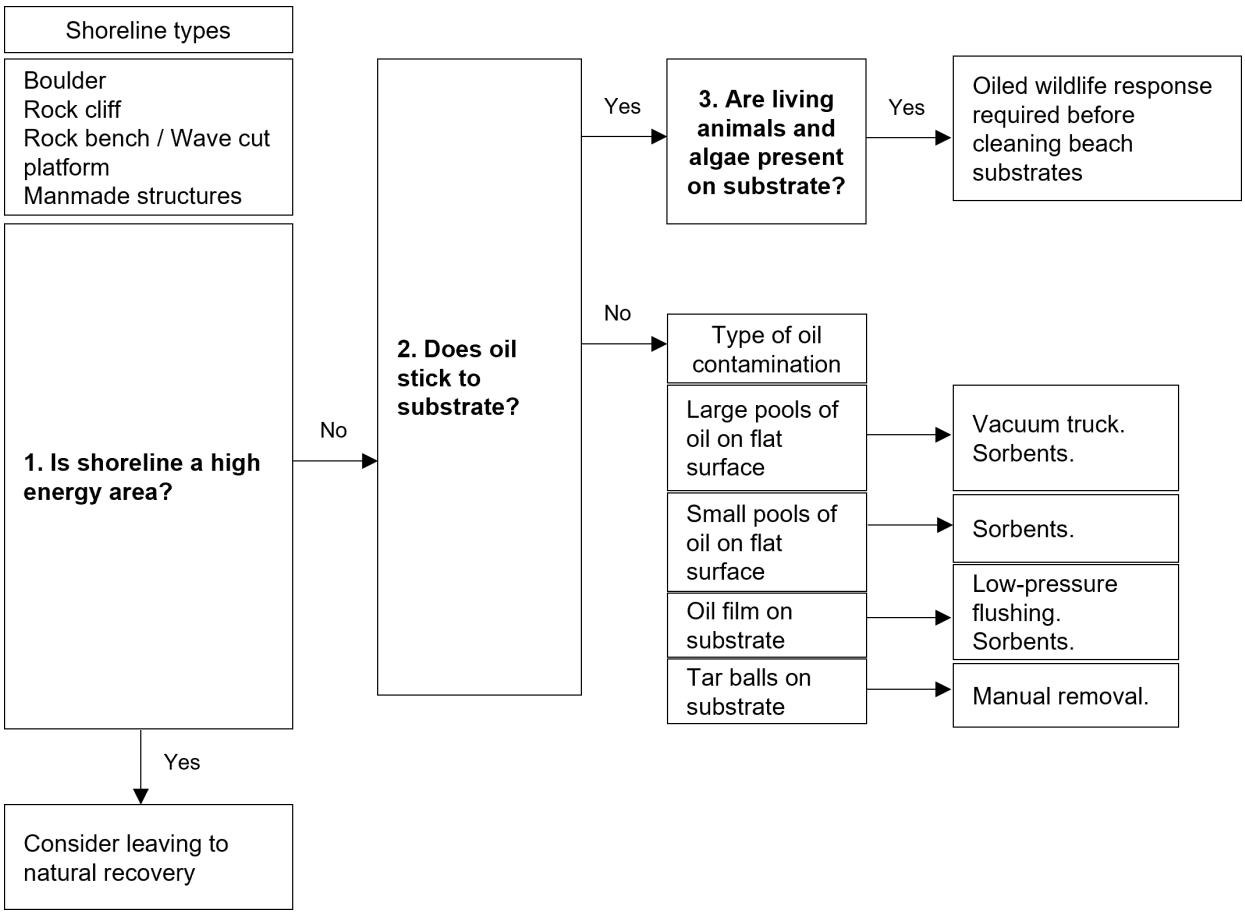


Figure K-4: Shoreline Clean-Up decision Guide 3

Appendix L Operational guidelines for shoreline response

L-1 Worksite preparation guidelines

The following provides guidelines for the preparation of staging areas supporting shoreline clean-up operations.

Organisation and worksite set-up

The worksite does not only include the polluted areas that require cleaning. Several other specific areas must be identified and cordoned off and routes for pedestrians and vehicles should be signposted.

These specific areas are:

- The polluted area;
- The waste storage area, with different types of containers suitable for the different kinds of waste;
- The decontamination area: whatever the size of the spill, a decontamination phase for operational personnel, equipment and tools must be carried out in order to provide some comfort to personnel after each work session, avoiding oiling clean areas, and group together personal clean-up equipment and protective gear, to facilitate the management of the site (cleaning, storage, re-use);
- A rest area, with at least changing rooms, toilets, a first aid kit and cold and hot beverages. Cold or even hot meals can also be organised on the spot provided that a canteen tent or temporary building is available; and
- A storage area for tools and machinery (or equipment warehouse).

Access to the worksite should be restricted and traffic of vehicles should be strictly regulated to avoid accidents.

Preparation

- Prevent the general public from accessing the worksite;
- Delineate accesses for vehicles and machinery (check load-bearing capacity) and routes;
- Channel vehicle and pedestrian traffic;
- Protect the ground (geotextile, roll out mat system…) during operations in sensitive areas (dunes...);
- Prepare and signpost the different areas of activity (on the beach), living areas (locker room, meals, showers, toilets...) and stockpiling areas presenting a risk (fuel, equipment, waste pit....);
- Define a site for fluid storage away from the locker room:
  - Provide an extinguisher for each cabin
  - Set up a recovery system for fuel leaks
- Provide at least minimum lighting for installations and the surrounding area during the winter.

Basic Equipment	Extra Equipment
• Plastic liners, geotextiles • Barrier tape and stakes • Signposting equipment	• Bins, barrels, skips, tanks • Hot and cold beverages Welfare) • Cooking oil, soap (Welfare) • Earthmoving equipment

Primary Storage of Waste

A primary storage site is:

- An emergency staging area of the immediate deposit of the waste collected before its transfer to either an intermediate long term storage site or if possible directly to a treatment facility; and
- A key stage in the waste management process for sorting, labelling and quantifying the types and volumes of waste collected and when possible, reducing volumes to be transported by pre-treatment.

The storage site must be closed as soon as clean-up operations are completed.

The return of the site to its original condition implies:

- A contamination diagnosis made by an organisation specialised in ground pollution, decontamination operations if needed and the approval of the authorities; and
- In some cases, botanical evaluations to define a plant cover restoration operation.

- Segregate the different types of waste
- Protect containers from rain water and to contain odours
- Protect containers from prolonged exposure to sunlight if necessary
- Ensure security to prevent unauthorised dumping

Primary waste storage sites should meet certain criteria:

- Close proximity to the site of clean-up;
- Good access to roads for heavy lorries; and
- A flat area with enough space away from environmentally-sensitive areas (vegetation, groundwater) and out of reach of the sea tides and waves.

- Depending on the volume of waste, site characteristics and availability of containers, prepare:
  - Staging areas
  - Pits if necessary
  - Platform within earth berms
  - Platform for bagged solids and liquids in tank.
- Protect areas using watertight plastic liners
- Lay fine gravel or sand at the base of the storage area to protect the membranes
- Prepare rain water or effluent management
- Ensure correct labelling of the containers to avoid mixing the different types of waste (liquid, solid, non-biodegradable – oiled plastics, contaminated cleanup equipment, biodegradable – oiled seaweed, faunal)
- Control access to the cleanup sites and protect access routes using lining and/or geotextiles

Base Camp / Rest Area

The rest area (base camp) should at least consist of:

- Changing rooms;
- Toilets; and
- A rest area.

At base camp, operators must be provided with:

- A first aid kit; and
- Hot and cold beverages, meals.

Selection of the rest area must meet certain criteria:

- Close proximity to the clean-up site;
- Easy access; and
- A flat area with enough space away from environmentally sensitive areas.

Equipment

- Shelter/rest area (tent, temporary building;
- Portable toilets (at least one for men and one for women);
- Locker rooms;
- First aid kit;
- Fire extinguisher; and
- Communication equipment.

Storage Area for Equipment and Machinery

This area consists of and equipped repair and maintenance site.

In order to avoid incidents and clean-up equipment failures, equipment should only be used by trained personnel and all equipment should regularly be checked for conformity with standard operating procedures and safety.

- Check and adjust daily levels of gasoline, diesel, oil, water and other fluids
- Regularly maintain the machines (pumps, pressure washers...)
- Equipment must be checked, counted by the person in charge of logistics and stored daily at the end of the work day
- Some pieces of equipment must be washed or at least rinsed daily, with proper recovery of cleaning effluent, other kinds of equipment should be washed weekly or at the end of operations
- Set up a systematic maintenance-cleaning-repair operation at the end of each week
- Small tools and equipment and even detachable parts of all equipment remaining outside should be securely stored away (eg stainless steel bucket of small sand screeners)
- In case of interruption of operations, large pieces of equipment should be moved to a supervised site
- Regularly check equipment for conformity and safety

The storage area for equipment and machinery must meet certain criteria:

- Close proximity to the site of clean-up;
- Easy access; and
- A flat area with enough space away from environmentally-sensitive areas.

Equipment

- Cabins;
- Hut;
- Maintenance equipment and tools; and
- Cleaning equipment.

L-2 Manual clean-up guidelines

Oil, polluted sediment and debris are removed by hand or with the help of manual tools and then stored for disposal.

Conditions of use

- Pollution : all types ; most often scattered pollution; on large spills, if implementation of other techniques is impossible;
- Pollutant : all types;
- Substrate : all types; sufficient load bearing capacity for pedestrians and light equipment; and
- Site: all types sufficiently accessible and which tolerate intensive traffic.

Equipment

Basic Equipment:

- Scrapers (paint scrapers, long handle scrapers...), rakes, brushes, forks; and
- Landing nets, shovels, trowels.

Extra Equipment:

- Waste containers, big bags, bins, plastic bags; and
- Front-end loader (for disposal).

PPE: At least protective clothing: overalls, boots, gloves, etc. depending on the nature of the pollutant, expose and responder activity.

- Divide the response personnel among three functions:
  - Collection/scraping/gathering
  - Placing in bags/waste containers
  - Disposal
- Rotate the teams among the three functions;
- The waste can be disposed of manually or with the use of mechanical means if possible;
- Don’t overfill bins, plastic bags; and
- Don’t remove excessive quantities of sediments.

Impact

- Impact insignificant to heavy, depending on the type of substrate. Risk of destroying the structure of the substrate in marshes. Erosion;
- Potentially destructive effects on vegetation (dunes, marshland);
- Deconstruction and destabilisation of the foot of the dune (upper end of beach); erosion, destruction of the dune and the associated vegetation, decrease in biodiversity and fertility by reduction of the low water mark; and
- Can tend to fragment the oil in certain conditions.

Performance

This is a highly selective technique, but requires a lot of time and personnel. If not done correctly, there is a risk of removal of large quantities of clean sediment.

L-3 Mechanical clean-up guidelines

This technique consists of collecting the oil in order to facilitate its removal from the beach. Collection is carried out using a tractor, ATV or earthmoving vehicle or earthmoving equipment.

Conditions of use

- Pollution : heavy pollution, continuous slick;
- Pollutant : slightly to very viscous oil;
- Substrate : vast, flat foreshore with wet fine-grain sand (very damp to saturated) and a good load-bearing capacity, without ripple marks; and
- Site: accessible and sufficient load bearing capacity for earthmoving equipment, sufficiently large to allow vehicles to manoeuvre.

Equipment

Basic equipment:

- Backhoe loader;
- Grader/bulldozer;
- Tractor or loader with front blade; and
- Front-end loader or lorry (for removal).
- PPE: At least suitable for heavy machinery operation

Impact

- Normally only removes the oil, but some sediment may also be taken with it (if the operator is poorly supervised or inexperienced), especially if used on light pollution or an unsuitable site;
- High risk of disturbance due to traffic and mixing of oil with sediment; and
- May lead to reduction of beach stability and beach erosion/loss of beach area.

Minimum workforce required: 2 people per vehicle (1 drive + 1 assistant).

Waste: oil mixed with a varying quantity of sediment; but can rapidly become unselective if scraping is carried out on moderate pollution (should be avoided).

- Consists of bringing the oil together in order to facilitate its removal from the beach. Scraping is carried out using a tractor or earthmoving equipment fitted with a front end blade in an oblique position. According to the viscosity of the oil, two options are available:
  - (case 1) fluid oil: radial or converging scraping towards a collection point on the foreshore; removal by pumping
  - (case 2) more viscous oil /solids: concentration to form windrows, by successive slightly curing passes parallel to the water line; subsequent removal of windrows
- Should only be carried out on heavy pollution; do not use on moderate to light pollution
- Inform and supervise operators; use experienced operators
- Work methodically
- Set up traffic lanes on the beach in order to reduce oil and sediment mixing
- Don’t remove excessive amounts of non-contaminated materials
- Don’t fill the bucket of loader more than 2/3 capacity
- Don’t drive on polluted materials

L-4 Shoreline vessel access guidelines

There are numerous landing craft vessels available in the North West Shelf area. These vessels are capable of grounding out; therefore the vessels can access a contacted area on high tide, ground out, unload equipment and personnel, reload with waste oil then depart on the next high tide. The Santos Offshore - Vessel Requirements for Oil Spill Response (7710-650-ERP-0001) describes the specifications for beach landing craft, and describes Santos vessel monitoring processes.

Mechanical equipment and PPE are to be mobilised to the nominated marine operational base for onward movement to the affected locations.

For shoreline clean-up of remote islands, the following guidelines will be considered so as to minimise the secondary impacts of high numbers of spill response personnel on shorelines:

Vessels are to be mobilised to the designated deployment Port to mobilise shoreline clean-up teams by water. The shoreline clean-up will be undertaken through on-water deployment to the defined shorelines in 4 stages:

1) Drop off of 6-person clean-up containers to shoreline contact locations defined by IMT through observation data;
2) Deployment of marine and environmental specialists to demarcate the clean-up zones with barrier posts and tape to prevent secondary contamination impacts to flora and fauna by the clean-up teams;
3) Deployment of small clean-up teams with a trained/competent shoreline responder as a Team Leader to conduct clean-up methods (flushing, bag and retrieve, etc.) with all waste being bagged and stored in temporary bunding made of HDPE above the high-tide mark; and
4) Deployment of waste pickup barges to retrieve collected wastes from the temporary bunding and to complete the shoreline clean-up and final polishing.

Appendix M Resourcing Requirements for OMP: Shoreline Clean-up Assessment

Shoreline clean-up assessment teams will comprise 2-3 members per team and are assumed to be able to cover 10 km per team per day. Teams may be able to exceed this distance, especially if remote sensing techniques (e.g. UAVs) are employed to cover shorelines that have access limitations, which includes many receptor locations in the EMBA.

Santos has used stochastic modelling data for shoreline contact to plan for the worst-case shoreline and habitat assessment personnel requirements. Table M-1 presents all receptors contacted at ≥100 g/m² using the stochastic modelling results for scenario 6 (MDO spill resulting from a vessel collision at the HDD crossing) along with the SCAT planning considerations and estimated number of SCAT teams required. Scenario 6 had the greatest overall contact and length of oiled shoreline.

It should be noted that not all of the receptors listed in Table M-1 will be contacted by one single spill. These results are presenting the range of possible worst-case timeframes to contact and length contacted based on all runs that make up the stochastic model. Santos will use initial monitor and evaluate data (e.g. trajectory modelling and aerial surveillance) to determine where resources should be allocated. This may include directing resources to conduct SCAT at locations not identified as protection priority areas, to determine if protection and clean-up activities may be required at these receptors.

Initially, shoreline clean-up assessment may be conducted via reconnaissance surveys and later confirmed via ground and/or vessel surveys.

Table M-2 provides the resource capability available to Santos that may be used to implement SCAT.

Table M-1: Resource requirements for shoreline clean-up assessment for all shorelines contacted ≥100 g/m² based on stochastic results for the surface MDO spill resulting from a vessel collision at the HDD Crossing (scenario 6)

Location	Min. arrival time shoreline oil accumulation ≥100 g/m² (days, hours)	Max. length of shoreline oiled (km) ≥100 g/m²	Planning considerations	Estimated No. of teams required
Dampier Archipelago	4 days, 15 hours	3	Much of these coastlines are inaccessible to ground surveys. Survey teams would initially conduct reconnaissance surveys followed by targeted monitoring surveys to focus areas. Targeted monitoring surveys may be completed via vessel, and where possible, ground surveys.	1
Middle Islands Coast	NC	NA		1
Northern Islands Coast	2 hours	11		1

NC = No contact predicted

NA = Not applicable

Note: SCAT numbers not to be added up from this table as spill will not contact all receptors modelled (as these are stochastic results). Number of personnel required will be based on direction of spill and timeframes to contact.

Source: RPS (2024)

Table M-2: Shoreline clean-up assessment – resource capability

Equipment Type/Personnel Required	Organisation	Quantity Available	Location	Mobilisation Timeframe
Shoreline assessment team leaders	Santos	12	Perth, Varanus Island	24-72 hours from time of shoreline contact prediction (WA-based, Santos personnel, AMOSC staff and Core Group personnel)
	AMOSC Core Group	As per monthly availability	Perth, Dampier and other Australian locations	
	AMOSC staff	12 trained in SCAT	Perth and Geelong	

Equipment Type/Personnel Required	Organisation	Quantity Available	Location	Mobilisation Timeframe
	OSRL	18	Perth and international	5 personnel available from 2–3 days, remaining personnel available from 4–5 days (subject to approvals/ clearances)
Shoreline assessment team members	Santos contracted work force hire company (e.g. Dare)	As per availability (up to 2,000)	Australia-wide	Subject to availability (indicatively 72+ hours)
Drones and pilots ** To assist shoreline and vessel-based surveillance	AMOSC	Drones available 24/7 through AMOSC sub-contract1 x pilot	Fremantle	Response via duty officer within 15 minutes of first call – AMOSC personnel available within 1 hour of initial activation call. Equipment logistics varies according to stockpile location (refer to Table 10-12)
	OSRL – Third-Party UAV provider	2 x qualified remote pilots, however response is on best endeavours basis	Perth	Depending on the port of departure, 1–2 days if within Australia
	Local WA hire companies	10+	Perth and regional WA	<48 hours

Appendix N Operational and scientific monitoring capability

The North West Shelf OSM-BIP (7715-650-ERP-0002) defines the 3-step process for ensuring that OSM capabilities of each activity are adequately covered by the existing information described within the North West Shelf OSM-BIP (7715-650-ERP-0002) (Section 1.1 and Appendix A of the North West Shelf OSM-BIP).

Step 1: Determine if the new activity EMBA fits within the North West Shelf OSM-BIP Combined EMBA

Comparison of the EMBA for Reindeer and Devil Creek activities (Figure 3-1) shows that this fits within the North West Shelf OSM-BIP Combined EMBA (Figure 2-1 in the North West Shelf OSM-BIP).

Step 2: Determine the locations requiring a baseline review and whether these locations are currently included in the North West Shelf OSM-BIP

As per Section 2.2 of the North West Shelf OSM-BIP, receptors requiring a baseline data review were identified as those sensitive receptors contacted by hydrocarbons at the low threshold for floating (≥1 g/m^2), shoreline contact (≥10 g/m^2), entrained (≥10 ppb), and dissolved (≥10 ppb) within 7.0 days at a probability >5%.

The locations requiring a baseline data review for this activity are presented in Table N-1, and are included within Table 2-2 of the North West Shelf OSM-BIP.

Step 3: Determine whether the capability requirements and monitoring arrangements of the new activity exceed or are met by the capability requirements outlined in Section 8 and capability arrangements described in Sections 9 and 10 of the North West Shelf OSM-BIP.

As per the criteria outlined in Appendix A of the North West Shelf OSM-BIP, for the worst-case scenario (scenario 6 - MDO spill resulting from a vessel collision at the HDD Crossing [325 m^3]), two emergent receptors are contacted within 7 days at a probability of >5% (refer to Table N-1) using stochastic modelling. Therefore, the OSM capability requirements for Reindeer and Devil Creek activities are met by the worst-case capability requirements presented in Section 8 of the North West Shelf OSM-BIP. Therefore, additional deterministic modelling for Reindeer and Devil Creek activities is not required to inform OSM first-strike capabilities.

Table N-1: Reindeer and Devil Creek modelling results for locations with a probability of contact ≥5% and <7 days (RPS, 2024)

Scientific monitoring priority area	Probability (%) dissolved oil at ≥10 ppb	Min. arrival time dissolved oil ≥10 ppb (days, hours)	Total contact probability (%) floating oil ≥1g/m²	Min. arrival time floating oil ≥1g/m2 (days, hours)	Total contact probability (%) shoreline accumulation ≥10 g/m²	Min. arrival time shoreline accumulation ≥10 g/m² (days, hours)	Probability (%) of entrained hydrocarbon exposure at ≥10 ppb	Min. arrival time entrained exposure at ≥10 ppb (days, hours)
Subsea pipeline leak of Reindeer condensate near the HDD crossing (Scenario 3)								
Northern Islands Coast	NC	NC	NC	NC	28.33	2 hours	NC	NC
Dampier Archipelago	NC	NC	NC	NC	NC	NC	8.67	2 days, 18 hours
MDO spill resulting from a vessel collision at the WHP (Scenario 4)								
Montebello Islands	0.33	4 days, 12 hours	NC	NC	1	3 days, 23 hours	6	3 days, 3 hours
Muiron Islands	NC	NC	NC	NC	2	10 days, 9 hours	9.67	6 days, 17 hours
Southern Islands Coast	NC	NC	NC	NC	1	10 days, 20 hours	10.67	6 days, 20 hours
Barrow-Montebello Surrounds*	0.33	3 days, 21 hours	NC	NC	NA	NA	11.00	2 days, 19 hours
Glomar Shoals*	0.33	4 days, 4 hours	NC	NC	NA	NA	8.33	3 days, 9 hours
Montebello AMP*	5.33	18 hours	NC	NC	NA	NA	42.67	16 hours
Ningaloo Offshore*	0.33	5 days, 22 hours	NC	NC	NA	NA	13.67	4 days, 6 hours
Penguin Bank*	NC	NC	NC	NC	NA	NA	5.33	6 days, 5 hours
WA State Waters†	0.33	2 days, 16 hours	NC	NC	NA	NA	11.33	1 day, 22 hours
MDO spill resulting from a vessel collision at the CSB (Scenario 5)								
Dampier Archipelago	0.33	3 days, 19 hours	0.67	2 days	1.67	2 days, 8 hours	5.67	1 day, 13 hours
Dampier AMP*	NC	NC	NC	NC	NA	NA	7.67	2 days, 8 hours
Barrow Island	NC	-	NC	NC	4.33	5 days, 13 hours	13.00	4 days, 6 hours
Lowendal Islands	0.67	4 days, 22 hours	NC	NC	6	4 days, 9 hours	21.33	3 days, 10 hours
Madeleine Shoals*	NC	NC	NC	NC	NA	NA	7.67	2 days, 17 hours

Scientific monitoring priority area	Probability (%) dissolved oil at ≥10 ppb	Min. arrival time dissolved oil ≥10 ppb (days, hours)	Total contact probability (%) floating oil ≥1g/m²	Min. arrival time floating oil ≥1g/m2 (days, hours)	Total contact probability (%) shoreline accumulation ≥10 g/m²	Min. arrival time shoreline accumulation ≥10 g/m² (days, hours)	Probability (%) of entrained hydrocarbon exposure at ≥10 ppb	Min. arrival time entrained exposure at ≥10 ppb (days, hours)
Montebello Islands	0.67	3 days, 16 hours	NC	NC	9.33	3 days, 21 hours	19	2 days, 14 hours
Barrow-Montebello Surrounds*	0.67	3 days, 8 hours	NC	NC	NA	NA	20.67	2 days, 9 hours
Montebello AMP*	0.33	19 hours	NC	NC	NA	NA	23.67	15 hours
Ningaloo Offshore*	NC	NC	NC	NC	NA	NA	5.67	4 days, 4 hours
MDO spill resulting from a vessel collision at the HDD Crossing (Scenario 6)								
Cod Bank*	NC	NC	NC	NC	NA	NA	27.67	2 days, 18 hours
Dampier Archipelago	NC	NC	NC	NC	25	2 days, 5 hours	66	1 day, 4 hours
Northern Islands Coast	NC	NC	NC	NC	47.67	2 hours	NC	NC

**Submerged receptor that has no features above the sea surface. Modelling indicates 'contact' with these receptors when the hydrocarbons pass over the receptor on the sea surface.*

† This receptor is the WA State Waters boundary and is not an EVA defined by Santos.

NC: No contact to receptor predicted for specified threshold

NA = Not applicable

Appendix O Forward operations guidance

The IMT operate from Perth within the Santos IMT room. These rooms are equipped and subject to reviews and updates as detailed in the Santos Incident Management Plan – Upstream Offshore (SO-00-ZF-00025).

For a significant Level 2/3 response requiring coordination of resources to be deployed to the field, Santos will establish a forward operations base (FOB). For a Level 2/3 spill crossing from Commonwealth to State waters (cross-jurisdictional spills) DoT will establish an FOB.

Further information on FOBs is provided in the Santos Oil Spill Response – Forward Operating Base Guideline (SO-91-IF-20017).

For the activities associated with this OPEP, Santos will likely establish an FOB at the Santos's Dampier facilities leased from Toll Energy. These facilities are located in Toll Energy's Yard 1 and Yard 2 on Streckfuus Road Dampier; the facilities consist of a conference room and multiple offices that could be used as break-out rooms. The Toll Energy Dampier facilities are already connected to the Santos internet and telephone system. These facilities are also available to the DoT to establish an FOB for State based response. There is also an option to use the Port of Onslow at Beadon Creek, subject to approval from DoT. The Port of Onslow has a suitable dredged berth and tarmacked areas for equipment laydown, and a building suitable for set-up of an FOB.

Additional FOBs may be set up as operational requirements dictate. Refer to Santos Oil Spill Response – Forward Operating Base Guideline (SO-91-IF-20017) for details on the other potential FOB locations.

Accommodation is available at the Devil Creek Accommodation Camp located adjacent to the DCGP and onshore pipeline. Where possible local facilities will be utilised to accommodate response personnel, however transportable accommodation and messing facilities can be supplied through contract suppliers if required.

Appendix P Oiled wildlife response personnel and equipment

In the event of a spill impacting wildlife, Santos will commence arrangements to mobilise personnel and equipment to fill responder positions as identified in the Santos Oiled Wildlife Response Framework Plan (7700-650-PLA-0017) and WAOWRP.

This appendix outlines the current OWR equipment, personnel and services available to Santos through current arrangements.

Overall OWR capability per OWR strategy

The overall OWR capability of Santos is outlined in Table P-1. Santos has access to aircraft that could be used for wildlife reconnaissance within hours of a spill. This would be followed by further access to vessels and Santos personnel trained in OWR that could be mobilised within 24 hours for vessel and wildlife shoreline reconnaissance, demonstrating Santos' ability to mount a swift response that could also be sustained as long as required.

Santos has the capability to set up oiled wildlife field stations within 3–4 days of a spill through access to AMOSC equipment and equipment purchased at the time of a spill. Santos could also arrange the transport of wildlife from the field to a primary care facility.

The indicative personnel required for a high impact-rated response is 93 personnel (as per the WAOWRP) (DBCA, 2022a), however depending on the number and species impacted, may require many more. Santos' current arrangements could support a large scale OWR (requiring >93 personnel) mainly through support staff, such as, non-technical wildlife support roles (management, logistics, planning, human resourcing, transporter, cleaners, trades persons, security etc). These roles could be filled by Santos personnel and labour hire agencies that can provide workers that undergo an induction and basic training. In addition, many of the roles required for an OWR require technical expertise and Santos will need to activate OWR arrangements with AMOSC and OSRL to fulfil roles, as well as make contractor arrangements for accessing skilled wildlife personnel at the time of a spill.

Table P-1: Santos OWR capability per OWR strategy

OWR Strategy	Considerations	Equipment/Personnel	Location	Mobilisation Timeframe
Reconnaissance	Identify opportunities to create synergies with surveys required for monitor and evaluate, and operational and scientific monitoring activities	Rotary Wing Aircraft & flight Crew	Karratha	Wheels up within 1 hour for Emergency Response.
		Drones and pilots	Local WA hire companies	1-2 days
		Contracted vessels and vessels of opportunity Santos Contracted Vessel Providers Vessels of opportunity identified through AIS Vessel Tracking.	Vessels mobilised from Darwin. Locations verified through AIS Vessel Tracking Software.	Pending availability and location. Expected within 12 hours.
		Aerial surveillance crew Santos staff AMOSC staff AMOSC Core Group personnel available Additional trained industry mutual aid personnel available	Perth and Varanus Island (VI) (Santos aerial observers) Australia wide	Santos trained personnel – next day mobilisation to airbase <24 hours
Preventative actions	Mainly effective for bird species Requires relevant WA/NT licence approval	5 x AMOSC Wildlife fauna hazing and exclusion kits 1 x AMOSC Breco buoy	4 x Fremantle, 1 x Geelong 1 x Fremantle	Location dependent
Rescue and field processing	Wildlife handling and first aid should only be done by persons with appropriate skills and experience or under the direction of DBCA	4 x AMOSC Oiled Fauna Kits (basic medical supplies, cleaning/rehab, PPE)	1 x Exmouth, 1 x Broome, 2 x Geelong	Location dependent
		2 x DBCA OWR trailers	1 x Kensington NSW 1 x Karratha WA	Location dependent
		50% of OSRL OWR response packages (Wildlife Search and Rescue kits / Cleaning and Rehab. kits (including field first aid)	5 x Singapore, 2 x Bahrain, 7 x UK, 5 x Fort Lauderdale	Location dependent
Transport	Transport of oiled animals by aeroplane or helicopter may be restricted due to Civil Aviation Safety Authority (CASA) regulations; such transport will depend on the level of oiling remaining on animals. Therefore, consultation with the air transport provider must take	Contracted vessels and vessels of opportunity Santos Contracted Vessel Providers Vessels of opportunity identified through AIS Vessel Tracking.	Vessels mobilised from Darwin. Locations verified through AIS Vessel Tracking Software.	Pending availability and location. Expected within 12 hours.

OWR Strategy	Considerations	Equipment/Personnel	Location	Mobilisation Timeframe
	place before transport to ensure the safest and most efficient means			
Primary care facility	OWR container could be placed on the deck of a suitably sized vessel for field processing in remote locations (benefits associated with temperature regulation and access to water and electricity) An OWR container on a vessel could also be used to aide transport form offshore islands	OWR container/mobile washing facility 2 x AMOSC 4 x AMSA 2 x DoT	AMOSC – 1 x Fremantle, 1 x Geelong AMSA - 1 x Dampier, 1 x Darwin, 1 x Devonport, 1 x Townsville DoT – 1 x Fremantle (AMOSC warehouse), 1 x Sydney	Location dependent
		AMOSC call off contract with DWYERTech NZ – a facilities management group	New Zealand	Availability within 24 hrs of call-off
Personnel	Untrained personnel would receive an induction, on-the-job training and work under the supervision of an experienced supervisor	Santos provides OWR training to staff, and to-date, approximately 20 personnel have received OWR training.	Perth and Varanus Island	<48 hours
		Santos maintains labour hire arrangements for access to untrained personnel		
		1 x AMOSC Oiled Wildlife Advisor	Perth, Western Australia	<48 hours
		62 x trained industry personnel (AMOSC OWR Strike Team members)	-	<48 hours
		AMOSC MOU with Phillip Island National Park (PINP) (best-endeavours availability)	Victoria, Australia	Best-endeavour availability
		AMOSC MOU's – WA organisations	WA	Best-endeavour availability
	Sea Alarm staff act in a technical advisory role and do not engage in hands-on OWR activities but work impartially with all parties (titleholder, local authorities, mobilised experts and local experts, and response groups), aiming to maximise the effectiveness of the wildlife response.	Via OSRL Access to 24/7 technical advice (remote or on-site) from the Sea Alarm Foundation Access to OWR assessment service from the Global Oiled Wildlife Response Service (GOWRS) consisting of a ready-to-deploy team of 4 specialists in Operations/Planning, Field & Capture, Rehab & Facilities, Vet/Incident-specifics.	Belgium Various locations in northern and southern hemisphere	Sea Alarm: Upon notification able to provide remote advice and option to mobilise a Sea Alarm Technical Advisor on-site during an incident GOWRS: Mobilised on a best endeavours basis

Australian Maritime Safety Authority (AMSA)

AMSA maintains four oiled wildlife response containers/ mobile washing facilities in Dampier, Darwin, Devonport and Townsville. All resources under the National Plan (including the four OWR containers) are available to Santos through formal request to AMSA under the arrangements of the National Plan. The containers also include some limited PPE and fresh and wastewater pools.

Western Australia Department of Transport (DoT)

The WA DoT maintains 2 x OWR containers/ mobile washing facilities (WA Fremantle – AMOSC warehouse, and NSW Sydney) which are available through the SHP-MEE and the AMSA National Plan on request.

Australian Marine Oil Spill Centre (AMOSC)

Santos is a participating Member of AMOSC and as such has access to AMOSC's Level 2/3 oiled wildlife equipment and personnel as outlined in the AMOSPlan.

Equipment

Table P-2 provides a summary of the oiled wildlife response equipment maintained by AMOSC.

Table P-2: AMOSC wildlife equipment

Location	Oiled fauna kits (basic medical supplies, cleaning/rehab, PPE)	Fauna hazing and exclusion equipment	Oiled wildlife washdown container (mobile washing facility)
Fremantle	-	4 x fauna hazing & exclusion kit 1 x Breco bird hazing buoy	1 x Oiled Wildlife Washdown Container
Exmouth	1 x Oiled fauna kit	-	-
Broome	1 x Oiled fauna kit	-	-
Geelong	2 x Oiled fauna kit	1 x fauna hazing & exclusion kit	1 x Oiled Wildlife Washdown Container
Total	**4 x Oiled fauna kit**	**5 x fauna hazing & exclusion kits** **1 x Breco bird hazing buoy**	**2 x Oiled Wildlife Washdown Containers**

Personnel

AMOSC currently has the following arrangements in place for OWR personnel:

- 1 x AMOSC OWR Officer available to act as an Industry Oiled Wildlife Advisor (OWA)
- 62 x trained industry personnel (AMOSC OWR Strike Team members)
  - Volunteer OWR trained industry personnel
- Wildlife Care Groups:
  - 35 introductory trained personnel
  - 24 completed management course
  - 16 completed Responder course
- AMOSC call off contract with DWYERtech Response NZ
  - A facilities management group with availability within 24 hours of call off – 2 x personnel
- AMOSC has the following MoU's in place:
- Phillip Island National Park (PINP), (VIC) (best-endeavours availability)
  - Approx. 50 PINP staff – collection/facility ops/rehabilitation
  - Approx. 45 volunteers – collection/facility ops/rehabilitation

  - Approx. 20 staff – animal feeding
  - 6 x PINP staff – wildlife emergency response including cetacean stranding/entanglement
  - 17 x PINP staff – wildlife team leaders
  - 5 x PINP staff – IMT Training
- Blue Planet Marine (WA)
  - 10-20 Personnel (best endeavours to respond)
- WA Seabird Rescue
  - No permanent staff, ~30 volunteers
- WA Native Animal Rescue
  - 5 staff, ~80 volunteers
  - Wangara – Avifauna and mammals
  - Broome – Marine turtles
- WA Wildlife
  - 10 staff, ~80 volunteers
- Darling Range Wildlife (WA)
  - 5 staff, ~50 volunteers
- Mandurah Wildlife (WA)
  - 5 staff, ~30 volunteers

Oil Spill Response Limited (OSRL)

Through the associate membership, Santos has access to the following OWR equipment and personnel services from OSRL.

Equipment

OSRL maintains a Level 3 wildlife equipment stockpile. This equipment is stored across the OSRL base locations and is designed to support the first 48 hours of the response and to ensure availability of critical equipment items that may be difficult to source locally (Note: this equipment does not provide everything that will be required to successfully operate a primary care facility and is focussed primarily on bird casualties (n=100)). Equipment is sorted according to search and rescue (including field first aid), medical, and cleaning and rehabilitation (Table P-3).

Table P-3: OSRL wildlife equipment (as per OSRL Equipment Stockpile Status Report, April 2024)

OWR Response Package	UK	Singapore	Bahrain	Fort Lauderdale
Wildlife Search and Rescue BHR	-	-	-	-
Wildlife Cleaning and Rehabilitation Part 1	2	1	1	1
Wildlife Cleaning and Rehabilitation Part 2	2	1	-	1
Wildlife Cleaning and Rehab. Medical	1	1	-	1
Wildlife Search and Rescue	1	1	1	1
Wildlife Search and Rescue Medical	1	1	-	1

Personnel

Through the OSRL SLA, Santos has access to 24/7 technical advice (remote or on-site) from the Sea Alarm Foundation, a small non-governmental organisation based in Brussels, Belgium that works to improve global preparedness and response for oiled wildlife incidents. Two technical Advisors are available, with one providing remote support and the other available to be mobilised for on-site support, either in-field or at the Command Post (typically working with the Wildlife Branch Director or the Planning and Operations sections as appropriate).. Sea Alarm staff will act in a technical advisory role at the incident management level and will work impartially with all

parties (titleholder, local authorities, mobilised experts and local experts, and response groups), with the aim of maximising the effectiveness of the wildlife response.

Through OSRL's ongoing funding of the GOWRS Project, a wildlife assessment team of 4 wildlife experts can be mobilised in-field for up to 4 days in addition to the Sea Alarm resources noted above. The GOWRS Oiled Wildlife Assessment Service is a ready-to-deploy 4-person team delivered by a network of 10 leading wildlife response organisations. The four-person team will initially deploy for 4 days to provide an on-the-ground technical assessment of wildlife response needs and the professional capabilities of local responders. The team will inform the client of the feasibility of a full-scale professional response and the details of the GOWRS expertise that is available to deliver to the scale of such a response. There is also access to additional oiled wildlife resources on a 'reasonable endeavours' only basis through the GOWRS partners.

In addition, through the SLA, Santos has the option to access OSRL's internal staff with OWR expertise (1 x UK) as part of the 18 personnel commitment for any single incident.

Appendix Q Santos Incident Response Telephone Directory

Santos incident response telephone directory (SO-00-ZF-00025.020), Rev 70, 20th November 2023.

Santos

SO-00-ZF-00025.20

Incident Response Telephone Directory

PROJECT / FACILITY	Corporate
REVIEW INTERVAL (MONTHS)	6 Months
SAFETY CRITICAL DOCUMENT	YES

Rev	**Owner**	**Reviewer/s** *Managerial/Technical/Site*	**Approver**
	Senior Crisis, Security & ER Adviser	**Senior Crisis, Security & ER Adviser**	**HSE Manager, Offshore WA Upstream**
70	Michelle Morrison	Michelle Morrison	Sonja Mavrick

Rev	Rev Date	Author/Edit	Amendment
55	1/10/2021		General update of whole document by various relevant departments
56	22/11/2021		Updated TRG details and new drilling details & Oceaneering 24hr no.
57	18/1/2022		Updated TL office & DLNG details
58	24/3/2022		Updated AFMA & DPIRD. Removed IMT team desk phones
59	28/4/2022		Updated DMIRS numbers after incident & general update/check of whole document
60	29/6/2022		Adding additional Home Affairs/Border Watch Details & MS-1 details
61	26/8/2022		Amending Veolia details, added Advisian & SDS
62	25/10/2022		Updated Energy Policy contacts, Ningaloo vessel update and all sections by various personnel. Also tested those sections not verified by others eg. government departments
63	03/03/2023		Updated VP contacts, took out NTP contacts, added Senversa – Jason Clay details
64			Updated Exmouth heliport details for NV, took out Astron & add RPS for SMP & added other operator HSE & Emergency contacts. Added ISOS
65	18/5/2023		6mthly review by sites/section holder to verify numbers. Tested sections not verified by other personnel.
66	20/6/2023		Added additional emails for Flag State Panama. Santos Primary Dr. Tiwi resources stakeholders added & DFAT GWO
67	26/6/2023		Update BU satellite phones. Offshore VP details, DC satellite, Far Seeker for BU
68	11/7/2023		Updated Devil Creek Numbers; Added DBCA Kimberley regional office; Added Tiwi Island's Munupi clan members' contact details; Added DFAT contacts for Timor-Leste or Indonesian Specific Matters. 6 mth review.
69			Updated Waste Management providers' NWA & Veolia Darwin's contact details. Changed ANPM to ANP.
70	20/11/2023		Document updated to new branding guidelines. Contents reviewed for NT notifications.6 mth review. Updated DMIRS to DEMIRS, 6mthly check by relevant parties & phone check of numbers not checked ie regulators etc.

Contents

1. Revision Procedure

This document will be revised and reissued six-monthly.

This is a controlled document and as such will be maintained through the document control system.

All numbers are stated as if calling from Australia.

If calling from outside of Australia substitute “0011” for your local international calling code.

If making international call to Australia dial your local outgoing country code followed by 61

Please see Appendix 1 for Satellite Phone Dialling Prefix list

2. Santos WANATL Incident Control Group

2.1. Incident Management Team

Role	Position/Location	Phone Number
	IMT Duty Manager	08 6324 0381
IS resource – when automated message answers, press "1" key after each question for an emergency (Alternatively submit request through self-service portal and mark urgent)		Within Santos 7777 Within Australia (08) 8116 7777 Outside Australia +61 8 8116 7777
Santos IS Security Manager	Andrew Speer	0418 831 428
Operational Technology Team Leader	Paul Goulding	0419 045 562
Oil Spill Coordinator	Anpa Sockalingam	0450 783 410
Principal Security Adviser	Greg Metzger	0433 860 380
Emergency Response – Oil Spill	Ray Buchholz	0417 939 627
Crisis & Emergency Response Adviser	Michelle Morrison Satellite Phone (Office)	0418 905 776 0147 185 732
VP notification	a) **If NV, John Brookes, Drilling & Completions (Barossa, HJV Plug & Abandonment, MEFF P&A, Halyard Infill), Projects or Decommissioning incident**– Vice President (VP) Upstream Gas & Liquids (Marcia Evans 0407 479 744) If not available contact: Sonja Mavrick 0403 335 035 - or Jason Young – 0411 402 455) b) **If VI, Devil Creek, Reindeer & BU incident** - Vice President Energy Solutions Hub NA & TL (Richard Hinkley (0422 035 157) If not available contact: Brenton Hawtin (0417 899 633) c) **If Barossa related (ie. GEP/SURF etc)** - Barossa Project Director (Gareth Bamford (0439 255 492) If not available contact: Chris Galway (0409 011 116)	
IMT activation number	Connect Call centre (Only IMT Duty Manager to call)	08 6324 0381

2.2. Santos Offshore & Drill Rig Facilities

Location / Asset	Position/Location	Phone Number
Varanus	VI Emergency Commander	08 6218 7640/08 6218 7601
	Radio Room (vacant but phones still there)	08 6218 7984 08 6218 7696
	Radio Room - Satellite Phone	0147 160 415
	Control Room	08 6218 7637 08 6218 7600
	Control Room – Satellite Phone	00 11 870 776 624 068
	Offshore Installation Manager	08 6218 7601
	Offshore Installation Manager – A/H	08 6218 7606
Devil Creek	Control Room (Perth Operations Centre with backup at DC)	08 6218 7700
	Control Room on site – Fixed Satellite	+ 870 776 624 043
	Portable ER Room (only turned on during total comms loss)	0147 183 763 0147 144 779
	Incident Communications Operator	08 6218 7734
	Village Manager	08 6218 7683
	Village/Dining Refuge – Satellite Phone	+870 776 624 060
	Reindeer – MCC	08 6218 7724
	Reindeer – Satellite Phone	0147 166 441
	Person In Charge	08 6218 7701
	Person In Charge – A/H	08 6218 7700 (CCR number and ask for PIC)
	Mob – Tony Morrison	0412 463 669
	Mob – Stan Bramwell	0405 471 195
	CS1 Portable - satellite phone	0147 144 779
Ningaloo Vision	Process Control Room	08 6218 7900
	OIM office	08 6218 7901
	Heli Admin	08 6218 7920
	Medic	08 6218 7907
	Bridge	08 6218 7911
	Fleet Broadband - Process Control Room Phone, Cargo Control Room, Telecoms Room, Bridge, OIM Quarters	+870 773 301 007
	ITRA - Alternate Command Muster	08 6218 7960
	Satellite Phone – Marine Supervisor (Outside Use Only)	0147 158 809
	Satellite Phone – OIM (Outside Use Only)	0147 164 470
	OIM – A/H	08 6218 7930
	Mob – Wes Renton	0414723833

Location / Asset	Position/Location	Phone Number
	Mob - Ian Antao	0477 371 577
	Mob – Steve Baird	0407 132 220
Vessel – Go Provider	Go Offshore Ship Ship Mobile: VOIP:	+61 499 020 073 +61 863777197 08 6146 6201 Bridge.provider@gooffshore.com.au
Timor Leste Office	Country Manager	José Lobato Gonçalves +670 7723 0856 + 618 6363 4001
	Timor Leste Engagement Coordinator	Reinalda Pires +670 7739 3553 + 618 6363 4000
	Business Services Supervisor	Elisabeth Gomes +670 7735 7543 + 618 6363 4005
	Timor Leste Engineering Supervisor	Robin Araujo +670 77393551 + 618 6363 4041
Timor Leste Authorities Feb 24 – Please note: We are currently waiting for ANP to advise new numbers – until then please contact William He (0468 460 688) or Reza Dashti	Autoridade Nacional do Petróleo (ANP)	+670 7309 9995 +670 7309 9996
	ANP HSE Director TBC ANP HSE Manager Constantino Afonso Pinto	+670 3324 098 +670 7873 9355 or +670 7309 9996 Prefers call or text via “WhatsApp” +670 332 4098 (Ext. 5027) +670 7727 0646 & 73510597 Prefers call or text via “WhatsApp”
	ANP Security Phone – 24/7	+670 7731 1689 or Constantino Pinto Tel: +670 332 4098 (Ext. 5027) Mobile : +670 7727 0646 & 73510597 E-mail: constantino.pinto@anp.tl
	Timor-Leste National Police (PNTL) National Operation Centre	+ (670) 77230635
	Australian Embassy	+670 7332 2111
	Defence Attaché	+670 7332 2111
MoH	TL Ministry of Health	Dr. Lizete Vong+670 7747 9443 Prefers call or text via “WhatsApp”
Stamford Clinic	Stamford Medical Clinic	Mr. Derek Chua +670 7743 4980 +670 3310141
Timor Leste Security	Maubere Security	Mr. Warren Knight Chairman

Location / Asset	Position/Location	Phone Number
		+670 7723 0547 Email: wmknight@ozemail.com.au Sebastiao MarquesManager+670 7749 2846 Email: mauberesec@gmail.com
	Regional Security Officer Lech Kazmirski	+670 7723 0948 / +670 332 4684 Ext. 2056
	Australian Maritime Boarder Operation	1800 041 800 or (02) 6275 600
	Dep. Of Infrastructure, Transport, Regional Development and Communication	1300 307 288
Bayu-Undan CPP	CPP CCR Operator (Emergency only)	08 6363 1140
	CPP CCR Emergency Commander - MOME Board	08 6363 1296
	CPP CCR number (Business use)	08 6363 1141
	Secondary Emergency Control Room	08 6363 1180
	CPP OIM	08 6363 1151
	CPP Ops Super	08 6363 1149
	CPP Medic Room	0011 870 773 205 655 (currently out of service)) (satellite hardwire)
	CUQ Heli Admin Area	08 6363 1145
	CUQ Medic	08 6363 1144
	TER, OIM, CCR	0011 870 773 205 655 (currently out of service) (satellite hardwire)
	CUQ Handheld Iridium Phone	0011 881 621 465 711 (Satellite Hand held) (Facility abandonment phone)
	Offshore HSE	08 6363 1220
Vessel – Britoil Dragon – Go Offshore	On Vessel Emergency Contacts On Shore Megan Perkins Crewing Manager/MLC Rep Lee Seubert Operation Manager DPA/CSO	VSAT +6531591356 IRIDIUM +881677126445 MOB +61 499 040 032 MOB +61 488 020 052 MOB +61 458 020 013
Vessel – ASL Leo – Go Offshore	On Vessel Emergency Contacts On Shore Megan Perkins Crewing Manager/MLC	VSAT +47 2339 7312 MOB +61 488 020 052

Location / Asset	Position/Location	Phone Number
	Rep Lee Seubert Operation Manager DPA/CSO	MOB +61 458 020 013
Bayu-Undan FSO	FSO CCR Operator	08 6363 1001 (24hrs) 08 6363 1011 (24hrs) 08 6363 1100 (Cordless Phone)
	FSO – Emergency Commander (OIM)	08 6363 1001 (24hrs) 08 6363 1011 (24hrs) 08 6363 1100 (Cordless Phone)
	FSO Satellite handset in CCR, OIM office, Medical Centre & TER	0011 870 773 204 862
	FSO Handheld Iridium Phone	0011 881 621 465 711 Only used during Facility Abandonment Hand Held Satellite phone
	FSO Heli Admin	08 6363 1006
	FSO OIM Office	08 6363 1003
	FSO Ops Super	08 6363 1000
	FSO Medic Room	08 6363 1005 Satellite Hardwire 0011 870 773 204 862
	Dili Aviation Coordinator	+670 777 25096 +670 774 58376
MS-1 – Onshore - Santos	Jason Young	08 6218 4980 0411 402 455
	Ben Fischer	0409 112 845 benjamin.fischer@ santos.com
	William Belson	08 6218 4941 0403 873 864 Will.Belson@santos.com
	Mark Salera	0408 317 695 mark.salera@santos.com
	Mark Murray	0406 067 996 Mark.Murray@contractor.santos.com
	Drilling Supervisor - Day	08 6218 4642 Travis Marriot / James (Jim) Matthews offshore.ds.ms1@santos.com
	Drilling Supervisor - Night	08 6218 4643

Location / Asset	Position/Location	Phone Number
		Christopher (Chris) Beck offshore.nds.ms1@santos.com
	Materials Logistics Coordinator	08 6218 4644 Tom Moroz/Gavin Poschkens
MS-1- Onshore – Valaris	Alistair McDonald Rig Manager	08 6146 6366 0438 754 969 Alistair.mcdonald@valaris.com
	Christian Ward Operations Support Engineer	+61 0475 146 631 Christian.Ward@valaris.com
	Luke Buscada QHSE Manager	08 6146 6358 0448 941 812 Luke.Buscada@valaris.com
MS-1 – Offshore – Valaris	MS-1 Call Sign D5P17 / IMO# 8770314	
	Radio Room (24hr coverage)	08 6313 6856 08 6218 4649 +8707 7320 4374 sat Rms1Radio@valaris.com
	James Savoy Malcolm O'Driscoll MS-1 OIM	08 6313 6855 +8707 7645 7106 Sat Rms1OIM@valaris.com
	Hospital (medic cabin)	08 6313 6854 Rms1Medic@valaris.com
MS-1 – Barossa – Onshore Materials & Logistics – Darwin Supply Base	Win Forsman	0421 762 536
MS-1 – Marine Superintendent	Rahul Pandit	+61 8 6218 7412 +61 417 952 098 Pandit, Rahul (Rahul) <Rahul.Pandit@santos.com>
MS-1 Vessels – Solstad Offshore ASA Perth, Australia	Joel Mullins Operations Director APAC	+61 8 9421 9315 +61 40095 8778 Joel Mullins <joel.mullins@solstad.com>
Vessel – Normand Ranger	VSAT: +47 52856055 | Mobile: +61 0428565871 | Sat: +881 677102436 E-mail: ranger.bridge@solstad.com	

Location / Asset	Position/Location	Phone Number
MS-1 Vessels – Tidewater Perth, Australia Adeline Yip Country Manager, Australia and New Zealand Razia Khan Regional QHSE Manager, Asia Pacific	Adeline Yip <adeline.yip@tdw.com> Razia Khan Razia.Khan@tdw.com (+65) 89384066	
Vessel –Seeker Tide Tidewater	Iridium **+88 1677108295**	
	V-SAT **+47 2278 5325 / +47 2278 5326**	
	GSM: **+61 (0)457 405 363**	
	E-mail: Seeker Tide <seekertide@tdw.com>	
Vessel – ASL Leo Laloran	Bridge VSAT: +47 2339 7512 bridge.leo@gooffshore.com.au	
Vessel – Britoil Dragon	VSAT: +65 31591356 IRIDIUM: +881677126445 MOB: +61 499 040 032 bridge.dragon@gooffshore.com.au	
Go Offshore Perth WA	Lee Seubert General Manager Operations (DPA / CSO) Phone: +61 8 9474 3600 Mobile: +61 4 58 020 013 Email: lee.seubert@gooffshore.com.au	
Vessel – Go Spica Go Offshore	FBB +870 773 802 676	
	V-SAT +61 8 6555 7093	
	Master Mobile +61 (0) 488 020 105	
	E-mail: bridge.spica@gooffshore.com.au	
Offshore Services Australasia Pty Ltd Darwin Base	Duty Operations Officer (including Night Operations) 24 hr primary activation. Tel: 0418 654 360 Email: darwin.base@offshoreservicesaustralasia.com	
	Base Manager Tel: 0475 758 152 (24hr secondary activation) Email: darwin.basemanager@offshoreservicesaustralasia.com	
	Senior Base Pilot Tel: 0474 308 346. Email: darwin.seniorbasepilot@offshoreservicesaustralasia.com	

Location / Asset	Position/Location	Phone Number
	Senior Base Engineer Tel: 0477 088 559 Email: darwin.seniorbaseengineer@offshoreservicesaustralasia.com	
Offshore Services Australasia Pty Ltd Adelaide	Operations Cell - Offshore (On-Call) Mobile: +61 447 428 718 Email: offshoreoperations@offshoreservicesaustralasia.com	
Barossa (Singapore Office)	Tony Quinn FPSO Project Manager +65 8671 0993 Geoff Stacey Project (Topside) HSE Advisor 9349 3653	
Barossa (Gas Export Pipeline)	Ben Haslam Barossa GEP Package Manager 0403 512 339 Chris Bogle GEP Installation Engineer 0423 148 453 James King GEP Construction Engineer 0431 927 697 Gabe Orr HSS Advisor 0429 103 474	
Allseas 'Audacia' vessel	Bridge Primary (+31) 1071 30834 Master (+31) 1071 30831 Master Secondary (+87) 077 620 5975	
Allseas 'Fortitude' vessel	Bridge Primary +31 10 669 0464 Catering Office (+31) 106 690 462 Master +31 10 669 0461	
Subsea7 'Oceanic' Vessel	Bridge Tel: +44 1224 568 647 Vessel Master Tel: +44 1224 568 631	
Subsea7 'Oceans' Vessel	Bridge Tel: +44 1224 359 161 Vessel Master Tel: +44 1224-359 150	

Location / Asset	Position/Location	Phone Number
Subsea7 'Pegasus' Vessel	Bridge Tel: +44 1224 292484 Vessel Master Tel: +44 1224 292 481 Mob: +44 7554 663 491	

3. Forward Operating Bases

Location	Position/Location	Contact Details
Toll Dampier Supply Base Yard 4	Dampier Supply Base Supervisor	0457 631 010 Offshore.dampier.logisticsproduction@santos.com
SES Emergency Centre	Compliance and Emergency Services Coordinator (CESC) (Shire of Exmouth)	0427 491 399 (08) 9949 1699 cesc@exmouth.wa.gov.au
	DFES Officer – responsible for facility - Paul Leiper	0419 937 834 (08) 9159 1400 paul.leiper@dfes.wa.gov.au
	Exmouth SES Unit Manager – Carl Atkin	0438 343 299 Manager@exmouthses.org.au
Harold E. Holt Naval Base Building 142	Naval Base Manager	(08) 9949 3321 0428 936 507 russell.levien@defence.gov.au
	Naval Base Support Services Project Manager	(08) 9949 3326 0417 279 496 gary.northrop@defence.gov.au
Exmouth VMR Building	Exmouth VMR Representative David Skene	(08) 9949 2426 0418 910 027 David.Skene@transport.wa.gov.au

4. Well Control

Company	Position/Location	Notification Details	Mobile	After Hours
Wild Well Control USA Wild Well Control UK	Houston TX	+1 281 784 4700 (primary) +44 1224 215 380 (secondary)		
Oceaneering		Contact 1: Rahman Khandker Project Manager Offshore Projects Group Direct: +61 8 6499 0036 | Mobile: +61 417799938 rrahman@oceaneering.com Contact 2: Jason Hughes Director APAC Offshore Projects Group Direct: +64 8 6499 0080 | Mobile: +61 (0)436 639 355 | Email: jhughes@oceaneering.com		

5. Government Agencies

Department	Position/Location	Notification Details	Mobile	After Hours
Bureau of Meteorology (BOM)	Tropical Cyclone Operations Desk	08 9263 2205		08 9263 2205
	Forecasts Desk	08 9322 4817		08 9322 4817
Pilbara Port Authority	Switchboard	08 9159 6555		08 9159 6556 0428 888 800 (24hr Emergency) Ashburton VTS Call sign: Ashburton VTS VHF Channel 14 and VHF Channel 16
	Harbour Master Ashburton - Anurodh Prasad Harbour Master Dampier – Mike Minogue	08 9159 6508	0400 468 724 0427 485 708	
	Deputy Harbour Master Vasyl Stiazhkin or Murali Krishna		 0418 521 659 0437 296 583	
	The Emergency Towe	08 9159 6556 0428 888 800		
Darwin Port Authority	Darwin	+61 (0) 401 110 320 Or +61 (0) 8 89190 816		
Port Melville – Tiwi Islands	Harbour Master – David McDonald	0409 328 337		
Department of Energy, Mines, Industry Regulation & Safety (DEMIRS) was Department of Mines, Industry Regulation and Safety (DMIRS)	Environment Duty Officer (Reportable incidents)	0419 960 621 or 9222 3727 Petroleum.environment@dmirs.wa.gov.au	0419 960 621	These numbers are now only manned between 9am-5pm Mon-Fri– 0419 960 621 may be diverted over weekends Outside office hours use email – petroleum.environment@dmirs.wa.gov.au
	Reporting an accident or incident (safety) Press 1 to report an incident	1800 723 364		
	Energy Safety	Sarah Roberts (media – electrical issues) 08 6552 9453 0466 409 828 (A/H) Mining & Resource (media – related to sites) 08 9222 6102		Incident reporting line 1800 678 198

Department	Position/Location	Notification Details	Mobile	After Hours
		media@dmirs.wa.gov.au		
	Worksafe WA	1300 307 877 WorkSafe (media) Caroline De-Vaney 0408 927 563		
	Resource Safety Division and Dangerous Goods	08 6251 2300 DGS&CR Branch – queries re how to complete reporting DGSB@DMIRS.wa.gov.au		Active Incidents 0417 091 662 – on call 0417 933 794 – incident officer
	Well Compliance Duty Officer (Connects to Petroleum Environment Team & Compliance Branch)	0427 479 615	0427 479 615	Only Mon-Fri, 9am-5pm
	Switchboard	08 9222 3333		
Department of Water & Environment Regulation (DWER)	1300 784 782 24 hour pollution watch hotline pollutionwatch@dwer.wa.gov.au			
Department of Climate Change, Energy, the Environment & Water (used to be environment in Department of Agriculture, Water & Environment)	Switchboard – Environment, Water, Parks and Heritage Breaches of EPBC Act (Triage & Wildlife)	1800 920 528 or 1800 110 395. environment.compliance@dcceew.gov.au epbc.permits@environment.gov.au epbc.referrals@dcceew.gov.au	9:00 am to 5:00 pm (AEST) Monday to Friday, except public holidays	
Department of Industry, Science, & Resources (used to be energy in Department of Industry Science, Energy & Resources)		02 6213 6000		
Department of Biodiversity Conservation and Attractions (DBCA)	State duty officer	08 9219 9837 wildlife.protection@dbca.wa.gov.au		08 9219 9837
	Perth Office	08 9219 9000		
	Pilbara (Karratha) Office Switchboard	08 9182 2000		
	Exmouth District	08 9947 8000		
	Kimberley regional office	08 9195 5500		
	Nature Protection Branch Manager	08 9219 9840		08 9219 9840
	WILDCARE	08 9474 9055		08 9474 9055

Department	Position/Location	Notification Details	Mobile	After Hours
Department of Premier and Cabinet (DPC) – Western Australia		08 6552 5000 (Main)		
Department of Transport (DOT)	MEER Duty Officer – Oil Pollution 24 Hr	08 9480 9924 24hr service (phone this number first) Marine.pollution@transport.wa.gov.au		
	Exmouth Office	(08) 9216 8219 After Hours - 0447 856 774		
Department of Fire & Emergency Services (DFES)	Emergency	000 – fire and life threatening emergencies 132 500 – SES emergency assistance 13 3337 – Emergency Information		
Energy Policy WA (part of DEMIRS) (formerly known as Public Utilities Office)	General EMT 24hr on call Paul Hynch Paul Power Georgina Stamp	08 6551 4600 08 6551 4652 0409 159 835 paul.hynch@dmirs.wa.gov.au paul.power2@dmirs.wa.gov.au georgina.stamp@dmirs.wa.gov.au		08 6551 4652 (24 hr EMT) EPWA-emergencymanagement@dmirs.wa.gov.au
Department of Primary Industries and Regional Development (DPIRD)	Primary Contact – Mark Pagano Oil spills etc	Mark.Pagano@dpird.wa.gov.au cc in all correspondence via email: environment@dpird.wa.gov.au	0418 779 053	First contact: 0418 779 053
Director of National Parks	Marine Parks Compliance Duty Officer	0419 293 465 marine.compliance@environment.gov.au		0419 293 465
AMSA (Rescue Coordination Centre, RCC) Note from ME: **MOB search and rescue (SAR) triggered through AusSar and AMSA available 24/7.** 1. Daytime only Helicopter SAR (LIMSAR) response provided by OSA AW139 Helicopter out of Karratha. 2. Activation can be either through OSA Operations directly, or AMSA. My recommendation is that SAR tasking is activated directly to AMSA, with direction provided to them during activation to		1800 641 792 (Maritime) 1800 815 257 (Aviation) rccaus@amsa.gov.au		1800 641 792 (Maritime) 1800 815 257 (Aviation)

Department	Position/Location	Notification Details	Mobile	After Hours
include our contracted LIMSAR services (OSA) in the formal tasking. Concurrent activation directly to OSA in Karratha will expedite response. Activation protocols are something worth clarifying to remove any potential confusion at time of activation.				
CoastWatch (BorderWatch) (Use this number for suspected illegal entries into Australia, suspicious cargo)		1800 06 1800		1800 06 1800
Australian Fisheries Management Authority (AFMA)	6am – 12 midnight with ability to leave message. After that it will be transferred to Duty Officer on call b/t Midnight and 6am	02 6275 5818 dutyofficer@afma.gov.au		0419 205 329 (Canberra) Duty Officer 0428 196 114 (Darwin) Duty Officer
Department of Foreign Affairs & Trade	Director of Indonesia Economic and Trade Section 24-hr Consular Helpline	02 6261 1111 (Main)		1300 555 135 Consular Emergency Helpline Or +61 2 6261 3305
National Offshore Petroleum Titles Administrator (NOPTA)	Switchboard	08 6424 5300		
NOPSEMA	Incident Notification	1300 674 472 submissions@nopsema.gov.au		1300 674 472
Comcare (Australian Number)		1300 366 979		
NORTHERN TERRITORY NUMBERS				
NT Department of Health		(08) 8999 2400		
NT Government Switchboard (NT DEPWS)		08 8999 5511		
NT EPA		08 8924 4218 1800 064 567 – pollution hotline Will put you through to air quality specialist pollution@nt.gov.au waste@nt.gov.au		
Environmental Operations		Ph: 08 8924 4218 waste@nt.gov.au		

Department	Position/Location	Notification Details	Mobile	After Hours
Waste Management and Pollution Control				
NT Dept. of Industry, Tourism & Trade – Fisheries (formerly known as NT Dept. of Primary Industry & Fisheries)		Ph: 08 8999 2144 fisheries@nt.gov.au Water Police: 08 8947 0391		
NT Dept. of Industry, Tourism & Trade		08 8999 2006		
NT Dept. of Infrastructure, Planning & Logistics (formerly known as NT Dept. of Transport (NT DoT))	Executive director of DIPL	Ph: 08 8924 7598		Going to call back with 24hr no.
Parks and Wildlife Commission of NT		08 8995 5008 0401 115 702 wildlife.management@nt.gov.au		0401 115 702
NT Government (switchboard who can put you through to rest of government)		08 8999 5511.		
Department of Infrastructure, Planning & Logistics Formerly known as Department of Lands, Planning & The Environment (NT)	Harbour Master Deputy Harbour Master	08 8999 3867 0428 181 480 Anil.Chadha@NT.gov.au 08 8924 7101 marinesafety@nt.gov.au		
APA Group	NT Gas emergency	1800 019 112 Or 1300 087 621		1800 019 112 Or 1300 087 621
NT WORKSAFE	DG's, Chemical & Workplace Accidents 24hrs (Switchboard)	1800 019 115 ntworksafe@nt.gov.au		1800 019 115
INTERNATIONAL NUMBERS				
Flag State Panama Segumar Singapore	Flag State Panama Segumar Singapore	+65 6221 8677 ext 204		
Flag State Panama (Ningaloo Vision only)	Chief of Maritime Affairs Investigation Department – Eng. Daniel Jaramillo djaramillo@amp.gob.pa casualty@amp.gob.pa Deputy Chief of Maritime Affairs Investigation Department – Eng. Gonzalo Cortez gcortez@amp.gob.pa casualty@amp.gob.pa	0011 507 501 5039 24 hr 0011 507 501 5087		

6. Oil Spill including Stakeholders to Contact

Company	Position/Location	Phone	Mobile	After Hours
AMOSC (amosc@amosc.com.au) Provision of oil spill response equipment and personnel	Duty Officer 24hrs	0438 379 328	0438 379 328	0438 379 328
SFRT – Called out under AMOSC Call out procedure for the SFRT: STO calls and sends official request to AMOSC for the use of the SFRT kit Contract note to be signed off by STO and AMOSC AMOSC will notify Oceaneering to issue the SFRT kit to STO STO to issue PO to Oceaneering				The SFRT is a toolbox of specialised equipment that has the ability to remove (light) debris near the wellhead and BOP, apply dispersants and enable direct BOP intervention. It aids in the preparation of the area for relief well drilling and cap installation. A contract is currently in place between STO and AMOSC (Australian Marine Oil Spill Centre) for the use of the SFRT.
Oil Spill Response Limited	Duty Manager (Asia Pacific)	+65 6266 1566 dutymanagers@oilspillresponse.com		+65 6266 1566
The Response Group (TRG)	TRG Duty Officer 24/7 Designated call-out authorities (all Incident Commanders) Arrangements with TRG for the provision of trained field response personnel	00 11 1 281 880 5000		00 11 1 281 880 5000
RPS	Duty Officer 24hrs	0408 477 196 rpsresponse@rpsgroup.com	0408 477 196	0408 477 196

North West Alliance	Primary Contact Mitchell James Contract Delivery Manager Secondary Contact Nikolai Panine – Operations Manager NWA Regional Manager – Trent Nolan NWA Centralised Admin	132 955	0437 013 114 mitchell.james1@northwestalliance.com 0417 828 319 nikolai.panine@northwestalliance.com 0400 621 481	
Veolia Darwin (for NT)	Primary Contact Person (Project Manager) - NT Operations Manager - Rick Barton Secondary Contact Person - NT Fleet Manager - Angela Maisey Location Responsible Person /Ops Supervisor: Justin Vicary Brian Gehringer		0427 927 723 rick.barton@northwestalliance.com 0409 328 052 angela.maisey@northwestalliance.com 0431 218 847 0497 791 388	
RPS (Oil Spill Scientific Monitoring) osmp.response@rpsgroup.com.au	Activation Phone Number	1300 424 115		1300 424 115
Advisian	Operational Dispersant Monitoring	(03) 9389 3637	spillresponse@advisian.com	
Intertek Geotech (WA)		08 9263 0100 Reception		
Ecotox Services Australasia (NSW) (ecotoxicology)		02 9420 9481 (automated)		
Senversa (Need to contact if Oil Spill VI & AI Shore contact)	Jason Clay Senior Principal, Contaminated Sites Auditor (NSW and WA)	0410 431 674	jason.clay@senversa.com.au	
Tiwi Resources Ranger Coordinator (on behalf of Tiwi Islands Traditional Owners Clan Groups) Also notify: Tiwi Minupi Clan members (note:do not test these numbers): Dennis Murphy, Marius Puruntatameri	Verbal phone call notification - Verbal phone call within eight hours of incident being identified. Follow up with email outlining details of incident.	(Primary): 08 8941 1162 (Secondary): +61 403 047 221 (Katherine Whitehead)	info@tiwiresources.com.au	

Therese Bourke (Need to notify for actual or impending spills in NT waters surrounding the Tiwi Islands)		D.Murphy: 0458 481 889 M.Puruntatameri: 0475 435 925 T.Bourke: 0484 368 582		
DFAT Global Watch Office (if oil spill has potential to contact another country)			globalwatchoffice@dfat.gov.au Monitored 24/7 and the staff monitoring DFAT will contact the relevant part of DFAT for a response	
Timor-Leste or Indonesian Specific Matters Please contact:			Joanne Lee (joanne.lee@dfat.gov.au) and Robert Sutton (robert.sutton@dfat.gov.au)	
City of Karratha	In the event of an emergency that may impact on the City's functions, interests or activities, please forward any correspondence direct to the CEO		ceo@karratha.wa.gov.au	
Shire of Ashburton	Given the potential for unplanned hydrocarbon release or discharge, the Shire requires Santos to brief the Shire's Local and District Emergency Management Committee's on its planned responses to such events before any activities commence.		emergency.management@ashburton.wa.gov.au	

Care of Hedland	Where Care of Headland's interests may be affected by an incident they must be advised.		coordinator@carefo rhedland.org.au	

7. WA Oil & Gas Companies

Company	Position/Location	Phone	Mobile	After Hours
Chevron 250 St Georges Tce PERTH WA 6000	Barrow Island Port Controller - 24/7 Emergency Hotline	08 9184 3581		
	Incident Commander	0417 442 081		
	Emergency Management Adviser	0427 495 187		
	HES Specialist – Emergency Management & Oil Spill Response Jacob Hagan jacob.hagan1@chevron.com	0473 640 293		
	Main Line:	08 9216 4000		
	Chevron reservation number Megan Falaniko Lead Reservation Clerk	08 9485 5992 08 9485 5884		0448 130 087
Kufpec Australia Pty Ltd	Main Switchboard	08 9380 3900		
Vermilion	Main Perth number	08 9215 0300		
	Wandoo Platform – Field Superintendent	08 9215 0377		
	Wandoo Platform – Control Room	08 9215 0399		
	Wandoo Platform – Nurse/Admin	08 9215 0366		
Woodside Offshore Petroleum Pty Ltd	240 St Georges Tce Perth WA 6000 Woodside Communication Centre Marine Emergency Response Duty Officer Acting HSE VP – Adam Nicholas adam.nicholas@woodside.com.au Crisis & Emergency Management Manager – Dave Howell david.howell@woodside.com.au	08 9348 4000 (Main) 08 9348 4624 1300 833 333 (also can use 08 9348 7184) 0419 328 630 9348 5712 (ex 85712) 0418 919 151		1300 833 333
Shell Australia Ltd – Perth	Switchboard	08 9338 6600		
ENI Perth	HQ	08 9320 1111		
Jadestone Energy	General Duty IMT	9486 6600 0488 655 759		0488 655 759

8. Medical Support

Company	Position/Location	Phone	Mobile	After Hours
Complete Corporate Health	Ascot clinic	08 9277 9900		
Santos Company Doctor Primary Clinical Advice – Santos in house Doctor (Emergency medicine background)	Dr David Crocker (Based in Sydney) Dr Lisa Walker Adelaide	02 8207 8477	0414 415 696 0411 898 692	0414 415 696
Dr Home Visit/ Deputising Dr		08 9321 9133		
Fremantle Hospital	Fremantle Hospital	08 9431 3333 *No Emergency Department*		
Fiona Stanley Hospital	Main	08 6152 2222 Emergency Dept – Open 24hrs		
	Hyperbaric Unit	08 6152 5222		08 6152 2222
Hedland Health Campus	Colebatch Way South Hedland WA 6722	08 9174 1000 Emergency Dept – Open 24hrs		
Karratha Medical Centre	Switchboard	08 9185 3555		Karratha Health Campus
Karratha Health Campus		08 9144 7777 – 24 hrs Emergency Dept – Open 24hrs		
Onslow Hospital		08 9184 3200 Emergency Dept – Open 24hrs		08 9184 3200
Exmouth Hospital	Lyon Street Exmouth WA	08 9949 3666 Emergency Dept – Open 24hrs		
	Dentist	08 9949 3690		
Queen Elizabeth II Medical Centre 7 Sir Charles Gairdner Hospital		08 6457 3333 Emergency Dept – Open 24hrs		08 6457 3333
WARAME – Aspen Medical Support Services	Switchboard 24 Hrs	Domestic : 1800 559 399 International : 02 6188 5548	Note: Post activation – ASPEN will provide relevant contact number for activating fixed wing, if required	

	Karratha Doctor	0408 172 439		
	Karratha Paramedic	0408 171 946		
	Service Delivery Manager (backup)	0409 447 057		
CPAG Medivac Support Hotline		1300 565 251		
Safety Direct Solutions (SDS)	Aero Medevac for Barossa	1300 702 737	Secondary +61 480 279 805	
International SOS	Assistance Centre	02 9372 2468		
Royal Flying Doctor Service	Main Number	08 9417 6300		
	Emergency only 24 Hr	1800 625 800 - State Wide calls 08 9417 6389 – Operations		1800 625 800
WA Health	Disaster Preparedness and Management Unit	0434 074 838 (Assistant Director) – Graham Stewart General Queries		Duty Manager 08 9328 0553 (Call this for an incident)
State Health Incident Control Centre (SHICC) [DoH (WA), 189 Royal Street, East Perth WA 6004]		08 9222 4444 (Operational only when stood up)	Emergencies on duty officer 08 9328 0553	
Royal Perth Hospital	Hotline	08 9224 2244 Emergency Dept – Open 24hrs		9224 2244
WA Poisons Information Centre		13 11 26		13 11 26
BSS EAP		08 9211 3700 1800 30 30 90		1800 30 30 90
Ambulance Central Control	Melbourne Central Control	03 9840 3500		1300 366 141 membership only
Devil Creek Ambulance Roebourne Hospital		08 9182 0200 Emergency Dept – Open 24hrs		
St Johns, Karratha	Admin Ambulance	08 9185 1222		000 – 24hrs
Bayu-Undan	CPAG - 24 Hour Medical (Request on call Doctor)	1300 133 624		
Timor Leste	Stamford Médical, Derek Chua	Emergency number Dili 00 11 670 7772 1111 00 11 670 331 0141 office hrs	Mobile (TL) 00 11670 7743 4980	00 11 670 7772 1111
Darwin	Royal Darwin Hospital	08 8922 8888		
	Darwin Nursing Coordinator – Heli pad	0401 116 415		
	St Johns Darwin	000 Office 08 8922 1503		

Careflight Emergency Tasking – NT (can handle north WA by try RFDS first)		(1300 070 919) NT Ops 1300 650 654 coordination unit Senior Coordinator 0417 826 336		

9. Aircraft Services

Company	Position/Location	Phone	Mobile	After Hours
Aerotech First Response (Fixed Wing Aerial Dispersant Capability – pilots, loading crew, liaison officer)	Kent Town, South Australia	08 8132 0400 08 8132 0999		In a response activate through AMOSC Duty Officer or AMSA RCC
AMOSC (Fixed Wing Aerial Dispersant Capability – Dispersant Operations Coordinator)	Via AMOSC Duty Officer		0438 379 328	0438 379 328
AMSA (Fixed Wing Aerial Dispersant Capability – Air Attack Supervisors, Liaison Officer)	AMSA Rescue Coordination Centre	1800 815 257		1800 815 257
Cobham (National Jet Systems)	Perth	9479 9700		
	Emergencies	1800 605 182		
	OCC Duty Manager	08 8154 7444	0431 729 886 Roy Frost	
Karratha Flying Services	Karratha Airport	08 9144 2444		0482 509 728
	Manager on Call	08 9144 2444		
	CEO	08 9144 2444		
	Senior Base Pilot Kris Dunctan		0450 655 528	
Polar Aviation	Port Hedland Airport	0419 955 210		
CTM Travel Tool	Bookings Onshore	Monday - Friday 8am - 6pm (AEST time zone) Phone from Australia: 1800 805 625 Phone from O/S: +61 9216 7200 santos@travelctm.com Emergency/After Hours Support (travel within 24 hours): Phone from Australia: 1800 805 625 Phone from O/S: +61 9216 7200 Sharepoint link		
	Bookings Offshore	Domestic/International/Trans Tasman Travel Booking Support:		

		Monday - Friday 8am - 6pm (AWST time zone) Phone from Australia: +61 8 9216 7296 santoswa@travelctm.com Emergency/After Hours Support (travel within 24 hours): Phone from Australia: +61 8 9216 7296 Phone from Australia: 1800 805 625 Phone from O/S: +61 8 6467 2100		
RAAF	National 24 hr	1300 333 362		1300 333 362 24Hr Aust Wide
Skippers Aviation skippers@skippers.com.au	Perth Airport	9478 3989 1300 729 924		0417 988 562
Alliance Airline	Perth Airport	General Manager 08 9373 0902 Operations Manager 08 9373 0919 Operational Control Centre (1st point of contact) 07 3212 1532	Russell Bryant 0438 738 321 Lisa Armstrong 0439 949 500	
TNT Air Charter	Sydney	13 11 50 – 24Hr		
Offshore Services Australasia	Head of Commercial	6316 4554 Graham Bowles	0428 121 578	
Offshore Services Australasia PTY LTD (Formerly Babcock Helicopters) (Karratha)	Karratha Operations 24 hours	08 7089 5400 Osa.ktachkn@chcheli.com Primary contact number is always 0455 432 001. There are times the desk phone will not be manned.	0455 432 001 (Main 24hr - Primary) 0439 948 466 (Ops PM)	0455 432 001
	24h Medivac	Aspen 1800 559 399		
	Karratha Check In (Menzies)	0437 090 962 OSA.KTACHKN@chcheli.com		

PHI Helicopters	BD & Contracts Manager	Jade Turner 0477 220 633		
	Commercial & BD Director	Gordon Watt 0477 221 147		
	Broome Base Manager	Ric Collins 0477 110 335		
	Onslow Base Manager	0499 162 444		
	Regional Operation Centre - Perth	0447 431 906 (24/7) 1300 727 469 (24/7)		
Offshore Services Australasia PTY LTD (Formerly Babcock Helicopter) (Darwin and Dili)	Dili Airbase Manager	+670 7401 1660		
	Dili Senior Base Pilot	+670 7397 9165		
	Dili Senior Base Engineer	+670 7397 9169		
	Dili Duty Ops Officer	+670 7401 1636 +670 7401 1637 +670 7401 1659		
	Darwin Manager	OSA.DWNBM@chcheli.com	0475 758 152	
CHC Helicopters Karratha	Karratha Base Manager	08 9185 7606	0420 773 411	0420 773 411
	CHC Duty OPSO		0429 374 243	0429 374 243
	24h Medivac		Aspen 1800 559 399 0409 447 057	
			08 9185 7601 Ops Landline	
Shire of Exmouth	Airport & Heliport			
	Airport Manager	08 9949 1326 0427 744 153 - 24/7		9949 1326 diverts to 0427 949 419 Duty ARO
	Learmonth Heliport Check-in	08 9949 1875		
	Exmouth Heliport Ops	08 9949 3000		
Shire of Ashburton	Onslow Airport	08 9153 2000		0487 654 272 after hours on call
Pilbara Transit Service/Land, Air, Sea Transport Solutions LASTS Transit	Dampier	0427 831 755 Operations 1800 527 878		
Air Traffic Control (Air services)	Perth Air Traffic Control	9476 8620 - 24 hr Tower – 9476 8625		

Melbourne Air Services (FRI) Own air space	Air service – Ops Director	03 9235 7420 Melbourne after 50 km out of Perth		
	Air services – Systems Specialist	03 9235 7402		03 9235 7402

10. Marine Vessel Services

Company	Position/Location	Phone	Mobile	After Hours
ABS 24/7 Casualty Response Program	ABS Rapid Response Damage Assessment	+1 281 820 8697 +1 281 877 6737		rrda@eagle.org
Bhagwan Marine	Primary Contact Managing Director - Loui Kannikoski	08 9424 2300	0418 939 177	
	Secondary Contact General Manager – Operations – Peter Carmichael	08 9424 2300	0458 939 076	
Dof Management	Primary Contact General Manager – Clint Rhodes	08 9278 8700	0438 975 721	
	Secondary Contact Commercial Manager – Tim Jeffery	08 9278 8700	0400 699 876	
Jetwave Marine Services	Primary Contact General Manager – Nik Smith		0427 913 438	
	Secondary Contact Commercial Manager – Mani Bajwa		0490 941 381	
	Jetwave Asari	08 6218 7576	0439 935 231	asari@jwms.com.au
	Jetwave Lightning		0455 516 001	lightning@jwms.com.au
GL Noble Denton	Senior Surveyor	08 9215 4600	0408 533 222	
Laloran	**See Go Offshore contact details below.			
Lloyds Register Fremantle	Senior Surveyor	08 9318 7318 08 9318 7328	0409 691 003 0412 467 335	
	Secondary	08 6436 1466	+61 476 826 368	
Maersk Supply Service	Primary Contact Managing Director – David Kearney	08 6436 1477	0408 200 606	
MMA Offshore	Primary Contact Chartering Manager – Mike Merrutia	08 9431 7431	0417 913 985	
	Duty Phone		0408 913 988	
	24hr Emergency Contact		0417 915 566	
Siem Offshore	Primary Contact Operations Manager – Aaron Barbetti		0436 812 428	
	Secondary Contact General Manager – Craig Roberts		0408 423 689	
Solstad Offshore	24 Hour Emergency	08 9421 9316		
	Primary Contact Commercial Director – John Annat	08 9421 9309	0408 703 387	
	Secondary Contact	+61 8 9421 9315	+61 40095 8778	

Company	Position/Location	Phone	Mobile	After Hours
	Operations Director - Joel Mullins			
Tidewater	Thibault Thiery	(+65) 6309 3705	(+65) 8121 5749	
Gun Marine	PRIMARY Marine Operations & HSSE Skyla Grant	08 9949 4646	0429 049 458	
	SECONDARY Director – Mike Forde		0417 733 329	
GO Offshore	PRIMARY General Manager Operations Lee Seubert	08 9474 3600	0458 020 013	
	SECONDARY Commercial Manager – Victoria Sullivan	08 9474 3600	0447 020 008	

11. Road Transport

Company	Position/Location	Phone	Mobile	After Hours
Toll Energy	Forrestfield			
	Operation Manager Jeremy Clark		0447 311 917	
	Supply Chain Lead Nathan Bainbridge		0437 023 419	
	Dampier			
	Business Unit Manager Clint Cork	08 9185 7021	0400 385 631	
	Operations Manager Adam Gallash	08 9183 6648	0419 537 507	
Independent Fuel Distributors DC Condensate Transport Specific	Director Mark Lindsay	91826300	0412956413	
	Operations Manager Ron Halliwell	08 91826330	0439626989	
CH Robinson	Team Leader – Account Management Damian Swyny		0419 963 403	
	Team Leader – Global Forwarding Jake Swallow		0425 775 931	
	Customer Service Manager Stefan Muenger		0478 489 568	
	WA State Manager Adam Hughes		0425 315 639	
Exmouth Freight and Logistics	Shane Coote Shane@exmouthfreight.com.au		0438 417 131	
	Phillip Gumbrell Phil@exmouthfreight.com.au		0417 922 753	
	On-call Duty Supervisor		0475 510 900	0475 510 900
Santos Offshore Santos logistics and storage base. Collection depot prior to cargo heading North. Coordinate collection as well as loadout/backload of cargo/equipment	Forrestfield			
	Supply Base Supervisor	6218 7781	0429 850 868	John Naughton
	Logistics Improvement Analyst	6218 7782	0438 641 864	Paul Arnold
	Dampier			
	Supply Base Supervisor	6218 7827	0457 631 010	John Ziolkowski
	Production MLC	6218 7836	0439 679 616	Lance Chapman

12. Police and Security Services

Company	Position/Location	Phone	Mobile	After Hours
Police - Australia		000		
WA Police Karratha Police Station (24 hrs 7 days a week		(08) 9143 7222 (08) 9143 7207 Shift Sergeant		
Northern Territory Police		P: 131444 (Police Response) Ask to speak to Officer in Charge NT Water Police		
Department of Home Affairs (Border Watch) (Use this number for breaches of 500m security zone)		1800 009 623 (only available in WA from 7.30am to 3.30pm) (or + 612 6246 1325 if calling from overseas or using a satellite phone)		
Office of Transport Security Aviation/Maritime – O&G Coordination Team		1300 791 581		
Australian Security Intelligence Organisation (Public line) Out Reach		13ASIO – 13 27 46 (02) 6234 1668		
National Security Hotline	24hr number	Tel: 1800 123 400		
Australian Border Force (Emergency Visas)	For URGENT medivac and travellers does not have a visa to travel, you MUST contact our Border Operation Centre (BOC - boc@abf.gov.au) for uplift approval; cc'd paxmanintell@abf.gov.au and borders.nt@homeaffairs.gov.au Relevant info and documents required when seeking approval from BOC, for example: 1. Patient medical and passport information 2. Hospital acceptance letter 3. Guarantee of payment letter for hospital expenses 4. Copy of patient passport	Emails to right in afterhours column are the first option. Lillian Ong Supervisor Aviation Operations – Border Operations Operations North P: 08 8901 6231 E: lillian.ong@abf.gov.au Ph: 08 8920 2552 (general)		These emails are monitored 24/7 by 4 separate aviation teams. boc@abf.gov.au cc'd paxmanintell@abf.gov.au and borders.nt@homeaffairs.gov.au

Company	Position/Location	Phone	Mobile	After Hours

13. Gas Customers

In the event of an incident that has the potential to affect gas supply, notify the Santos Offshore Gas Marketing Team via the Duty Phone; (08) 6186 1000.

Appendix 1 Satellite Phone Dialling Pre-Fixes List

Satellite Phone Dialling Prefix List

Calling From: **Fixed Sat Phone**	Calling To: **Fixed Sat Phone**
Dial 00, then the number Eg. To call CCR fixed sat phone dial 00 870 776 624 043	
Calling From: **Fixed Sat Phone**	Calling To: **Mobile Phone**
Dial 00618, drop the first 0, and dial the rest of the number Eg. To call mobile dial 0061 421 840 371	
Calling From: **Fixed/Portable Sat Phone**	Calling To: **Landline**
Dial 00618, then the number Eg. To call CCR dial 00618 6218 770	
Calling From: **Fixed/Portable Sat Phone**	Calling To: **Portable Sat Phone**
Dial 0061, drop the first 0, and dial the rest of the number Eg. To Call CS1 portable sat phone dial 0061 147 144 779	
Calling From: **Portable Sat Phone**	Calling To: **Mobile Phone**
Dial 0061, drop the first 0, and dial the rest of the number Eg. To call mobile dial 0061 421 840 371	
Calling From: **Portable Sat Phone/Landline/Mobile Phone**	Calling To: **Fixed Sat Phone**
Dial 0011, then the number Eg. To call CCR fixed sat phone dial 0011 870 776 624 043	
Calling From: **Landline/Mobile Phone**	Calling To: **Portable Sat Phone**
Simply dial the number Eg. To call CS1 portable sat phone dial 0417 144 779	