Santos

Bayu-Undan Decommissioning

SUPPLIER COVER SHEET

Bayu-Undan to Darwin Gas Export Pipeline Decommissioning and Preservation Oil Pollution Emergency Plan

Company Document ID	Rev
DCOM-652-EN-OPE-00002	**0**
Supplier Document ID	
DCOM-652-EN-OPE-00002	**0**

Supplier	Contract / Purchase Order No.
BlueSands Environmental	**4521497332**

Equipment Tag No.

Tag No

DOCUMENT STATUS AS REVIEWED BY CONOCOPHILLIPS

- ☐ 1. Proceed
- ☐ 2. Revise & resubmit. Work may proceed. Incorporate all changes indicated.
- ☐ 3. Revise & resubmit for review. WORK MAY NOT PROCEED.
- ☐ 4. Review not required. Work may proceed. Information only.

REVISIONS TO COMPANY DOCUMENT ID			**REVIEWED BY:**	**DATE**
REV	**DATE**	**STATUS**		
A	08/04/2020	Draft for internal review	Supplier shall resubmit document in accordance with instructions accompanying this returned document. This review and comments, if any, do not alter any of the terms and conditions of the Contract under which the Purchase Order referenced above has been issued ("Purchase Order"). Nor does it relieve the Supplier from any responsibility or liability for the accuracy and completeness of the document, nor shall it be interpreted to imply approval of such document. Company (as defined in the Purchase Order) or any of its Affiliates do not assume any liability or responsibility for, as a result of, or in connection with this review.	
B	22/06/2020	Draft for internal review		
C	24/07/2020	Draft for internal review		
0	04/08/2020	Final for NOPSEMA submission		

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ACRONYMS

Abbreviation/Acronym	Definition
ABU	Australian Business Unit
ABU-W	Australian Business Unit-West
ADIOS	Automated Data Inquiry for Oil Spills
AFMA	Australian Fisheries Management Authority
ALARP	As Low As Reasonably Practicable
AMOSPlan	Australian Marine Oil Spill Plan
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
API	American Petroleum Institute
CIMP	Crisis and Incident Management Plan
CMT	Crisis Management Team
CSR	Client Site Representative
DENR	Department of Environment and Natural Resources
DFAT	Commonwealth Department of Foreign Affairs and Trade
DoAWE	Commonwealth Department of Agriculture, Water and the Environment
DPaW	Department of Parks and Wildlife (now Department of Biodiversity, Conservation and Attractions)
DPIF	Department of Primary Industry and Fisheries
EMBA	Environment that May be Affected
EP	Environment Plan
ERP	Emergency Response Plan
ERT	Emergency Response Team
EUL	Environment Unit Lead
FSO	Floating Storage and Offloading
FPSO	Floating Production Storage and Offloading
GIS	Geographic Information System
HSE	Health, Safety and Environment
IAP	Incident Action Plan
IC	Incident Commander

Abbreviation/Acronym	Definition
ICS	Incident Command System
IMT	Incident Management Team
JSA	Job Safety Analysis
MARPOL	The International Convention for the Prevention of Pollution from Ships 1973/78
MDO	Marine Diesel Oil (Diesel)
MNES	Matters of National Environmental Significance
MODU	Mobile Offshore Drilling Units
NOPSEMA	National Offshore Petroleum Safety and Environment
NOPTA	National Offshore Petroleum Titles Administrator
NT	Northern Territory
OMP	Operational Monitoring Plan
OPEP	Oil Pollution Emergency Plan
OSCP	Oil Spill Contingency Plan
OSMP	Operational and Scientific Monitoring Plan
OSRL	Oil Spill Response Limited
OPGGS (E)	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS (E) Regulations
OPP	Offshore Project Proposal
OWR	Oiled Wildlife Response
OWRP	Oiled Wildlife Response Plan
POLREP	(Statutory) Pollution Report
PPE	Personal Protective Equipment
RCC	Rescue Coordination Centre
SCAT	Shoreline Clean-up Assessment
SIMA	Spill Impact Mitigation Analysis
SITREP	Situational Report
SMP	Scientific Monitoring Plan
SOPEP	Shipboard Oil Pollution Emergency Plan
TMPC	Territory Marine Pollution Controller

1 QUICK REFERENCE INFORMATION

In the event of an emergency situation where human safety is at significant risk, tasks included in this OPEP may not be implemented, and the International Convention for the Safety of Life at Sea (SOLAS) 1974 may take precedence.

Parameter	Information			Further Information
Petroleum Activity	Bayu-Undan to Darwin Gas Export Pipeline Decommissioning and Preservation			N/A
Activity	Pipeline Decommissioning and Preservation			N/A
Water depth	Ranges from approximately 50 m to approximately 135 m			Section 4 of the EP
Permit/ Licence References	Timor-Leste offshore waters (pursuant to the Treaty): BU-1-PL (former Production Sharing Contracts JPDA 03-12); Australian Commonwealth waters: WA-8-PL and NT/PL1; and NT waters: NTC/PL1 and PL20			Section 3 of the EP
Spill scenarios	• Tank rupture following vessel collision (location: KP380) • Tank rupture following vessel collision (location: KP34.2) • Hose break or coupling failure during refuelling			**Section 7.2**
Hydrocarbon type, International Tanker Owners Pollution Federation (ITOPF) grouping, worst case volume	**Scenario**	**Hydrocarbon type (ITOPF Group)**	**Worst case volume**	**Section 7.2**
	Vessel collision	Marine Diesel Oil (Group 2)	700 m^3	
	Vessel collision	Marine Diesel Oil (Group 2)	1,125 m^3	

Parameter	Information			Further Information
	Hose break or coupling failure	Marine Diesel Oil (Group 2)	10 m^3	
Hydrocarbon properties	Marine Diesel Oil (MDO) Density kg/m^3 at 25°C = 829 Dynamic viscosity (cP) = 4 @ 25° C API Gravity = 37.6			**Attachment A**
Weathering potential	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 60% will generally evaporate over the first two days. Approximately 5% is considered "persistent hydrocarbons", which are unlikely to evaporate and will decay over time. 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. MDO re-surfaces when the conditions calm. It does not form mousse.			**Attachment A**
Protection priority areas	Oceanic Shoals Australian Marine Park (AMP) Tiwi Islands (Bathurst Island)			**Section 7.5**

2 FIRST STRIKE RESPONSE ACTIONS

Santos is currently integrating ConocoPhillips' Australian Business Unit-West (ABU-W) assets, including the Bayu-Undan Facility and associated infrastructure. During this transitional period, Santos (ABU-W) will remain in operational control of this Facility and its associated infrastructure until it is fully transitioned to Santos (ABU-W). Therefore, this OPEP and the Santos (ABU-W) Crisis and Incident Management Plan (ALL/HSE/ER/001) will continue to guide the Santos (ABU-W) Incident Management Team (IMT) when responding to incidents, including oil spills. These documents are supported by the Santos-ABU-W Incident and Crisis Management Bridging Plan (ALL/HSE/BDG/016), which outlines the interface between the ABU-W IMT and Santos Crisis Management Team (CMT). Initial actions for activating the Santos (ABU-W) IMT and Santos CMT are repeated here, along with incident-specific actions to ensure a prompt response may be implemented.

Following a spill, the person who observed the spill and their supervisors are required to follow first-strike procedures, which may involve activating the Emergency Response Team (ERT) and IMT. **Table 2-1** outlines the first strike response actions that need to be followed in the event of a spill.

The level of activation of the ABU-W ERT, IMT and Santos CMT will be related to the tier classification of the oil spill (**Table 4-2**).

Table 2-1: First Strike Response Actions Checklist

Responsibility	Actions
Observer	❑ Provide details of the incident to the Vessel Master
Vessel Master	❑ Monitor the safety of all personnel ❑ Take immediate actions to control the source of the spill, in accordance with the vessel-specific Shipboard Oil Pollution Emergency Plan (SOPEP) or Emergency Response Procedure (if available) ❑ If source control is not possible, ensure vessel safety by clearing the immediate vicinity of the spill, if possible ❑ Conduct risk assessment and assess safe approach routes ❑ Contact relevant Jurisdictional Authority and Control Agency, as soon as practicable, to inform them of the incident, providing as much information as possible via POLREP (Refer to **Table 4-1** for description of Jurisdictional Authorities and Control Agencies and **Table 6-1** for reporting requirements)

Responsibility	Actions
	❑ Notify ABU-W Client Site Representative (CSR) of the spill
Santos (ABU-W) (CSR) on vessel	❑ Notify the IMT Operations Section Chief of the incident and ensure source control measures being implemented ❑ Provide assistance to the Vessel Master in preparing the POLREP[1] and provide as much information[2] to the IMT Operations Section Chief as soon as practicable, including: ☐ Name and details of vessel ☐ Location and coordinates ☐ Date and time the release occurred or was first reported ☐ How it was detected ☐ Names of any witnesses ☐ Hydrocarbon type (e.g. MDO), any Material Safety Data Sheets ☐ Vessel's Oil Record Book (contains information on volumes and contents in each tank) ☐ Cause of the spill (e.g. collision) ☐ Source of spill (e.g. fuel tank) ☐ Approximate volume of spill (better to overestimate) ☐ If the spill is controlled or continuous ☐ Weather, tide and current details ☐ Trajectory of the spill (what direction is the slick spreading) ☐ If any fauna has been observed nearby (e.g. whales, dolphins, seabirds) ❑ Provide updated POLREPs to the IMT Operations Section Chief, as required ❑ Use personal Incident Log to record events ❑ Take photos and send to the IMT Incident Commander/ Operations Section Chief, if possible

[1] This information will also be required when completing Santos (ABU-W) incident reports and reports to external agencies.
[2] Some details may be limited in the initial POLREP. Aim to get the initial report submitted as soon as possible and follow up with more detail as it becomes available.

Responsibility	Actions
IMT Operations Section Chief	General Actions ❑ Notify Incident Commander as soon as practicable that an incident has occurred and determine if IMT activation is required ❑ Ensure ERT has been activated (if required) Incident Specific Actions ❑ Confirm incident report and capture key details relating to the incident (obtain POLREP) ❑ Notify IMT Public Information Officer and Environment Unit Lead (EUL) for them to undertake external notifications and reporting (Refer to **Table 6-1** for reporting requirements) ❑ Remain as the sole liaison and communication interface between the IMT Incident Commander and the Santos (ABU-W) CSR on Vessel
Incident Commander	General Actions ❑ Evaluate initial incident report ❑ Confirm category of the incident (tier) in consultation with Operations Section Chief ❑ Activate IMT in consultation with Operations Section Chief ❑ Notify Santos Crisis Duty Manager/CMT Leader of incident (if Tier 2 or 3) ❑ Notify Santos Executive Vice President (EVP) Offshore of incident ❑ Remain as the decision making interface between the Santos (ABU-W) IMT and the Santos Crisis Duty Manager/CMT Leader Incident Specific Actions ❑ For vessel-based spills[3] in Commonwealth waters, establish direct line of communication with AMSA and manage spill response actions as directed by AMSA ❑ For vessel-based spills in Timor-Leste waters, Establish direct line of communication with ANPM

[3] Refer to Table 4-1 for definition of vessel

Responsibility	Actions
	and determine if there is a need to obtain assistance from AMSA. If support is required, Santos (ABU-W) IMT shall notify ANPM, who will proceed with an inter-government request for assistance through the Australian Government (Department of Foreign Affairs and Trade (DFAT)) who will request support be provided by AMSA ❑ If spill is heading towards Northern Territory (NT) waters, ensure EUL has reported the incident to the Regional Harbourmaster and the NT Pollution Hotline (NT Department of Environment and Natural Resources (DENR)) as per notification reporting in **Table 6-1**
IMT Safety Officer	❑ Conduct hazard assessment and advise Operations Section Chief of recommended safety actions ❑ Initiate gas plume modelling via Environment Unit Lead and establish an exclusion zone, if required
IMT Public Information Officer	❑ Ensure all reporting requirements have been completed (Refer to **Table 6-1** for reporting requirements)
IMT EUL (or delegate)	❑ Ensure all reporting requirements have been completed (Refer to **Table 6-1** for reporting requirements)

Note: The Santos (ABU-W) Emergency Contacts Directory contains the contact numbers for external personnel and facilities. The Emergency Contacts Directory is reviewed and updated every six months.

3 INTRODUCTION

3.1 Purpose

This Oil Pollution Emergency Plan (OPEP) outlines the emergency management arrangements and oil spill response options for activities associated with Bayu-Undan to Darwin Gas Export Pipeline decommissioning and preservation activities.

This OPEP addresses the requirements of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth.) and forms a supporting document to the Bayu-Undan to Darwin Gas Export Pipeline Decommissioning and Preservation Environment Plan (EP) (DCOM-652-EN-EPP-00002).

3.2 Scope

This OPEP covers the response to oil spill incidents associated with Bayu-Undan to Darwin Gas Export Pipeline Decommissioning and Preservation activities. This OPEP aids the Incident Management Team (IMT) in planning and decision-making from when the IMT is first notified of the incident. The credible spills associated with Bayu-Undan to Darwin Gas Export Pipeline Decommissioning and Preservation are listed in **Section 7.2**.

The location of the activity covered by this OPEP is shown in **Figure 3-1** and includes Commonwealth, Timor-Leste and Northern Territory (NT) waters, however NOPSEMA has jurisdictional authority for environmental regulation of the length of the Bayu-Undan to Darwin Gas Export Pipeline, including the section of pipeline in Timor-Leste waters.

Although, activities for Bayu-Undan to Darwin Gas Export Pipeline Decommissioning and Preservation are being undertaken within Commonwealth, Timor-Leste or NT waters, a spill from the activity may also enter Indonesian waters.

3.3 Objectives

The objectives of this OPEP are as follows:

- To define the oil spill response arrangements and capabilities that are in place for the credible spill scenarios;
- To provide guidance to the IMT in relation to spill response selection and supporting the Emergency Response Team (ERT) during spill response implementation; and
- To provide procedures for identifying appropriate resources to support a marine hydrocarbon spill response.

3.4 Format of this OPEP

Section 1: Quick reference information

Section 2: First strike response actions

Section 3: Introduction

Section 4: Spill management arrangements

Section 5: Incident management

Section 6: External notifications and reporting

Section 7: Selecting response options

Section 8: Implementing response options

Section 9: Waste management

Section 10: Operational and scientific monitoring

Section 11: Response implementation

Section 12: References.

3.5 Interface with Other Documents

This OPEP interfaces with the Bayu-Undan to Darwin Gas Export Pipeline Decommissioning and Preservation EP (DCOM-652-EN-EPP-00002), which provides detailed information regarding the existing environment and risks to environmental, socio-economic and cultural receptors associated with the decommissioning and preservation activity scope. The EP also demonstrates that appropriate management controls are in place to reduce the potential for environmental impacts to occur as a result of the Bayu-Undan to Darwin Gas Export Pipeline Decommissioning and Preservation to a level that is considered to be as low as reasonably practicable (ALARP) and acceptable. This includes an assessment of response options that will reduce impacts and risks to ALARP and/or acceptable levels and evaluation of the potential impact and risks of implementing these response options.

Details of the training, exercises, drills and audits that will be undertaken to provide preparedness and capability for delivery of this OPEP in the event of a spill are outlined in the EP (Implementation Strategy -Section 8).

This OPEP provides components of the Implementation Strategy for the EP, specifically in relation to Regulations 14 (8), (8AA), (8D), (8E) of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations (OPGGS (E) Regulations). This OPEP is consistent with, and supports, the procedures and resources provided in the Santos (ABU-W) documents listed in

Table 3-1, and the following external plans and documents:

- The National Plan for Maritime Environmental Emergencies (AMSA, 2019)

- Australian Marine Oil Spill Centre (AMOSC) Australian Industry Cooperative Oil Spill Response Arrangements (AMOSPlan) (AMOSC, 2017).

Table 3-1: Key Interfacing Santos (ABU-W) Documents

Santos (ABU-W) document	Description
Bayu-Undan to Darwin Gas Export Pipeline Decommissioning and Preservation Environment Plan (DCOM-652-EN-EPP-00002)	Provides a detailed description of the activity, the existing environment, environmental impacts and risks, and prescribes environmental performance outcomes and standards (i.e. management and mitigation measures) to reduce potential impacts of response strategy implementation to ALARP. The EP also details roles and responsibilities of personnel (including competencies, training, drills and exercises); management of non-conformance and change; internal and external reporting arrangements; and stakeholder consultation undertaken. The plan also provides details of the legislation applicable to hydrocarbon spills and the stakeholder engagement process that has informed the development of this OPEP.
Santos (ABU-W) Operational and Scientific Monitoring Program (OSMP) (ALL/HSE/PLN/032)	Describes a program of monitoring oil pollution that will be enacted in the event of an oil spill. The OSMP is the principal tool for determining the extent, severity, and persistence of environmental impacts from a marine hydrocarbon spill and informs any remediation activities that may be undertaken.
Santos (ABU-W) Crisis and Incident Management Plan (CIMP) (ALL/HSE/ER/001)	The CIMP details the Santos (ABU-W) procedures for responding to an emergency incident, including a hydrocarbon spill event. The CIMP contains procedures for the activation of the IMT and Crisis Management Team (CMT), the roles and responsibilities of the IMT and CMT, and procedures for post-incident reporting and investigation.
Santos (ABU-W) Emergency Contacts Directory (ALL/HSE/ER/008)	Contains all contact numbers of agencies, regulators, Oil Spill Response Organisations, vendors and suppliers.
Santos (ABU-W) Incident Reporting and Investigation Procedure (ALL/HSE/PRO/003)	Identifies business rules and processes to be implemented to confirm that reporting, recording and investigation of incidents (including near misses) are undertaken, documented and communicated. These documents align with the Santos (ABU-W) Health, Safety and Environmental Management System.
Bayu-Undan Decommissioning Waste Management Strategy (DCOM-453-EN-STR-00001)	Defines Santos (ABU-W) business rules for eliminating or minimising the environmental impacts resulting from production, storage, handling, transport, recycling and disposal of all waste generated during Bayu-Undan decommissioning activities.

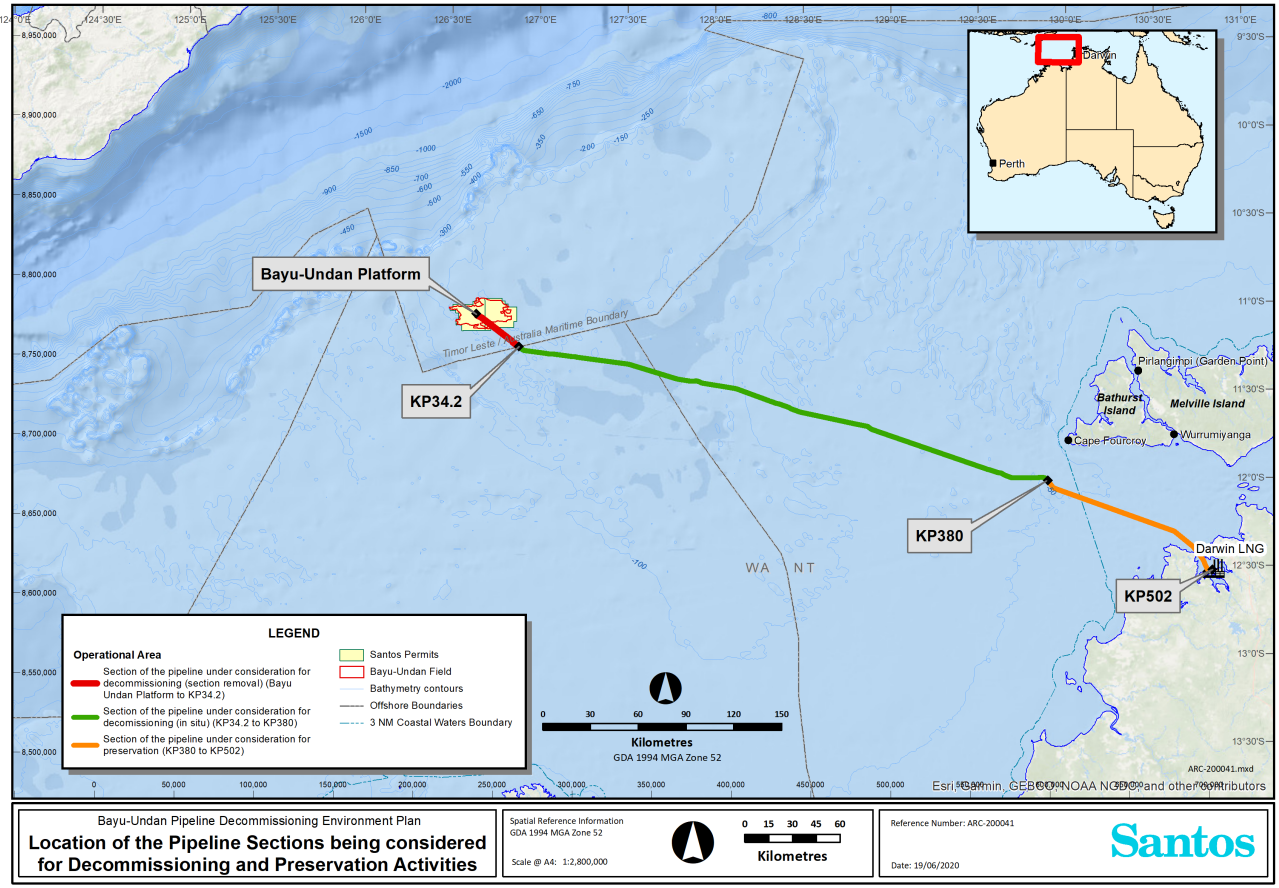


Figure 3-1: Bayu-Undan Gas Export Pipeline Decommissioning and Preservation Activity Area

4 SPILL MANAGEMENT ARRANGEMENTS

4.1 Control Agencies and Jurisdictional Authorities

The spill source, initial spill location and eventual trajectory of the spill will influence the Jurisdictional Authorities and Control Agencies involved in the spill response. Definitions of Jurisdictional Authority and Control Agency are as follows:

- Jurisdictional Authority – the agency which has responsibility to verify 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

- Control Agency – the organisation that is assigned by legislation, administrative arrangement or within a relevant contingency plan to direct and manage the spill response. 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.

Table 4-1 provides guidance on the designated Control Agency and Jurisdictional Authority for Commonwealth, International and Territory waters and for vessel and petroleum activity spills.

4.1.1 Vessel spills

AMSA manages the National Plan for Maritime Environmental Emergencies (AMSA 2020) and is the Control Agency for all vessel-based spills in the Commonwealth jurisdiction. This includes vessels undertaking seismic activities, supply or support vessels and offtake tankers.

In all circumstances, the vessel master is responsible for implementing source control arrangements detailed in the vessel-specific SOPEP and/or Emergency Response Plan.

This activity involves the use of vessels; therefore, Santos (ABU-W) has engaged with AMSA, as relevant to the nature and scale of the potential hydrocarbon releases from this activity.

Santos (ABU-W) has arrangements in place to conduct the first strike response (e.g. SOPEP and/or aerial surveillance operations) until AMSA or a nominated National Plan agency assumes Incident Command (as the Control Agency).

Santos (ABU-W) will continue to implement response activities outlined in this plan and operational and scientific monitoring activities as outlined in the ABU OSMP (ALL/HSE/PLN/032), as deemed necessary by the Control Agency. **Figure 4-1** outlines the activation process for vessel-based spills and how Santos (ABU-W) may support AMSA in response operations.

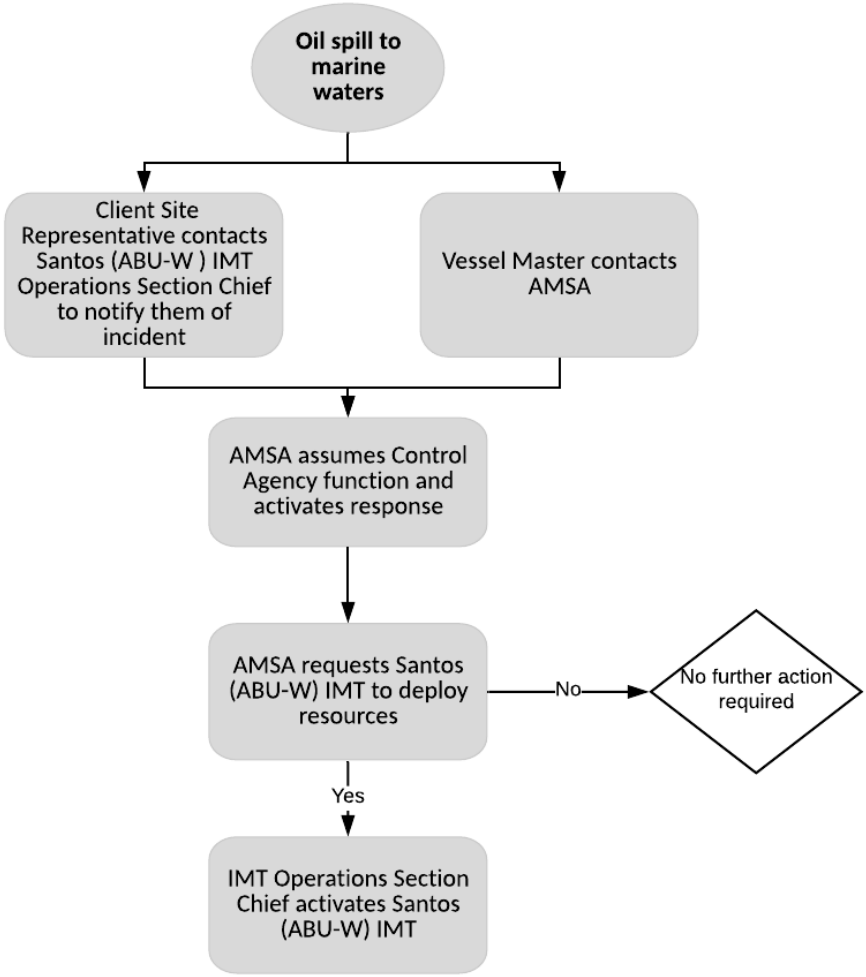


Figure 4-1: Activation Process – Vessel-Based Spills in Commonwealth Waters

4.1.2 Petroleum activity spills – Commonwealth waters

Santos (ABU-W) holds the Control Agency role for its petroleum activity related spills within Commonwealth waters. Petroleum activity spills include those from fixed platforms, Floating Production Storage and Offloading (FPSO)/Floating Storage and Offloading (FSO) systems, Mobile Offshore Drilling Units (MODU) and subsea infrastructure. It also includes vessels undertaking construction, decommissioning, preservation and pipelaying activities in the Titleholder's operational area. This definition of a 'facility' is defined by Schedule 3, Part 1, Clause 4 of the *Offshore Petroleum and Greenhouse Gas Storage Act 2006*.

If a spill occurs within Commonwealth waters and trajectory modelling predicts entry of the hydrocarbon into NT waters, Santos (ABU-W) will maintain its own incident command centre, but provide a Darwin Liaison Officer to the NT Emergency Operations Centre, if established. This is to ensure uniformity between relevant Commonwealth and Territory agencies and Santos (ABU-W) in the incident response. **Figure 4-2** describes the overall activation process for petroleum-based spills.

4.1.3 Spills entering international waters

The Australian Commonwealth Government has agreed that, in responding to offshore petroleum incidents originating in Commonwealth waters, a central incident coordination committee be convened and chaired by the Department of Industry, Innovation and Science (DIIS). The committee is known as the Offshore Petroleum Incident Coordination Committee (OPICC). The OPICC provides for interdepartmental coordination in the event of a significant offshore petroleum incident, and provides an overview of the Commonwealth Government arrangements for addressing crises arising from offshore petroleum incidents (DIIS, 2019).

Where there is an incident in Commonwealth waters that crosses into international waters such as the jurisdiction of Timor-Leste, the OPICC framework will apply, in addition to the National Plan for Maritime Emergencies (AMSA, 2020).

Santos (ABU-W) shall notify the relevant authorities (as per **Table 6-1**) to initiate governmental communications, including the Australian Government Crisis Coordination Centre (AGCCC) for diplomatic assistance.

4.1.4 Vessel spills originating in Timor-Leste offshore waters

On 6 March 2018, the Timor-Leste and Australia Governments signed the Treaty Between Australia and the Democratic Republic of Timor-Leste Establishing Their Maritime Boundaries in the Timor Sea (the Treaty). The Treaty delimited the maritime areas between Australia and Timor-Leste in the Timor Sea and provides Timor-Leste sovereignty over the waters within the previously defined Joint Petroleum Development Area (JPDA). The Timor-Leste Treaty was ratified on 31 August 2019.

As Timor-Leste has sovereignty over these waters, Autoridade Nacional do Petróleo e Minerais (ANPM) is the Control Agency for any vessel spills originating in Timor-Leste waters. There is currently no bilateral agreement between Timor-Leste and Australia for preparedness and response efforts.

4.1.5 Petroleum activity spills – Northern Territory waters

The NT Department of Environment and Natural Resources (DENR) is the Jurisdictional Authority for marine oil pollution incidents from vessels and petroleum facilities into NT coastal waters (from the coastline seaward of 3 nm from the territorial sea baseline).

If a Tier 2/3 spill occurs within NT waters, Santos (ABU-W) shall notify the NT Regional Harbourmaster and NT Pollution Hotline as per **Table 6-1** who will then contact the Territory Marine Pollution Controller (TMPC). The TMPC will then establish an NT Incident Controller (IC) and NT IMT, if required.

For Tier 2/3 spills that cross from Commonwealth waters into NT waters, Santos (ABU-W) will remain Control Agency but will ensure all operational tasking is reviewed by the NT IC. The NT IC and the TMPC will be consulted prior to the finalisation of each Incident Action Plan (IAP) that relates to activities in NT waters.

For Tier 2/3 spills that contact NT shorelines, the NT IMT will assume the role of Control Agency. An NT IMT will be established in Darwin, comprising staff from across NT Government. The NT IMT will be supported by existing Northern Territory emergency response arrangements and Santos (ABU-W) will provide support via resourcing and personnel. Additional support, if required, will be provided under the provisions of the *NT Emergency Management Act 2013*, through the Territory Emergency Management Council and the NT Government Functional Groups. Santos (ABU-W) will provide Liaison Officer/s to sit within the NT IMT to ensure uniformity between the NT IMT and Santos (ABU-W) in the incident response.

Figure 4-2 illustrates the Control Agency and coordination structure for spills entering NT waters and contacting NT shorelines.

4.1.6 Oiled wildlife response

The Northern Territory Government have the following interim arrangements in place for oiled wildlife response (OWR) management:

- The NT Emergency Management Council will delegate responsibilities associated with wildlife and relevant activities in National Parks, Reserves and Marine Parks.
- Direct coordination shall be managed through the designated NT Government Functional Group.

The Commonwealth Department of Agriculture, Water and the Environment (DoAWE) is the Jurisdictional Authority for oiled wildlife in Commonwealth waters, although for vessel-based spills, the Control Agency function remains with AMSA. The framework for developing the Commonwealth Oiled Wildlife Response Plan (OWRP) is provided in AMSA's National Guidelines for the Development of Oiled Wildlife Response Contingency Plans and guidance may also be sought from State and Territory OWRPs.

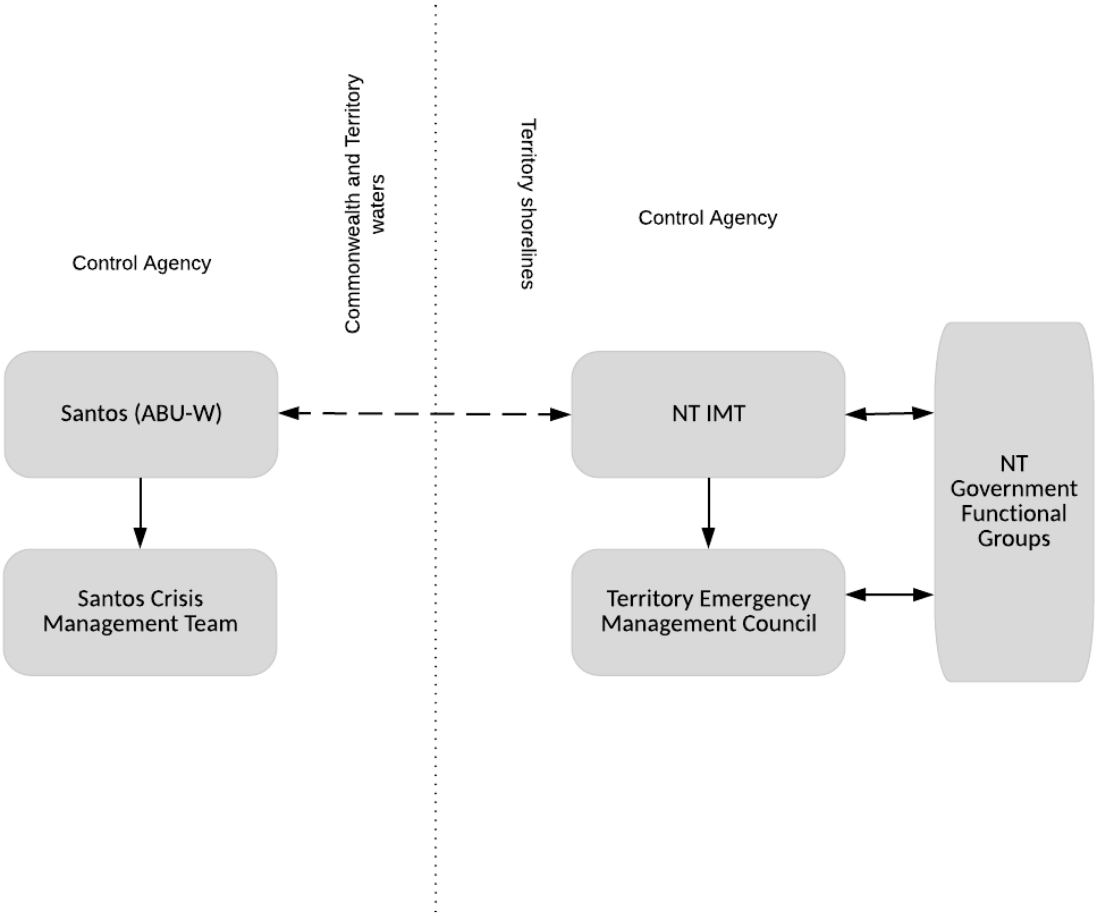


Figure 4-2: Activation Guidance – Petroleum Activity Spills

Table 4-1: Jurisdictional and Control Agencies for Hydrocarbon Spills

Jurisdictional boundary	Spill source	Jurisdictional authority	Control agency		Relevant documentation
			Tier 1	Tier 2/3	
Commonwealth waters (three to 200 nautical miles from territorial/state sea baseline)	Vessel [1]	AMSA	AMSA		• Vessel SOPEP • National Plan
	Petroleum activities[2]	NOPSEMA	Santos (ABU-W)		• Activity OPEP
International waters	Petroleum activities	Relevant foreign authority	Santos (ABU-W)		• Activity OPEP
	Vessel		Relevant foreign authority		• National Plan
NT waters (territorial sea baseline to three nautical miles and some areas around offshore	Vessel	DENR	Vessel owner	NT IMT[3]	• Vessel SOPEP • NT OSCP (Department of Lands and Planning 2012)
	Petroleum	DENR	Santos (ABU-W)[4]		• Activity OPEP

[1] Vessels are defined by Australian Government Coordination Arrangements for Maritime Environmental Emergencies (AMSA, 2017) as a seismic vessel, supply or support vessel, or offtake tanker.

[2] Includes a 'Facility', such as a fixed platform, FPSO/FSO, MODU, subsea infrastructure, or a construction, decommissioning and pipelaying vessel. As defined by Schedule 3, Part 1, Clause 4 of the OPGGSA 2006.

[3] NT IMT will be the Control Agency but will be supported by the Titleholder (additional support from AMOSC if required)

[4] Santos (ABU-W) will be the Control Agency but will request approval of IAPs from the NT IC.

Jurisdictional boundary	Spill source	Jurisdictional authority	Control agency		Relevant documentation
			Tier 1	Tier 2/3	
atolls and islands)	activities				• NT OSCP (Department of Lands and Planning 2012)
NT shorelines	Vessel	DENR	Vessel owner	NT IMT[5]	• NT OSCP (Department of Lands and Planning 2012)
	Petroleum activities	DENR	Santos (ABU-W)	NT IMT[5]	• NT OSCP (Department of Lands and Planning 2012)

[5] NT IMT will be the Control Agency but will be supported by the Titleholder (additional support from AMOSC if required)

4.2 Key Roles and Responsibilities

Santos (ABU-W) IMT personnel are trained in emergency management in line with the Santos (ABU-W) Incident Command System (ICS) framework. The roles and responsibilities of the IMT are listed in detail in the Santos (ABU-W) CIMP (ALL/HSE/ER/001). The function of each team and key individual roles are summarised in Section 8 (Implementation Strategy) of the EP.

4.3 Santos (ABU-W) Tiered Response Framework

The Santos (ABU-W) crisis and incident management arrangement uses a tiered response framework which classifies incidents based on the significance of the consequences, the risks involved and potential for escalation. The significance of the emergency situation determines the tier level of response that is activated. Santos (ABU-W) emergency response personnel are trained to respond according to the characteristics of the emergency response tier, and hence this OPEP refers to the crisis and incident management tier levels. **Table 4-2** provides an overview of the characteristics and escalation criteria for each tier and how each tier aligns to the incident levels in the National Plan for Environmental Emergencies (AMSA 2020).

4.4 Response Tiers and Escalation Criteria

The incident tier will determine where the resources will be drawn from to respond to the spill and the level of incident management that is required to manage the response effort. In the event of a spill occurring where effective response is considered beyond the capabilities within a tier, the response will be escalated immediately to the next tier. The decision to escalate a response to a higher tier (or level) (as defined in **Table 4-2**) will be made by the responsible Control Agency. If the response tier is undetermined, then a worst-case scenario should be assumed when activating resources, as it is always possible to scale down the response effort.

Table 4-2: Santos (ABU-W) Incident Tier Guidance

Characteristic	Santos (ABU-W) crisis and incident management response tier		
	Tier 1	**Tier 2**	**Tier 3**
General description and escalation criteria	An incident that has not caused severe injury to personnel or damage to assets or the environment Incident does not threaten the safety of a facility and can be managed by the	An incident that exceeds tier 1 capability and requires the assistance of the IMT and external support services/agencies If no external support is required, an	An incident that exceeds tier 2 capabilities and resources and requires the assistance of the CMT Incident may attract media coverage or

Characteristic	Santos (ABU-W) crisis and incident management response tier		
	Tier 1	**Tier 2**	**Tier 3**
	ERT and its resources	incident may be classified in a higher tier if there is potential for escalation or damaging public image or government relations	create public outrage and has the potential to cause, or does cause, a major impact
AMSA National Plan levels and escalation criteria	Level 1 Generally able to be resolved by Responsible Party through the application of local or initial response resources (first strike response)	Level 2 Typically, more complex in size, duration, resource management and risk than Level 1 incidents. May require deployment of resources beyond the first strike response	Level 3 Characterised by a high degree of complexity, require strategic leadership and response coordination. May require national and international response resources
Santos (ABU-W) IMT/CMT activation	On Site or Facility ERT activated	IMT activated CMT may be activated	IMT activated CMT activated
Resources at risk			
Human	Potential for serious injuries	Potential for loss of life	Potential for multiple loss of life
Environment	Isolated impacts or with natural recovery expected within weeks.	Significant impacts and recovery may take months. Monitoring and remediation may be required.	Significant area and recovery may take months or years. Monitoring and remediation will be required.
Wildlife	Individuals of a small number of fauna species affected	Groups of fauna species or multiple numbers of individuals affected	Large numbers of fauna (individuals and species) affected
Economy	Business level disruption	Business failure	Disruption to a sector
Social	Reduced services	Ongoing reduced services	Reduced quality of life
Infrastructure	Short term failure Non-safety/operational critical failure	Medium term failure Potentially safety/operational critical failure	Severe impairment Safety/operational critical system failure

Characteristic	Santos (ABU-W) crisis and incident management response tier		
	Tier 1	**Tier 2**	**Tier 3**
Public affairs	Local and regional media coverage	National media coverage	International media coverage

5 INCIDENT MANAGEMENT

5.1 IMT Planning Process

Santos (ABU-W) uses the ICS Planning Process for managing incidents. This process ensures that response operations include sufficient, ongoing planning to enable development of strategic objectives, effective use of resources, and implementation of response options.

This Planning Process is commonly referred to as the 'Planning P'. The Planning P provides a guide to the key steps involved in the incident planning process. The leg of the 'P' describes the initial response period which is commonly characterised by the first operational period of the response (Reactive Phase). During this period, the IMT will conduct initial notifications, assess the incident, prepare the ICS 201 Briefing Forms and Weather Report and consider resourcing and tactics to respond to the incident. For a short-duration response, an initial response may be all that is required.

If the incident is likely to require additional operational periods, shift changes of personnel or third parties involved in the response, an IAP should be developed. The development of the IAP is facilitated by the IMT Planning Section Chief. This involves using IAP software to facilitate development of the IAP and recording of critical information and actions to enable effective management of the response.

5.2 Incident Action Plan (IAP) Development

The initial IAP will contain the following;

- ICS 201 – 1: Incident Briefing map
- ICS 201 – 2: Summary of current activities
- ICS 201 – 3: IMT structure
- ICS 201 – 4: Resources Summary
- ICS 201 - 5 : Site Safety and Control Analysis
- Weather (Bureau of Meteorology information)
- Notification status report
- Incident log – including each sections 214a individual logs

Additional components will be added to the IAP according to the size and complexity of the incident. For complex incidents, it may take a number of operational periods to achieve the incident objectives. The cyclical Planning P is designed to take the incident objectives and break them down into tactical assignments for each operational period. Typically, the Planning Section will commence work on the IAP for the next operational period during the current operational period.

The Santos (ABU-W) IMT Emergency Operations Centre contains specific display boards and technology that will facilitate the collection and review processes required in the IAP development process. The IMT should ensure that as IAPs are implemented, their performance is monitored through communication with the ERT (e.g. surveillance personnel, Vessel Masters, team leaders) who can report on the effectiveness of the tactics being implemented. This information can then be used in the development of the IAP for the next operational period.

5.3 Activation of Santos Offshore IMT Resources

In the event of a Tier 2-3 incident, additional IMT support will be provided by Santos Offshore IMT resources. The Santos (ABU-W) IMT IC has the authority to request these resources by contacting the Santos Offshore IMT Duty Manager. When requesting support, the Santos (ABU-W) IMT IC must state which IMT functions are required, the number of personnel for each function requested and expected deployment period.

5.4 Activation of External Agency Support Resources

If Santos (ABU-W) requires additional support or technical expertise to monitor or respond to a spill, it can request the support of external agency resources. **Table 5-1** provides guidance on the resources offered by these support services and instructions on when and how to activate them.

Table 5-1: Activation of External Agency Support Services

Support agency/role	Timing	Resources	Activation instructions	Santos (ABU-W) person responsible for activating
AMOSC, AMOSC Duty Manager	As soon as possible	Santos is a Participating Company in AMOSC and can call upon AMOSC personnel and equipment (including oiled wildlife). Under the AMOSPlan, Santos (ABU-W) can also call upon mutual aid from other trained industry company personnel and response equipment AMOSC's stockpiles of equipment include dispersant, containment, recovery, cleaning, absorbent, oiled wildlife and communications equipment. Equipment is located in Geelong, Fremantle, Exmouth and Broome (Refer to **Attachment B** for additional detail)	**Step 1.** Obtain approval from Santos (ABU-W) 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.** E-mail confirmation and a telephone call to AMOSC will be required for mobilisation of response personnel and equipment, and callout authorities will be required to supply their credentials to AMOSC. A signed service contract must also be completed by a call out authority and returned to AMOSC prior to mobilisation	Operations Section Chief and EUL to discuss need for AMOSC resources If support is required, this must be approved by the IMT Incident Commander (see step 1). The IMT EUL (or delegate) will notify AMOSC

Support agency/role	Timing	Resources	Activation instructions	Santos (ABU-W) person responsible for activating
Oil Spill Response Limited (OSRL), OSRL Duty Manager	If spill requires additional resources or technical expertise	Santos has an Associate Membership Service Level Agreement with OSRL, which includes the provision of support functions, equipment and personnel to meet a wide range of scenarios Personnel Personnel are on standby and available 24 hours a day, 365 days a year with equipment and logistics support to initiate, mobilise, and sustain a response comprising: 1 Senior Oil Spill Response Manager 1 Oil Spill Response Manager 18 Oil Spill Response Specialists / Oil Spill Responders 1 Logistics Service Branch Coordinator Technical advisors and additional response personnel may also be provided	**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	IMT Incident Commander, Operations Section Chief and EUL to discuss need for OSRL resources If support is required, the IMT Incident Commander must formally make the request

Support agency/role	Timing	Resources	Activation instructions	Santos (ABU-W) person responsible for activating
		OSRL can obtain access to a Wildlife Response Officer through the Sea Alarm Foundation **Equipment and services** Equipment includes subsea well intervention equipment, dispersant, dispersant application systems, containment, recovery, cleaning, absorbent, waste storage, oiled wildlife kits, vehicles, vessel and communications equipment, plus logistics support (Access to 50% of equipment by type)		
RPS Group	As soon as practicable	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 tier 1. AMOSC can also run modelling on behalf of Santos (ABU-W), if required,	Contact RPS Group Duty Officer	IMT EUL (or delegate)

Support agency/role	Timing	Resources	Activation instructions	Santos (ABU-W) person responsible for activating
		as part of contracting arrangements with RPS Group		
Operational and Scientific Monitoring Plan (OSMP) Providers (Refer to **Attachment B:** Response preparedness, resources and Support summary for list of providers)	If OSMP initiation criteria are triggered (Refer to **Attachment D:** Operational and Scientific Monitoring Plans)	Santos (ABU-W) has contract arrangements in place with its third party OSMP providers to make ready personnel and equipment to undertake operational and scientific monitoring scopes	Contact Santos (ABU-W) Project Manager for each provider	IMT EUL (or delegate)

Note: The Santos (ABU-W) Emergency Contacts Directory contains the contact numbers for external personnel and facilities. The Emergency Contacts Directory is reviewed and updated every six months

Table 5-2: Environmental Performance – Incident Management

Environmental Performance Outcome	Performance Standard	Measurement Criteria
EPO 1 Manage incident via a systematic planning process	**EPS 1.1** IMT to complete ICS Briefing Forms (ICS-201) during the initial phase of the incident, followed by an IAP for each operational period	**MC 1.1.1** Records demonstrate IMT completed ICS Briefing Forms (ICS-201) during the initial phase of the incident, followed by an IAP for each operational period
	EPS 1.2 IMT to monitor effectiveness of tactics being implemented and use information in the development of IAPs	**MC 1.2.1** Records demonstrate IMT used information on effectiveness of tactics in the development of IAPs
EPO 2 Maintain contracts with support agencies to obtain additional support or technical expertise to monitor and/or respond to a spill	**EPS 2.1** Service Level Agreement maintained with OSRL, Master Services Contract maintained with AMOSC and agreement maintained with RPS for the duration of the activity	**MC 2.1.1** Records demonstrate that Service Level Agreement maintained with OSRL, Master Services Contract maintained with AMOSC and agreement maintained with RPS for the duration of the activity

6 EXTERNAL NOTIFICATIONS AND REPORTING

Santos (ABU-W) is required to make timely notifications to several government agencies in the event of a spill. In addition, Santos (ABU-W) has stringent health, safety and environmental reporting requirements that must be met.

All spills are reported in accordance with the Santos (ABU-W) Incident Reporting and Investigation Procedure (ALL/HSE/PRO/003).

The key external contact points and agencies that require notification in the event of a reportable spill are provided in **Table 6-1.**

This notification summary table is a guide to be used by the Santos (ABU-W) IMT for agencies that must be contacted in the event of a spill incident.

The Santos (ABU-W) Emergency Contacts Directory (ALL/HSE/ER/008); contains the contact numbers for all agencies listed. The Emergency Contacts Directory is reviewed and updated every six months.

Table 6-1: External Notification and Reporting Requirements

Agency or Authority	Type of Notification /Timing	Legislation/ Guidance	Reporting Requirements	Responsible Person/Group	Forms
NOPSEMA REPORTABLE INCIDENTS					
NOPSEMA (Incident Notification Office)	1. Verbal notification within **2 hours** 2. Written report as soon as practicable, but no later than 3 days	*Petroleum and Greenhouse Gas Storage Act 2006* Offshore Petroleum Greenhouse Gas Storage (Environment) Regulations 2009 (as amended 2014)	A spill associated with Bayu-Undan to Darwin Gas Export Pipeline decommissioning and preservation that has the potential to cause moderate to significant environmental damage[1]	Notification by Santos (ABU-W) IMT EUL (or delegate)	Incident reporting requirements: https://www.nopsema.gov.au/environmental-management/notification-and-reporting/
National Offshore Petroleum Titles Administrator (NOPTA) (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 Santos (ABU-W) IMT Environment Unit Lead (or delegate)	Provide same written report as provided to NOPSEMA

[1] A reportable incident is defined by the OPGGS (E) Regulations as 'an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage'. For the purpose of determining whether an incident is a reportable incident, Santos (ABU-W) considers any incident that causes, or has the potential to cause, a consequence severity rating of 3 or greater to be a reportable incident

Agency or Authority	Type of Notification /Timing	Legislation/ Guidance	Reporting Requirements	Responsible Person/Group	Forms
TIER 1-3 SPILLS					
AMSA (Rescue Coordination Centre (RCC))	Immediate verbal notification to include: • name of ship/s involved • time, type and location of incident • quantity and type of harmful substance • assistance and salvage measures • any other relevant information Written POLREP form, within 24 hours of request from AMSA	National Plan for Maritime Environmental Emergencies	Australian Commonwealth waters: • All slicks trailing from a vessel • All spills to the marine environment • All spills where National Plan equipment is used in a response	Vessel Master	Incident reporting requirements: https://www.amsa.gov.au/marine-environment/marine-pollution/mandatory-marpol-pollution-reporting Online POLREP - https://amsa-forms.nogginoca.com/public/
Autoridade Nacional do Petróleo e Minerais (ANPM)	Verbal notification, as soon as practicable Follow up with written report (e.g. POLREP and template) within 48 hours of incident. Report must	Administrative Guidelines, Regulations and Directions issued under Article 37 of the PMC	All actual or impending spills in Timor-Leste offshore waters, regardless of source or quantity	Santos (ABU-W) Operations Health Safety and Environment Manager	Template as provided by ANPM

Agency or Authority	Type of Notification /Timing	Legislation/ Guidance	Reporting Requirements	Responsible Person/Group	Forms
	contain a pollutant description (including estimated volume and distribution), spill tier, proposed response; and the pollution cause				
DoAWE (Director of monitoring and audit section)	Email notification as soon as practicable	*Environment Protection and Biodiversity Conservation Act 1999*	If Commonwealth 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	Santos (ABU-W) IMT Environment Unit Lead (or delegate)	Not applicable
NT Regional Harbourmaster	• **Immediate** verbal notification • Follow up with POLREP as soon as practicable after verbal notification	Northern Territory Oil Spill Contingency Plan. As per State legislation (i.e. *Marine Pollution Act 1999*)	All actual or impending spills in NT waters, regardless of source or quantity Notify if spill has the potential to impact wildlife in Territory waters (to activate the	Santos (ABU-W) IMT Environment Unit Lead (or delegate)	Marine Pollution Reports (POLREPs) are to be emailed to rhm@nt.gov.au (Regional Harbourmaster) Instructions for submitting POLREPs

Agency or Authority	Type of Notification /Timing	Legislation/ Guidance	Reporting Requirements	Responsible Person/Group	Forms
			Oiled Wildlife Coordinator)		(including a POLREP Template) are provided on the NT Government webpage https://nt.gov.au/marine/marine-safety/report-marine-pollution
NT Department of Environment and Natural Resources (DENR) (Pollution Response Hotline; Environmental Operations)	• Verbal notification as soon as practicable • Written report to be provided as soon as practicable after the incident, unless otherwise specified by the Minister	Northern Territory Oil Spill Contingency Plan. As per State legislation (i.e. *Marine Pollution Act 1999*)	All actual or impending spills in NT waters	Santos (ABU-W) IMT Environment Unit Lead (or delegate)	Marine Pollution Reports (POLREPs) are to be emailed to pollution@nt.gov.au (Environmental Operations) Instructions for submitting POLREPs (including a POLREP Template) are provided on the

Agency or Authority	Type of Notification /Timing	Legislation/ Guidance	Reporting Requirements	Responsible Person/Group	Forms
					NT Government webpage https://nt.gov.au/marine/marine-safety/report-marine-pollution
Parks Australia (Director of National Parks)	Verbal notification as soon as practicable	*Environment Protection and Biodiversity Conservation Act 1999*	All actual or impending spills which occur within a marine park or are likely to impact on an Australian marine park	Santos (ABU-W) IMT Environment Unit Lead (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

Agency or Authority	Type of Notification /Timing	Legislation/ Guidance	Reporting Requirements	Responsible Person/Group	Forms
					as per the OPEP • Details of the relevant contact person in the IMT
Australian Fisheries Management Authority (AFMA)	Verbal phone call notification within 8 hours		• Commonwealth fisheries within the environment that may be affected (EMBA) • Consider a courtesy call if not in exposure zone	Santos (ABU-W) IMT Public Information Officer (Government and Public Affairs)	Not applicable
NT Department of Primary Industry and Fisheries (DPIF)	Verbal phone call notification within 8 hours		• NT fisheries within the EMBA • Consider a courtesy call if not in exposure zone	Santos (ABU-W) IMT Public Information Officer (Government and Public Affairs)	Not applicable

7 SELECTING RESPONSE OPTIONS

7.1 Response Objectives

Santos (ABU-W) response priorities are consistent with Territory and State response priorities and the National Plan for Maritime Environmental Emergencies (AMSA 2020). Santos (ABU-W) (CIMP) (ALL/HSE/ER/001) states the following elements should be considered during any incident:

- Safety;
- Impact on people;
- Impact on the environment;
- Impact on assets;
- Public information;
- Impact on reputation;
- Business recovery; and
- Legal aspects.

For spills where Santos (ABU-W) is the Control Agency, the response objectives are to develop and implement appropriate and effective response options commensurate to the scale, nature and risk of the spill, including the following:

- Minimise the volume or duration of a hydrocarbon spill;
- Obtain and situational awareness as soon as practicable, and maintain situational awareness for the duration of the response; and
- Protect sensitive receptors from hydrocarbon impacts, if identified within the EMBA (area potentially impacted by the spill) and at potential risk from the spill trajectory.

7.2 Spill Scenarios

There are three credible spill scenarios associated with marine vessel operations during decommissioning and preservation activities, which could occur in the EMBA as outlined in **Table 7-1.** Additional detail on hydrocarbon characteristics and weathering data are included in **Attachment A.**

Table 7-1: Bayu-Undan to Darwin Gas Export Pipeline Decommissioning and Preservation Spill Scenario Summary

Worst case credible spill scenario	Hydrocarbon type	Maximum credible volume released (m^3)	EMBA for surface hydrocarbons	Estimated minimum time and volumes for shoreline contact
Vessel collision (location: KP380)	MDO	700 m^3 surface release over a 6-hour period	Above moderate exposure threshold (10- 25 g/m^2) up to 54km (NW) from release location (Winter)	2.9 days for Bathurst Island (Summer) Maximum volume ashore 6m^3 (By Day 9 in Summer)
Vessel collision (location: KP34.2)	MDO	1,125 m^3 surface release over a 6-hour period	Above moderate exposure threshold (10- 25 g/m^2) up to 46 km (WSW) from release location (Transitional)	No contact predicted
Hose break or coupling failure during refuelling	Marine Diesel Oil	10 m^3 instantaneous	Immediate vicinity of spill site	NC

7.3 Response planning thresholds

In addition to the environmental impact assessment thresholds described in Table 6-11 in Section 6 of the EP, 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 (e.g. chemical dispersant application) require certain oil spill thicknesses and conditions to be effective.

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 less than 50g/m^2.

Surface chemical dispersants are most effective on hydrocarbons that are at a thickness of 50-100g/m^2 on the sea surface. EMSA (2010) recommends thin layers of spilled hydrocarbons should not be treated with dispersant. This includes Bonn

Agreement Oil Appearance Codes (BAOAC) 1-3 (EMSA, 2010). Response planning thresholds are provided in **Table 7-2**.

Table 7-2: Surface Hydrocarbon Thresholds for Response Planning

Hydrocarbon (g/m^2)	Description
>1	Estimated minimum threshold for commencing some scientific monitoring components
>10	Estimated minimum threshold for commencing operational and/or scientific monitoring components
50	Estimated minimum floating hydrocarbon threshold for containment and recovery and surface dispersant application (if selected)
100	Estimated floating hydrocarbon threshold for effective containment and recovery and surface dispersant application Estimated minimum shoreline accumulation threshold for shoreline clean-up (if required)

7.4 Spill modelling results

The worst-case credible spill scenarios shown in **Table 7-1** were used as the basis for modelling, which was performed using a three-dimensional spill trajectory and weathering model, SIMAP (Spill Impact Mapping and Analysis Program). This model is designed to simulate the drifting, spreading, weathering and fate of specific oil types under the influence of changing meteorological and oceanographic forces.

A stochastic modelling approach was followed for each of the scenarios. The stochastic model involves the repeated application of SIMAP (100 simulations for each season; summer, transitional and winter) to simulate the defined spill scenarios using different samples of current and wind data. The model results were then combined to provide a summary of each season.

The modelling outputs do not represent the potential behaviour of a single spill (which would have a much smaller area of influence) but provides an indication of the probability of any given area of the sea surface being contacted by hydrocarbons above impact thresholds.

For the purpose of spill response preparedness, outputs relating to oil on the sea surface 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, the modelling results presented in **Table 7-3** and **Table 7-4** relate to sea surface exposure and shoreline contact.

Results for the worst-case credible scenarios have only been included if there was a floating hydrocarbon concentration greater than 10 g/m^2 at >0.25% probability.

Modelling results for dissolved and entrained oil for the worst case scenarios have not been included given there are limited response strategies that will reduce subsurface impacts.

Note: there was no predicted shoreline contact for any season for Scenario 2 (Vessel collision KP34.2 – 1,125 m^3 of MDO), therefore it is not represented in **Table 7-4.**

Table 7-3: Spill Modelling Results – Bayu-Undan to Darwin Gas Export Pipeline decommissioning and preservation activities – oil exposure on sea surface

Spill Scenario			Modelling results				
Event	**Hydrocarbon Type**	**Maximum volume/duration**	**Location**	**Probability (%) of oil exposure on sea surface >10g/m²**	**Minimum time (days) before oil exposure on sea surface >10g/m²**	**Probability (%) of oil exposure on sea surface 10-50g/m²**	**Minimum time (days) before oil exposure on sea surface 10-50 g/m²**
Vessel collision (location: KP380)	Marine Diesel Oil	700 m^3 over 6 hours	Oceanic Shoals Australian Marine Park	10	2.8	1	4.7
			Pinnacles of the Bonaparte Basin KEF	6	20	-	-
			Carbonate bank and terrace system of the Sahul Shelf KEF	7	27	-	-
			Carbonate bank and terrace system of the Van Diemen Rise KEF	22	0.75	11	0.75
Vessel collision (location: KP34.2)	Marine Diesel Oil	1,125 m^3 over 6 hours	Oceanic Shoals Australian Marine Park	42	0.3	18	0.4
			Indonesian EEZ	3	3.5	-	-
			Oceanic Shoals Integrated Marine and Coastal	50	0.2	24	0.3

Spill Scenario			**Modelling results**				
Event	**Hydrocarbon Type**	**Maximum volume/duration**	**Location**	**Probability (%) of oil exposure on sea surface >10g/m^2**	**Minimum time (days) before oil exposure on sea surface >10g/m^2**	**Probability (%) of oil exposure on sea surface 10-50g/m^2**	**Minimum time (days) before oil exposure on sea surface 10-50 g/m^2**
			Regionalisation of Australia (IMCRA)				
			Carbonate bank and terrace system of the Sahul Shelf KEF	42	0.3	21	0.4
			Pinnacles of the Bonaparte Basin KEF	6	0.9	1	1.0

Table 7-4: Spill Modelling Results – Bayu-Undan to Darwin Gas Export Pipeline decommissioning and preservation activities – shoreline contact and accumulation

Spill Scenario			**Modelling Results**						
Event	**Hydrocarbon Type**	**Maximum volume/duration**	**Location**	**Probability (%) of shoreline contact >10g/m^2**	**Minimum time (days) before shoreline accumulation >10g/m^2**	**Probability (%) of shoreline contact >100g/m^2**	**Minimum time (days) before shoreline accumulation >100g/m^2**	**Peak volumes on shoreline (m^3)**	**Maximum length of shoreline contacted (km) >100g/m^2**
Vessel collision (location: KP380)	Marine Diesel Oil	700 m^3 over 6 hours	Bathurst Island	1	2.9	1	3.2	5.8	2.0

7.5 Priority Protection Areas

When dealing with oil spills in remote environments, it is not always realistic or feasible to protect all receptors. Therefore, prioritising receptors helps identify where available resources 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.

Results from hydrocarbon spill modelling were compared against the location of key sensitive receptors with high conservation valued habitat or species or important socio-economic/heritage value within the EMBA. Sensitive receptors within the EMBA with shortest potential timeframes to contact above the following moderate impact thresholds were identified:

- Floating oil: 10 g/m^2
- Entrained oil: 100 parts per billion (ppb)
- Dissolved aromatic hydrocarbons: 50 ppb
- Shoreline accumulation: 100g/m^2.
- More information on the development of the moderate impact thresholds is provided in Section 6 of the EP.

Table 7-5: Priority Protection Areas in the EMBA outlines the priority protection areas in the event of a spill associated with decommissioning and preservation activities. Depending on the spill scenario (i.e. volume and location), these priority protection areas could be impacted by surface hydrocarbons at or above moderate impact threshold concentrations.

Implementation of operational and scientific monitoring may focus on Priority Protection Areas relative to other areas due to their high environmental value.

Table 7-5: Priority Protection Areas in the EMBA

Priority protection area	Description
Oceanic Shoals Australian Marine Park (AMP)	The Oceanic Shoals Marine Park is protected under the EPBC Act. The Oceanic Shoals Marine Park is significant because it contains habitats, species and ecological communities associated with the Northwest Shelf Transition. It contains four key ecological features: carbonate bank and terrace systems of the Van Diemen Rise; carbonate bank and terrace systems of the Sahul Shelf; pinnacles of the Bonaparte Basin; and shelf break and slope of the Arafura Shelf (all valued as unique seafloor features with ecological properties of regional significance). Refer to Section 4 of the EP for additional detail

Priority protection area	Description
Tiwi Islands (Bathurst Island)	Contains a range of shoreline types that are vulnerable to oil pollution, including: • Mangroves; • Sandy beaches; • Exposed rocky shores; • Wavecut platforms; and • Tidal flats. Contains cultural heritage sites, including: • Culturally significant heritage sites for Tiwi Islanders; and • War graves. Contains nesting beaches for flatback and olive ridley turtles and crested terns.

7.6 Spill Impact Mitigation Assessment

Spill Impact Mitigation Analysis (SIMA) is a decision support tool that enables oil spill planners and responders to consider available information which helps them select the most suitable response option or combination of options that would minimise impacts to the environment and people. Different response options provide varying levels of effectiveness and protection under different environmental conditions, depending on the individual spill (Coelho et al. 2014).

Conducting a SIMA is an important step in the oil spill planning and preparedness process, and is often called a Strategic SIMA. An overview of this assessment is provided in **Figure 7-1**. To complete a Strategic SIMA, all available information on a potential spill is considered (e.g. oil type, volume, duration of release), together with any spill trajectory modelling to consider potential impacts to sensitive receptors (**Sections 7.1** to **7.5**).

A list of possible response options are considered from a 'response toolbox', including monitor and evaluate, source control, containment and recovery, mechanical dispersion, surface dispersant, subsea dispersant, shoreline protection/deflection, shoreline clean-up and oiled wildlife response.

Following this, a detailed assessment of the benefits and drawbacks of all response options are evaluated to help determine the combination of options that would be most suited to each maximum credible spill scenario (**Table 7-6**). This includes 'primary response strategies' and 'secondary response strategies', with the former typically being more reliable and effective in reducing impacts from an individual spill. **Table 7-6** also identifies any options not recommended for a particular spill and hydrocarbon type.

An Operational SIMA is an iterative process that should be used to help guide an IMT during a response. Real-time data from monitor and evaluate and operational monitoring activities should be incorporated into the Operational SIMA, so that the IMT can adjust the response according to the effectiveness of tactics during each operational period.

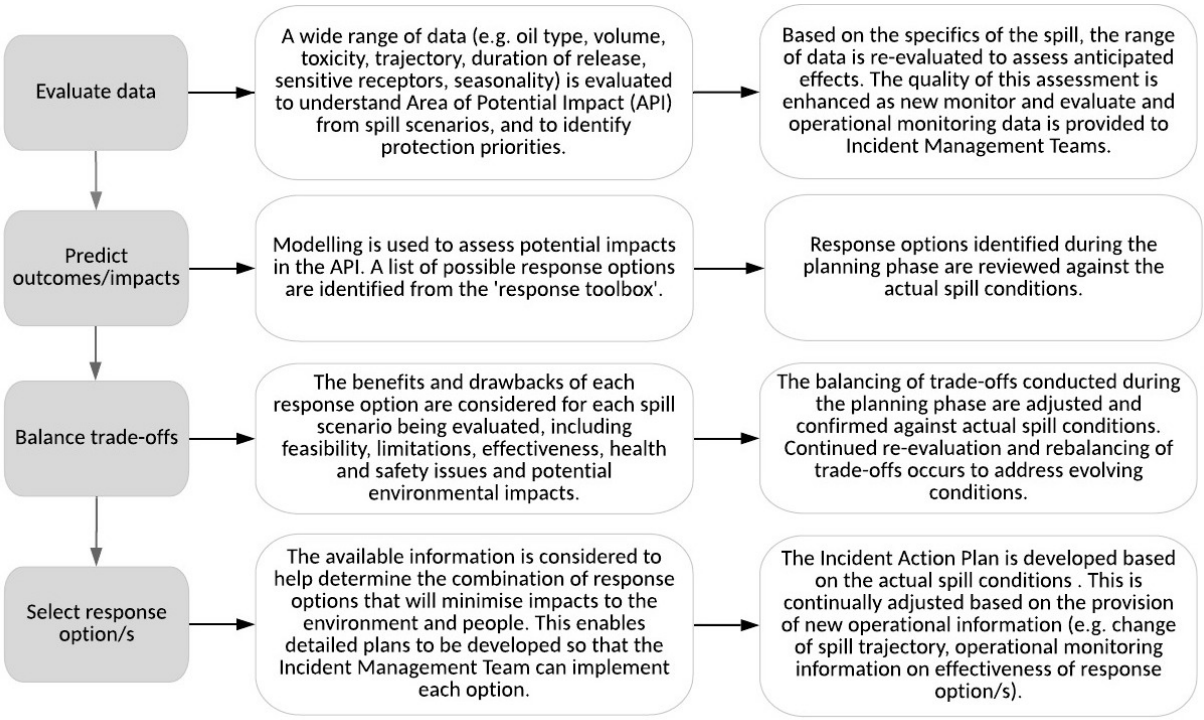


Figure 7-1: SIMA application during planning and responses phases (adapted from IPIECA-IOGP, 2015a)

7.6.1 Strategic SIMA

Selecting which response strategies to use often involves making trade-offs (e.g. health and safety, feasibility, flexibility, effectiveness), based on which environmental receptors should receive priority for protection. For example, it may be more beneficial to apply subsea dispersants on a well blow out, as dispersant efficacy is highest on fresh condensate, even though this may result in minor impacts to certain fish populations in the immediate vicinity of the spill location. However, this application of dispersant would then make the spill location safer for responders to undertake source control and reduce the overall area that would be affected by higher hydrocarbon concentrations. In turn, this would potentially reduce impacts to other fish populations and sensitive shoreline receptors, such as nesting turtles or birds.

A Strategic SIMA is presented in **Table 7-6** and indicates the applicability of each response strategy for each spill scenario.

Table 7-6: Strategic SIMA - Evaluation of response options

Response option	Scenario	Evaluation	Recommendation
Monitor and evaluate	**Scenario 1 –** Vessel collision (700 m^3/6 hours)	The requirement for situational awareness is critical in order to implement a coordinated, focussed and effective spill response. This strategy has several tactics (e.g. tracking buoys, aerial surveillance) and is scalable according to the nature and scale of the spill. SIMA will always support the implementation of 'Monitor and Evaluate' given the clear benefits in maintaining situational awareness throughout the duration of a spill event and little or no environmental impact associated with its implementation. Therefore, the benefits of undertaking this response are considered to significantly outweigh the potential environmental risks/impacts.	Primary response option
	Scenario 2 – Vessel collision (1,125 m^3/6 hours)		Primary response option
Source control	**Scenario 1 –** Vessel collision (700 m^3/6 hours)	In the event of a vessel spill, the Vessel Master would revert to the Ship Oil Pollution Emergency Plan (SOPEP) and/or ERP depending on the nature of the spill.	Primary response option
	Scenario 2 – Vessel collision (1,125 m^3/6 hours)		
Containment and recovery	**Scenario 1 –** Vessel collision (700 m^3/6 hours)	Unlikely to be effective as diesel products will rapidly degrade in the open ocean environment. For containment and recovery to be effective, a sufficient oil thickness is required be achieved by the containment booms (minimum of 50g/m^2). This is often limited to Group 3 and 4 (ITOPF) hydrocarbons.	Not recommended
	Scenario 2 – Vessel collision (1,125 m^3/6 hours)		

Response option	Scenario	Evaluation	Recommendation
(Mechanical) physical dispersion	**Scenario 1 –** Vessel collision (700 m^3/6 hours) **Scenario 2 –** Vessel collision (1,125 m^3/6 hours)	The benefits of undertaking this response are not considered to significantly outweigh the potential risk to human health due to the volatility of the hydrocarbon products. Mechanical dispersion is not considered a suitable response option for these scenarios.	Not recommended
Chemical dispersion – surface application	**Scenario 1 –** Vessel collision (700 m^3/6 hours) **Scenario 2 –** Vessel collision (1,125 m^3/6 hours)	MDO is not a persistent hydrocarbon and has high natural spreading, dispersion and evaporation rates in the marine environment. Dispersant application has a low probability of being effective in increasing the dispersal rate of MDO and would introduce more chemicals to the marine environment. The benefits of applying chemical dispersant do not significantly outweigh the potential environmental risks/ impacts and therefore this response option is not considered suitable.	Not recommended
Shoreline protection	**Scenario 1 –** Vessel collision (700 m^3/6 hours)	Modelling indicates low probability of shoreline contact and low exposures (**Table 7-4**). Contact exposure levels are also well below thresholds that would cause significant impact. The exposed nature of the shorelines and typical metocean conditions (large tidal range and associated strong currents) means that shoreline protection and deflection is unlikely to be effective along much of the shoreline. Shoreline protection and deflection activities involve mobilising personnel and equipment to remote coastal environments, which can result in physical disturbance to intertidal and shoreline habitats. Given the small volumes and area of shoreline predicted	Not recommended

Response option	Scenario	Evaluation	Recommendation
		to be impacted, leaving the product to degrade naturally would cause less harm than active methods of protection and deflection. The benefits of conducting this response option are not considered to significantly outweigh the potential environmental and safety risks/ impacts associated with its implementation. Therefore, shoreline protection and deflection is not considered a suitable response option.	
	Scenario 2 – Vessel collision (1,125 m^3/6 hours)	Modelling indicates no shoreline contact above moderate shoreline accumulation thresholds (>100g/m^2).	n/a
Shoreline clean-up	**Scenario 1 –** Vessel collision (700 m^3/6 hours)	Modelling indicates low probability of shoreline contact. Contact exposure levels are also well below thresholds that would cause significant impact. Shoreline clean-up activities involve mobilising personnel and equipment to remote coastal environments, which can result in physical disturbance to intertidal and shoreline habitats. Given the small volumes and area of shoreline predicted to be impacted, leaving the product to degrade naturally would cause less harm than active methods of clean-up. The benefits of conducting this response option are not considered to significantly outweigh the potential environmental and safety risks/ impacts associated with its implementation. Therefore, shoreline clean-up is not considered a suitable response option.	Not recommended
	Scenario 2 – Vessel collision (1,125 m^3/6	Modelling indicates no shoreline contact above moderate shoreline accumulation thresholds (>100g/m^2).	n/a

Response option	Scenario	Evaluation	Recommendation
	hours)		
Oiled wildlife response	**Scenario 1 –** Vessel collision (700 m^3/6 hours)	This strategy would only be triggered if the monitor and evaluate option and/or operational monitoring showed wildlife were at risk of being impacted or had already been impacted by the spill, and it is safe and practicable to implement wildlife response tactics.	Secondary response option
	Scenario 2 – Vessel collision (1,125 m^3/6 hours)		

7.6.2 Operational SIMA

Following implementation of the initial (first strike) response, the Strategic SIMA (**Table 7-6**) will form the basis for the initial Operational SIMA. **Table 7-7** includes considerations to help complete the Operational SIMA.

The initial Operational SIMA should be completed by the Environment Unit Lead within 6 hours of arrival in the Emergency Operations Centre.

It should be noted that the initial Operational SIMA may be based on limited information; however, the overall response effort should not be delayed due to a lack of some information. The Operational SIMA can always be revised when more information is provided to the Environment Unit Lead.

The Environment Unit Lead is responsible for completing the Operational SIMA and to determine if outputs from the Strategic SIMA are still appropriate. The Operational SIMA should incorporate post-spill trajectory modelling data, surveillance data, operational monitoring data and should be incorporated into the IAP.

Table 7-7: Operational SIMA Considerations

Response option	Operational SIMA Considerations
Monitor and evaluate	• What sensitive receptors are in the current or anticipated trajectory? • What is the assessed volume and size of the spill? • Is the product weathering as anticipated? • What data is being returned from operational monitoring and how can this be used to aid decision making (refer to ABU OSMP for further guidance)? • How do the response options and tactics seem to be influencing the spill?
Oiled Wildlife Response	• Would response activities cause more stress or mortality to individuals than the hydrocarbon itself (e.g. How long would individuals need to be kept. How far would they need to be transported)? • Are known species breeding or nesting? • What is their known vulnerability and/or recoverability to this hydrocarbon type?

Table 7-8: Environmental Performance – SIMA

Environmental Performance Outcome	Performance Standard	Measurement Criteria
EPO 3 Implement emergency response options that result in net environmental benefit	**EPS 3.1** IMT to undertake initial Operational SIMA within 6 hours of arrival at Emergency Operations Centre to support initiation of response options	**MC 3.1.1** Records demonstrate Operational SIMA undertaken within 6 hours of arrival at Emergency Operations Centre to support initiation of response options
	EPS 3.2 Operational SIMA to be revised during each new Operational Period and should incorporate post-spill trajectory modelling data, surveillance data, operational monitoring data and should be incorporated into the IAP	**MC 3.2.1** Records demonstrate IMT completed revision of Operational SIMA during each new Operational Period and incorporated information into the IAP

8 IMPLEMENTING RESPONSE OPTIONS

8.1 Monitor and Evaluate

Monitor and evaluate involves the collection and evaluation of information to provide and maintain situational awareness in the event of a spill. This response option includes fate and weathering modelling, trajectory modelling, satellite surveillance and spill tracking via use of buoys and field observations.

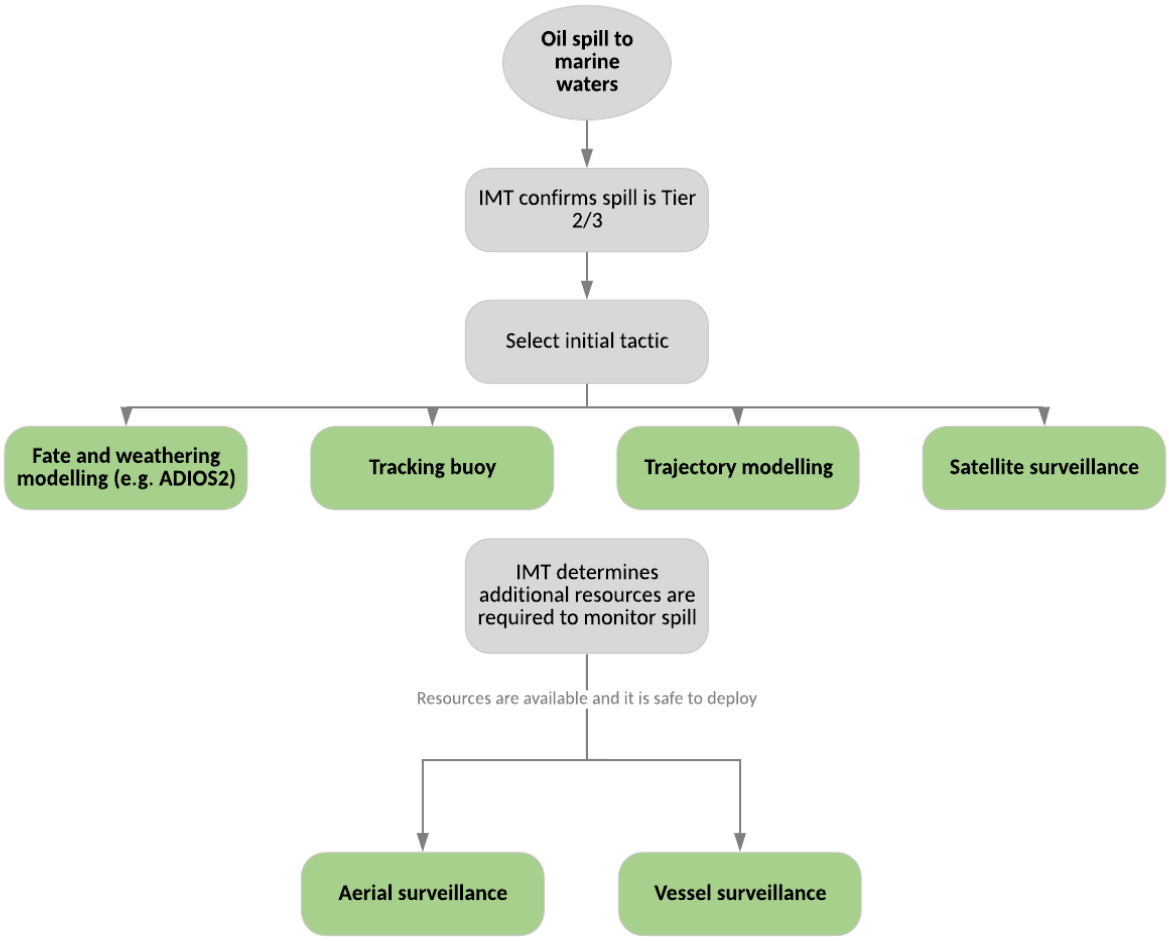
Monitor and evaluate activities should be conducted throughout the spill response, as it provides the IMT with ongoing information on sensitive receptors at risk of impact from the spill and the effectiveness of spill response operations. This information should be used by the IMT when updating response (operational) SIMAs and in the development of IAPs.

Monitor and evaluate can include one or more of the following tactics:

- Deployment of tracking buoy(s) – requires a buoy to be deployed to the water at the leading edge of the spill to track the movement of the spill
- Fate and weathering modelling – uses computer modelling (e.g. ADIOS2) to estimate the weathering of an oil spill
- Oil spill trajectory modelling – uses computer modelling (e.g. SIMAP) to estimate the movement, fate and weathering of spills
- Visual observation (via aerial and/or vessel surveillance) – requires trained observers to identify and characterise spills. Survey platforms typically include aircraft and/or vessels. Is also used to ground truth oil spill trajectory modelling and monitor the effectiveness of response options
- Satellite surveillance and data capture – uses satellite technology to identify and track oil spills.

The process for selecting which tactic to apply is shown in **Figure 8-1**. **Table 8-1** provides guidance to the ERT and IMT, on tasks and responsibilities that should be considered when implementing this response option. Note: these are provided as a guide only. The Emergency Commander and/or Incident Commander are ultimately responsible for the implementation of the response and may therefore determine that some tasks be varied, should not be undertaken or should be reassigned.

Information on resources, implementation times and termination criteria for this option are shown in **Table 8-2**. Environmental Performance Outcomes, Standards and Measurement Criteria are listed in **Table 8-3**.



Limitation/s: *Surveillance activities should not be deployed in areas where the hydrocarbon release potentially poses a safety hazard to response personnel (e.g. VOCs associated with diesel).*

Termination criteria: *The response will be terminated when either a silvery-grey sheen (as defined by Bonn Agreement Oil Appearance Code 1- Sheen) is no longer evident to observers from the release area or when the spill response is terminated. This decision will be made by the control agency.*

Figure 8-1: Decision Guide for Monitor and Evaluate

Table 8-1: Monitor and Evaluate Implementation Guide

Responsibility	Task	Consideration/s	Complete
Fate and weathering modelling (if selected)			
IMT	Conduct hydrocarbon distribution, fate and weathering assessment using Automated Data Inquiry for Oil Spills (ADIOS2) using information available on oil type in **Attachment A** - Hydrocarbon Characteristics, Weathering Properties And Modelling Resultsof this OPEP		☐
Tracking buoy (if selected)			
ERT	Use available vessel to deploy tracking buoy as close as possible to spill location (vessel safety is priority)	Tracking buoy available on the vessel	☐
IMT	Verify deployment of tracking buoy using tracking buoy deployment guideline	Tracking buoy login details and deployment guideline available in the IMT EUL Folder	☐
IMT	Use tracking buoy data to maintain situational awareness	Data tracked online and fed into spill models and IMT situational awareness boards	☐
IMT	Determine if any additional tracking buoys are required to assist with building situational awareness of spill trajectory		☐
Trajectory modelling (if selected)			
IMT	Call RPS Duty Manager to execute service contract and initiate trajectory modelling. Request supply chain unit leader to execute hydrocarbon modelling provider service contract	Refer to Emergency Contacts Directory for contact details Potentially inaccurate modelling outputs require ground truthing by surveillance activities conducted	☐

Responsibility	Task	Consideration/s	Complete
		during the course of operational monitoring	
IMT	Complete and submit the hydrocarbon spill modelling request form to RPS	Modelling to be undertaken within 3 hours of the request being sent to RPS Group, then every operational day during the spill response or, if additional response options are employed, to identify possible changes to trajectory etc. Results from surveillance activities, tracking buoys and/or satellite-derived observations and data derived from hydrocarbon assays of the source hydrocarbon or from other reservoirs in the region that may be available should be used as input data to improve model accuracy. Provide available data to RPS at the end of each operational period. Form available in the IMT EUL Folder	☐
Satellite surveillance (if selected)			
IMT	Notify AMOSC Duty Officer to request initiation of satellite services	Refer to Emergency Contacts Directory (request for AMOSC support must be approved by Incident Commander)	☐
IMT	Combine satellite data with optical imagery (aerial surveillance, vessel-based observations) to mitigate issues of angle of insolation, thick cloud cover and night	Satellite derived data can be used to broaden aerial survey data in terms of both spatial and temporal scale and provide images	☐
Aerial surveillance (if selected)			
IMT	Contact Darwin International Airport to establish a		☐

Responsibility	Task	Consideration/s	Complete
	location for Santos (ABU-W) Air Support Base		
IMT	Confirm availability of aerial surveillance platform	If aviation asset available at spill location, utilise where possible to gather as much information about the spill If aviation asset not available at spill location IMT is to seek available resources through existing contractual arrangements. Aerial platform should be capable of providing the following: • immediate accessibility from a Darwin based airport • capability to fly at 150 feet • provision of aircraft crew for 1 x aircraft and space for at least one trained aerial observer	☐
IMT	Obtain approval from the Emergency Commander to commence surveillance flights in the vicinity of the facility		☐
IMT	Mobilise aircraft and trained observers to the spill location to undertake surveillance activities	Trained observers should be familiar with the Bonn Agreement Aerial Operations Handbook (Part III) (Bonn Agreement, 2016). An Aerial Surveillance Observation Log is provided in **Attachment C.** The following data should be obtained during surveillance activities. • name of observer, date, time, aircraft type, speed and altitude of aircraft • location of slick or plume (GPS positions)	☐

Responsibility	Task	Consideration/s	Complete
		• spill source and access • size of the spill, including length, width, volume and percentages of cover of the slick or plume • visual appearance of the slick (e.g. colour, emulsification) • edge description (clear or blurred) • general description (windrows, patches etc.) • wildlife, habitat or other sensitive receptors observed • information on any response activities observed • basic metocean conditions (e.g. sea state, wind, current) • photographic/video images	
ERT	All records to be relayed to Santos (ABU-W) IMT within 2 hours of when aircraft returns from observation flight	Visual observations from aircraft have inherent subjectivity due to the effect of the angle of insolation on the surface of the ocean. Optical techniques are also dependent on cloud cover and daylight. 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	☐
IMT	Develop a flight schedule for ongoing aerial surveillance	Frequency of flights should consider information needs of IMT to help maintain situational awareness	☐

Responsibility	Task	Consideration/s	Complete
		and determine ongoing response operations	
Vessel surveillance (if selected)			
ERT	Vessel Master to provide IMT initial report on estimated spill volumes and movement based on visual observation (if possible)	Preliminary observations are intended to provide initial projections of spill trajectory and scale prior to more detailed modelling and surveillance. These observations should be immediately verified by more detailed surveillance. The following data should be obtained during surveillance activities: • name of observer, date, time, vessel type, speed of vessel • location of slick or plume (GPS positions) • spill source and access • visual appearance of the slick (e.g. colour, emulsification) • quantity of hydrocarbons on surface and how this was calculated • wildlife, habitat or other sensitive receptors observed • information on any response activities observed • basic metocean conditions (e.g. sea state, wind, current) • photographic/video images	☐

Responsibility	Task	Consideration/s	Complete
General			
ERT	Record relevant data e.g. equipment used, time deployed, weather conditions, Job Safety Analysis (JSA) for all tasks		☐
ERT	Hold pre-mobilisation survey team meeting, including communication of field survey schedules (provision for field personnel rotation)		☐
IMT	Obtain weather and tidal information from the Bureau of Metrology and on-scene observers		☐
IMT	Assemble competent field team(s) (if required), including required personal protective equipment (PPE). Arrange any required inductions and/or permits		☐
IMT	Arrange transportation (e.g. flights, vehicles), accommodation and food/equipment for field teams		☐
IMT	Activate Geographic Information Systems (GIS) personnel to develop maps that can overlay surveillance data to enhance situational awareness of the spill	May require support from GIMAT or external support resources	☐
IMT	Review fate and weathering, tracking buoy, oil spill modelling data and satellite data with field surveillance data (aerial and vessel surveillance) to validate spill fate and trajectory	Use available data to conduct response (operational) SIMA and confirm that pre-identified response options are appropriate	☐

Responsibility	Task	Consideration/s	Complete
IMT	Use monitor and evaluate data to periodically reassess the spill and modify the response (through the IAP), as required		☐
IMT	Review OSMP to determine which operational and/or scientific monitoring initiation criteria have been reached, and activate OSMP personnel to implement relevant monitoring programs	Situational awareness data will be used by the IMT to help determine response effectiveness; operational monitoring teams to direct monitoring; and by the scientific monitoring teams to prioritise the sampling areas for impact assessment	☐

Table 8-2: Monitor and Evaluate Resource Guide

Tactic	Resources Available	Service Providers	Implementation Timeframe	Termination Criteria
Fate and weathering modelling	IMT Environment Unit members utilise ADIOS2 Programs installed on IMT computers	N/A	Within 2 hours of IMT activation	The response will be terminated when either a silvery-grey sheen (as defined by Bonn Agreement Oil Appearance Code 1-Sheen) is no longer evident to observers from the release area or when the spill response is terminated. This decision will be made by the control agency
Tracking buoy	Tracking buoys available on vessel undertaking decommissioning and preservation activities	AMOSC (additional buoys)	2 hours for tracking buoy on vessel 2-4 days for additional tracking buoys (if required) from AMOSC, Geelong	
Trajectory modelling	Spill response modelling software provided by RPS Modelling staff provided by RPS	RPS	Within 3 hours of IMT activation	
Satellite surveillance	Satellite data from supplier sourced through AMOSC subscription (OSRL subscription available as a secondary option)	AMOSC, OSRL	Data available within 24 hours, then every 6 to 24 hours thereafter depending on satellite positions.	

Tactic	Resources Available	Service Providers	Implementation Timeframe	Termination Criteria
Aerial surveillance	1 x aircraft sourced through existing contracts with Babcock Helicopters Aerial surveillance observers using national pool of trained/experienced observers – sourced through AMOSC or AMSA	AMOSC, AMSA, Babcock Helicopters	2 days for national pool trained/experienced aerial observers 4 hours for aircraft to be ready for mobilisation	
Vessel surveillance	1 x vessel crew supplied by vessel contractor	Marine vessel contractors	Within 2 hours for vessels situated close to the spill source (if available)	

Table 8-3: Environmental Performance – Monitor and Evaluate

Environmental Performance Outcome	Performance Standard	Measurement Criteria
Response Preparedness		
EPO 4 Maintain capability to implement monitor and evaluate tactics	**EPS 4.1** Maintain contracts with third-party providers to provide access to suitably qualified and competent personnel and equipment to assist in the implementation of monitor and evaluate tactics	**MC 4.1.1** AMOSC Master Services Agreement
		MC 4.1.2 OSRL Service Level Agreement
		MC 4.1.3 RPS Contract for oil spill modelling services
		MC 4.1.4 Aviation and vessel contracts in place for the duration of the activity
	EPS 4.2 Tracking buoys available on vessel undertaking decommissioning and preservation activities are maintained according to manufacturer specifications throughout activity	**MC 4.2.1** Records demonstrate that tracking buoys are maintained according to manufacturer specifications throughout activity
Response Implementation		
EPO 5 Maintain situational awareness and inform IMT decision making using monitor and evaluate tactics	**EPS 5.1** IMT to undertake fate and weathering modelling within 2 hours of IMT activation to estimate the current and projected weathering of the spill	**MC 5.1.1** Records demonstrate fate and weathering modelling (ADIOS2) undertaken within 2 hours of IMT activation

Environmental Performance Outcome	Performance Standard	Measurement Criteria
	EPS 5.2 IMT to initiate trajectory modelling within 3 hours of IMT activation to estimate trajectory of the spill	**MC 5.2.1** Records demonstrate trajectory modelling requested within 3 hours of IMT activation
	EPS 5.3 Data from monitor and evaluate activities used by the IMT during each operational period when developing operational SIMAs and in the development of IAPs	**MC 5.3.1** Records demonstrate monitor and evaluate data incorporated into operational SIMAs and the Incident Action Plan during each operational period
	EPS 5.4 Provide available data from monitor and evaluate activities to RPS at the end of each operational period to help improve spill model accuracy	**MC 5.4.1** Records indicate that at the end of each operational period, available data from monitor and evaluate activities was submitted to RPS to help improve spill model accuracy
	EPS 5.5 Commence vessel surveillance deployment planning and mobilisation within 2 hours if the tactic is selected by the IMT	**MC 5.5.1** Records demonstrate that if vessel surveillance selected as a suitable tactic that deployment planning and mobilisation commenced within 2 hours of that decision
	EPS 5.6 Commence aerial surveillance deployment planning and mobilisation within 2 hours if the tactic is selected by the IMT	**MC 5.6.1** Records demonstrate that if aerial surveillance selected as a suitable tactic that deployment planning and mobilisation commenced within 2 hours of that decision

Environmental Performance Outcome	Performance Standard	Measurement Criteria
	EPS 5.7 Trained aerial observers to complete Attachment C: Aerial Surveillance Observation Log during each flight	**MC 5.7.1** Attachment C: Aerial Surveillance Observation Log completed during each flight
	EPS 5.8 All aerial observation records to be relayed to IMT within 2 hours of aircraft returning from observation flight	**MC 5.8.1** Records demonstrate that aerial surveillance personnel sent aerial observation records to IMT within 2 hours aircraft returning from observation flight

8.2 Oiled Wildlife Response

Oiled Wildlife Response (OWR) includes 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 have succumbed to the effects of oiling.

OWR is considered to be a secondary response option for this activity, which would only be triggered if monitor and evaluate activities and/or operational monitoring activities indicate wildlife were at risk of contact/have been contacted by the spill.

Santos (ABU-W) has an Oiled Wildlife Response - Implementation Plan (ALL/HSE/PLN/025) which aligns to the current Commonwealth and Territory arrangements for OWR and provides operational guidance to the IMT for the protection of wildlife during a hydrocarbon spill event. The Plan provides the following detail:

- Overview of the impacts of oil on fauna groups
- Advice on suitable tactics to protect and treat fauna groups
- OWR arrangements in Commonwealth and Territory waters
- Structure of the Oiled Wildlife Branch and detail on how this should be integrated into the Santos (ABU-W) IMT
- Roles, responsibilities and actions for key oiled wildlife response personnel during each stage of the oiled wildlife response effort (including activation of the oiled wildlife response through to rehabilitation and termination of the response).

Implementation of the OWR-Implementation Plan will follow the stages shown in **Figure 8-2** (derived from the Western Australian OWR Plan (DPAW, 2014)). Implementation of stages will occur as appropriate to the nature and scale of the incident. For example, if only a small number of wildlife are affected by a spill, there would be no need to establish an OWR treatment facility, given that small numbers of animals are likely to be cared for utilising existing local wildlife care networks.

Table 8-4 outlines the initial responsibilities and tasks for the ERT and IMT for OWR for the first few stages of the response. Note: these are provided as a guide only and the IMT should refer to the OWR - Implementation Plan (ALL/HSE/PLN/025) if monitor and evaluate activities and/or operational monitoring activities indicate offshore wildlife are at risk of contact/have been contacted by the spill. The Emergency Commander and/or Incident Commander are ultimately responsible for the implementation of the response and may therefore determine that some tasks be varied, should not be undertaken or should be reassigned.

Information on resources, implementation times and termination criteria for this option are shown in **Table 8-5**. Environmental Performance Outcomes, Standards and Measurement Criteria are listed in **Table 8-6**.

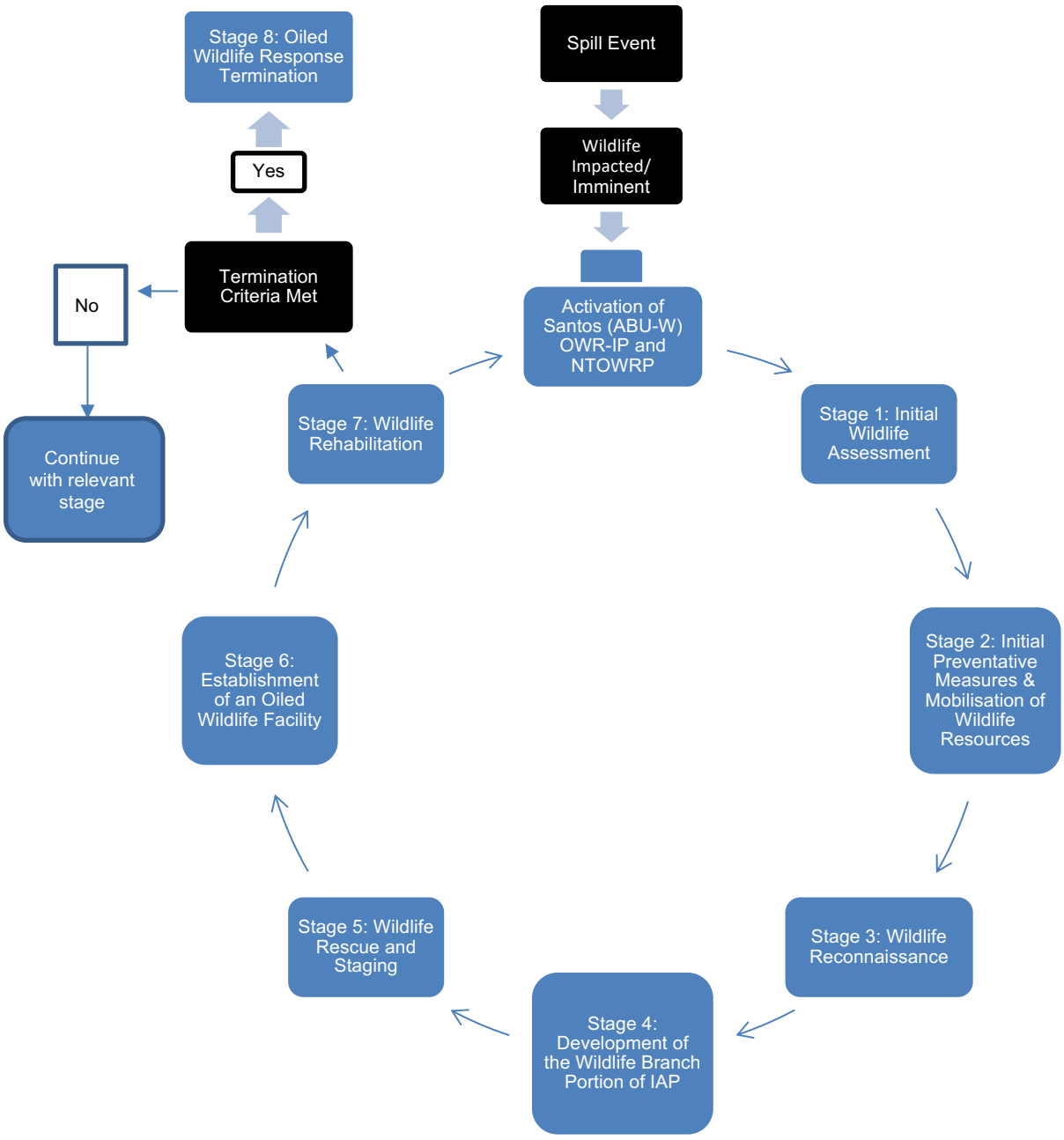


Figure 8-2: Stages of an Oiled Wildlife Response (modified from the WAOWRP)

Table 8-4: Oiled Wildlife Response Implementation Guide

Responsibility	Task	Consideration/s	Complete
Situational awareness			
ERT	Vessel Master to report all wildlife sightings (including those contacted with hydrocarbons or at risk of contact) near the spill source to the IMT within 2 hours of detection		☐
ERT	Personnel conducting aerial surveillance activities (as part of monitor and evaluate and/or operational monitoring activities) shall report wildlife sightings in or near the spill trajectory (including those contacted with hydrocarbons or at risk of contact) and report them to the IMT within 2 hours of detection	Many species are not visible due to the lack of time they spend on the ocean surface	☐
Activate oiled wildlife response (tasks below provide a guide only. Refer to OWR - Implementation Plan (ALL/HSE/PLN/025) for additional guidance)			

IMT	If wildlife are sighted and are at risk of contact (or have been contacted), initiate oiled wildlife response	• Record all reports of wildlife potentially impacted and impacted by spill. Record reports on:
		  ○ Location
		  ○ Access
		  ○ Number
		  ○ Species
		• Condition of impacted animals (if available)
			☐

Responsibility	Task	Consideration/s	Complete
IMT	Obtain approval from Incident Commander to initiate an OWR and notify the relevant Territory Agency/Authority (as per **Table 6-1** of this OPEP)		☐
IMT	Obtain approval from Incident Commander to mobilise AMOSC Technical Officer / OSRL Wildlife Response Advisor as per **Section 5.3** of this OPEP		☐
Initial wildlife assessment (tasks below provide a guide only. Refer to OWR - Implementation Plan (ALL/HSE/PLN/025) for additional guidance)			
IMT	Confirm wildlife reports directly with field personnel and obtain any additional information as required	• Obtain all current wildlife reports from the field (e.g. from opportunistic/incidental observations from other monitoring activities (e.g. operational monitoring and monitor and evaluate activities) • Compile known existing wildlife data: ○ OMP03: Pre-emptive assessment of Sensitive Receptors at Risk ○ Relevant OWR regional plan ○ Relevant EPs ○ Offshore Project Proposal (OPP) ○ Oil Spill Response Atlas ○ Birdlife Australia • Review oil spill trajectory modelling	☐
IMT	Ensure data from initial assessments and reports are incorporated into Operational SIMA	Oiled wildlife response tactics can cause additional stress and mortality on individuals than oil pollution alone. Santos (ABU-W) will determine via an Operational SIMA whether capture and cleaning of oiled wildlife will result in a net environmental benefit	☐

Responsibility	Task	Consideration/s	Complete
IMT	Determine initial OWR Response Level (1-6), based on the determined risk areas and likely number of oiled wildlife	Refer to the OWR - Implementation Plan (ALL/HSE/PLN/025) for guidance on OWR Response Level classification	☐
IMT	Obtain approval from Incident Commander for the activation and mobilisation of OWR equipment		☐
IMT	Wildlife Specialist and Environment Unit Lead to liaise and assess wildlife assets at risk and develop recommendations for the resource requirements for Stage 2 of the response (Initial Preventative Measures and Mobilisation of Wildlife Resources)		☐
General			
ERT	Record relevant data e.g. equipment used, time deployed, weather conditions, Job Safety Analysis (JSA) for all tasks		☐
ERT	Hold pre-mobilisation survey team meeting, including communication of field survey schedules (provision for field personnel rotation)		☐
IMT	Assemble trained personnel (if required), including required personal protective equipment (PPE). Arrange any required inductions and/or permits		☐
IMT	Arrange transportation (e.g. flights, vehicles), accommodation and food/equipment for survey teams		☐

Responsibility	Task	Consideration/s	Complete
IMT	Prepare a communications plan for field personnel		☐

Table 8-5: Oiled Wildlife Response Resource Guide

Tactic/Activity	Resources Available	Service Providers	Implementation Timeframe	Termination Criteria
Situational awareness and ongoing reconnaissance	1 x aircraft sourced through existing contracts with Babcock Helicopters Aerial surveillance observers using national pool of trained/experienced observers – sourced through AMOSC or AMSA	AMOSC Babcock Helicopters	2 days for national pool trained/experienced aerial observers 4 hours for aircraft to be ready for mobilisation	Agreement is reached with the jurisdictional authority relevant to the spill to terminate the response. No wildlife observed in the trajectory of the spill
Activate oiled wildlife response and initial assessment	Environment Unit Lead Wildlife Specialist (in Planning Section)		< 1 day from reports of imminent wildlife impact or actual impact	
Wildlife hazing	1 x vessel and crew supplied by vessel contractor Hazing equipment (vessel fire water monitors vessel horns) – Vessel Contractor Contract with AMOSC to provide trained Oiled Wildlife Branch Director, Oiled Wildlife Responders (including mutual aid – via AMOSC)	AMOSC Marine vessel contractors	< 3 days for support vessel on site, if available 3 days for Santos (ABU-W) marine dept. approved vessel sourced in Darwin 2 days for Industry Oiled Wildlife Advisor via AMOSC	

Tactic/Activity	Resources Available	Service Providers	Implementation Timeframe	Termination Criteria
	National Response Team trained Oiled Wildlife Responders			
Pre-emptive capture and post-contact response	1 x vessel and crew supplied by vessel contractor Four Oiled Wildlife Response Kits and Oiled Wildlife Response Containers located in Fremantle (x1) and Geelong (x1) OSRL OWR equipment (Search, Rescue and Medical Kit; and Cleaning and Rehabilitation Kit) Contract with AMOSC to provide trained Oiled Wildlife Branch Director and Oiled Wildlife Responders (including mutual aid – via AMOSC) National Response Team trained Oiled Wildlife Responders	AMOSC (Includes contract with DwyerTech to assist with set-up of OWR containers) OSRL Marine vessel contractors	< 3 days for support vessel on site, if available 3 days for Santos (ABU-W) marine dept. approved vessel sourced in Darwin 2 days for Industry Oiled Wildlife Advisor via AMOSC 4 days for equipment to be mobilised to Darwin	

Table 8-6: Environmental Performance – Wildlife Response

Environmental Performance Outcome	Performance Standard	Measurement Criteria
Response Preparedness		
EPO 6 Maintain capability to implement oiled wildlife response tactics	**EPS 6.1** Maintain contracts with third-party providers to provide access to suitably qualified and competent personnel and equipment to assist in the implementation of oiled wildlife response tactics	**MC 6.1.1** AMOSC Master Services Agreement
		MC 6.1.2 OSRL Service Level Agreement
		MC 6.1.3 Aviation and vessel contracts in place for the duration of the activity
EPO 7 Locate, identify and apply suitable response tactics to wildlife to prevent them from being contacted by oil or treat them if already contacted by oil (if deemed to result in a net environmental benefit)[1]	**EPS 7.1** Establish Wildlife Branch if monitor and evaluate activities and/or operational monitoring have confirmed that wildlife are at risk of being contacted or have already been contacted by the spill	**MC 7.1.1** Records demonstrate that Wildlife Branch established if wildlife impacts confirmed via monitor and evaluate or operational monitoring activities

[1] Capture and cleaning of oiled wildlife may result in additional stress and mortality than oil pollution alone. Santos (ABU-W) will determine during implementation of the oiled wildlife response as to whether capture and cleaning of oiled wildlife will result in a net environmental benefit. This will be considered during the operational SIMA.

Environmental Performance Outcome	Performance Standard	Measurement Criteria
	EPS 7.2 Conduct oiled wildlife operations in accordance with Santos (ABU-W) Oiled Wildlife Response – Implementation Plan (ALL/HSE/PLN/025)	**EPS 7.2.1** Records demonstrate that oiled wildlife operations were conducted in accordance with Santos (ABU-W) Oiled Wildlife Response – Implementation Plan (ALL/HSE/PLN/025)

9 WASTE MANAGEMENT

The implementation of some spill response options will collect and generate waste that will require management, storage, transport and disposal, and may consist of solid and liquid waste.

Waste management aims to ensure wastes are handled and disposed of safely and efficiently and prevent contamination of unaffected areas.

The type and amount of waste generated during a spill response will vary depending on the spill type/characteristics, volume released, and response options 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.

The potential types and total volumes of waste anticipated for each response option are provided in **Table 9-1.**

Table 9-1: Waste Types and Volumes Anticipated During a Spill Response

Spill response option	Oily liquid waste	Solid oily waste	PPE and consumables
Monitor and evaluate	Nil	Nil	< 10 m^3
Wildlife hazing	Nil	Nil	< 1 m^3/ day
Wildlife post contact response	Nil	< 1 m^3/ day	< 2 m^3/ day

Table 9-2 summaries the waste storage, treatment and disposal options available to manage waste associated with the spill response options. The capacity is considered appropriate and acceptable to manage the maximum waste volumes that may be produced through implementation of the various response options.

Based on the credible spill scenarios modelled, Santos (ABU-W) do not anticipate that large volumes of waste will be generated. As soon as the details of an actual spill are available, waste management arrangements to allow a continuous response to be maintained should be reviewed.

Any waste products will be transported by vessel from the response location to Darwin Port. Waste will be transported from Darwin Port to licensed waste disposal facilities by a dedicated waste contractor. Santos (ABU-W) has existing service agreements with Veolia Waste Management (primary waste manager) which include the provision of waste management services during a spill response. Transport to the licensed waste management facilities would be undertaken via controlled-waste-licensed vehicles and in accordance with the *Waste Management and Pollution Control Act 2015*.

Table 9-2: Spill Response Waste Storage, Treatment and Disposal Options

Waste category	On-site storage	Treatment/disposal option	End disposal destination
Solid waste – PPE and consumables (e.g. oily gloves, booms, sorbent pads)	Lined skips, oil drums, industrial waste bags, plastic rubbish bags	Recovery (e.g. thermal desorption or fixation process) and recycling Incineration Landfill	Toll Veolia Waste Management
Oiled wildlife response	Industrial waste bags, plastic rubbish bags	Incineration Landfill	

Waste will be managed in accordance with the Bayu-Undan Decommissioning Removal and Disposal Waste Management Plan (DCOM-453-EN-PLN-00002), MARPOL 73/78 (as appropriate to vessel class) and relevant Commonwealth and NT regulations. The Bayu-Undan Decommissioning Removal and Disposal Waste Management Plan (DCOM-453-EN-PLN-00002) will address the specific wastes associated with this decommissioning activity scope, including wastes associated with spills response. All waste stored or transferred should be documented, including details of the volumes and nature of the waste, receiver and destination of the waste.

Should waste management activities be required in environmentally sensitive locations, the impact of the activities will be monitored, and appropriate controls implemented as informed by response (operational) SIMAs.

Environmental Performance Outcomes, Standards and Measurement Criteria are listed in **Table 9-3.**

Table 9-3: Environmental Performance – Waste Management

Environmental Performance Outcome	Performance Standard	Measurement Criteria
Response Preparedness		
EPO 8 Maintain capability to implement monitor and evaluate tactics	**EPS 8.1** Santos (ABU-W) to maintain contracts with third-party providers to provide access to suitably qualified and competent personnel and equipment to assist in the implementation of waste management activities	**MC 8.1.1** Records demonstrate that Santos (ABU-W) maintains contracts with third-party providers to provide access to suitably qualified and competent personnel and equipment to assist in the implementation of shoreline clean-up tactics
Response Implementation		
EPO 9 Collect, manage, transport and dispose of waste produced from response options to minimise secondary contamination of sensitive receptors	**EPS 9.1** Use the Bayu-Undan Decommissioning Removal and Disposal Waste Management Plan (DCOM-453-EN-PLN-00002) as guidance to collect, manage, transport and dispose of waste produced from response options	**MC 9.1.1** Records demonstrate that the Bayu-Undan Decommissioning Removal and Disposal Waste Management Plan (DCOM-453-EN-PLN-00002) was used as guidance to collect, manage, transport and dispose of waste produced from response options

	EPS 9.2
	Waste management, storage, transport and disposal will comply with relevant legislation, conventions and standards, including:
	• MARPOL 73/78 (as appropriate to vessel class), including:
	  ○ MARPOL 73/78, Annex I (Prevention of pollution by oil)
	  ○ MARPOL 73/78 Annex II (Control of pollution by noxious liquid substances in bulk)
		MC 9.2.1
		Records demonstrate waste generated during a hydrocarbon spill response is managed, stored, transported and disposed of in accordance with relevant legislations, conventions and legislation, including:
		• MARPOL 73/78 Annex I and Annex II
		• Marine Order 91
		• Waste Management and Pollution Control Act 2015

Environmental Performance Outcome	Performance Standard	Measurement Criteria
	• Relevant NT and Commonwealth Regulations, including: ○ Marine Order 91 (Marine pollution prevention – oil) (as appropriate for vessel class) ○ Waste Management and Pollution Control Act 2015 (NT)	
	EPS 9.3 Santos (ABU-W) to maintain contracts with third-party providers to provide access to suitably qualified and competent personnel and equipment to assist in the implementation of waste management activities	**MC 9.3.1** Records demonstrate that Santos (ABU-W) maintains contracts with third-party providers to provide access to suitably qualified and competent personnel and equipment to assist in the implementation of shoreline clean-up tactics

10 OPERATIONAL AND SCIENTIFIC MONITORING

Santos (ABU-W) Operational and Scientific Monitoring Program (OSMP) (ALL/HSE/PLN/032), describes a program of monitoring oil pollution that will be adopted in the event of a hydrocarbon spill incident (Tier 2 or 3) to marine or coastal waters. The OSMP 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) sit under this framework and provide detail on the initiation criteria, termination criteria and guidance on objectives, monitoring design, standard operating procedures, data management and reporting.

These plans are listed in **Attachment D:** Operational and Scientific Monitoring Plans and consider the environmental and socio-economic receptors found within the EMBA. The Plans will only be implemented when individual initiation criteria are met, as specified in the individual Operational Monitoring Plans (OMPs) and Scientific Monitoring Plans (SMPs) (ALL/HSE/PLN/033). A summary of the objectives, initiation and termination criteria are provided in **Attachment D:** Operational and Scientific Monitoring Plans.

Operational monitoring collects information about the spill and associated response activities to aid situational awareness, planning and decision making for executing spill response activities. Operational monitoring data must be provided to the IMT in a timely manner to ensure situational awareness is current so that it can inform decision making on protection priorities and response options. In the event of a spill, the Santos (ABU-W) Incident Commander, in consultation with the Operations Section Chief, the OSMP Implementation Lead and the OSMP Service Providers, will coordinate and manage OSMP activities.

Scientific monitoring focuses on the short-and long-term environmental impact assessment. It may occur in parallel to operational monitoring and can continue for some time after the hydrocarbon/chemical spill event. Scientific monitoring determines the potential ongoing environmental impact attributable to the spill or the associated response activities and informs the requirements for remediation.

Santos (ABU-W) may use existing baseline information (Section 4.2 of the EP) when evaluating the priority protection areas (**Section 7.5**) at risk of hydrocarbon contact above thresholds. Santos (ABU-W) will also undertake a more detailed evaluation post-spill, pre-impact of sensitive receptors predicted to have contact with hydrocarbons above thresholds.

Operational monitoring reporting will be provided to the IMT to maintain situational awareness and advise response strategy requirements. The reporting requirements will be specific to the individual OMPs and SMPs deployed. The terms of responsibilities, report templates, schedule, quality assurance/quality control and peer-review will be agreed with the nominated Environmental Service Providers engaged to conduct the OMPs and SMPs.

Environmental Performance Outcomes, Standards and Measurement Criteria relevant to operational and scientific monitoring are listed in **Table 10-1**.

Table 10-1: Environmental Performance – Operational and Scientific Monitoring

Environmental Performance Outcome	Performance Standard	Measurement Criteria
Response Preparedness		
EPO 10 Maintain capability to implement Operational and Scientific Monitoring	**EPS 10.1** Santos (ABU-W) maintains access to OSMP resources through contracts with service and equipment providers listed in **Attachment B:** Response preparedness, resources and Support summary	**MC 10.1.1** Service provider and equipment provider contracts in place and maintained in accordance with **Attachment B:** Response preparedness, resources and Support summary
Response Implementation		
EPO 11 Implement relevant Operational and Scientific Monitoring Plans	**EPS 11.1** IMT will ensure operational and scientific monitoring initiation criteria are reviewed during the initial Incident Action Plan (IAP) and subsequent IAPs, and if any criteria are met, the relevant Operational Monitoring Plans (OMPs) and/or Scientific Monitoring Plans (SMPs) will be activated	**MC 11.1.1** Records demonstrate that the IMT reviewed operational and scientific monitoring initiation criteria during the initial and subsequent IAPs, and when criteria were met, the relevant OMP and/or SMP was activated
	EPS 11.2 Santos (ABU-W) maintains the capability and capacity to deliver the OSMP through: • OSMP Implementation Plan describes the process for implementing the operational and scientific monitoring programs • Individual OMP and SMP methodology describe data acquisition techniques, personnel and equipment required to conduct OMPs and SMPs	**MC 11.2.1** Records demonstrate OSMP carried out in accordance with the following: • OSMP Implementation Plan • Individual OMP and SMP methodologies

11 RESPONSE IMPLEMENTATION AND TERMINATION PROCESSES

This Plan addresses the initial and ongoing actions in response to the potential spill scenarios outlined in **Section 7.2**. Although AMSA is the Control Agency for vessel-based spills, Santos (ABU-W) may be directed to undertake response activities as part of the response effort and will establish an IMT to coordinate its response.

11.1 Terminating the Response

Terminating the spill response may involve demobilising personnel and equipment from response locations, post-incident reporting, identifying improvement opportunities, reviewing and updating plans and restocking equipment supplies. Scientific monitoring may continue after response operations have ceased and may be used to inform remediation activities.

The decision to terminate response operations will be made by the Control Agency, in accordance with the National Plan (AMSA, 2020). **Figure 11-1** provides guidance on termination activities.

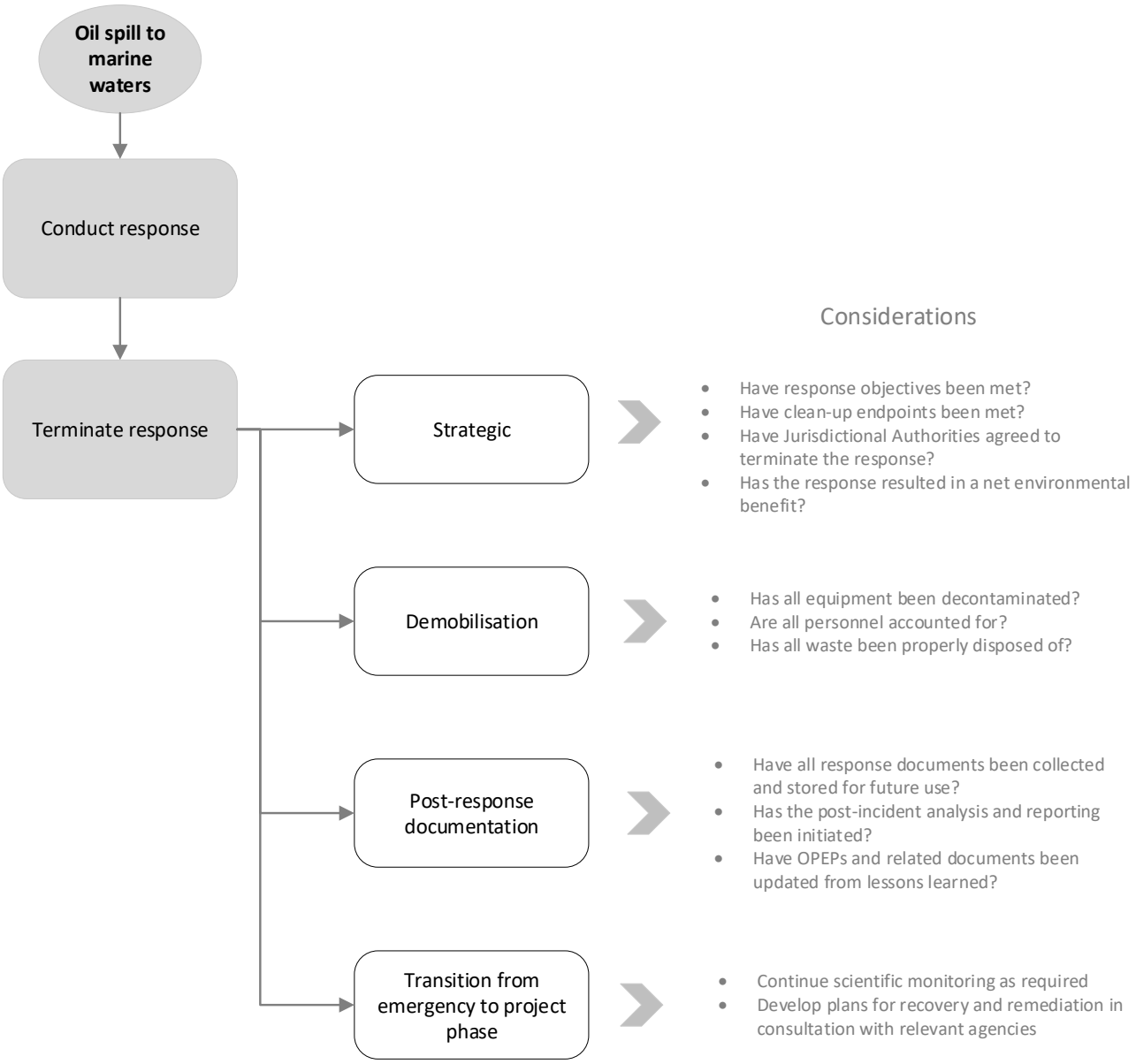


Figure 11-1: Guidance for Response Termination

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ATTACHMENT A - HYDROCARBON CHARACTERISTICS, WEATHERING PROPERTIES AND MODELLING RESULTS

Marine diesel oil (MDO) is a mixture of volatile and persistent hydrocarbons. The oil properties used in the modelling included a density of 829 kg/m^3, API of 37.6, and viscosity of 4 cP (at 25°C). The MDO consists of 6% volatile and 89% semi- to low volatile components with only a 5% contribution of persistent hydrocarbons, which will not readily evaporate. **Table A-01** shows the physical properties and boiling point ranges of the MDO.

When released to the marine environment, the MDO will spread quickly and thin out to low thickness levels, thereby increasing the rate of evaporation. Due to its chemical composition, up to 60% will generally evaporate over the first two days depending upon the prevailing conditions and spill volume.

MDO has a strong tendency to entrain into the upper water column (0 m–10 m) (and consequently reduce evaporative loss) in the presence of moderate winds (> 10 knots) and breaking waves. However, the MDO re-surfaces when the conditions calm.

Table A-01: MDO Characteristics

Hydrocarbon type	Density at 25 °C (kg/m^3)	Viscosity at 25 °C (cP)	Component	Volatile (%)	Semi-volatile (%)	Low volatility (%)	Residual (%)
			BP (°C)	<180	180–265	265–380	>380
MDO	829	4.0	% of total	6	35	54	5

Figure A-01 (below) provides the predicted weathering and fates of a 700m^3 surface release of MDO. By the end of the simulation, 538 m^3 (77% of the total release volume) and 22 m^3 (3%) of the oil was predicted to have evaporated and decayed, respectively. While 137 m^3 (10%) was predicted to remain in the water column. There was no oil predicted on the water surface at the end of the 50-day simulation. The maximum volume of oil ashore occurred on day 9 and was estimated at 6 m^3. At the end of the simulation, the predicted volume ashore was 5.8 m^3 (<1% of the total release volume). The initial shoreline contact was predicted to occur 2.9 days after commencement of the release.

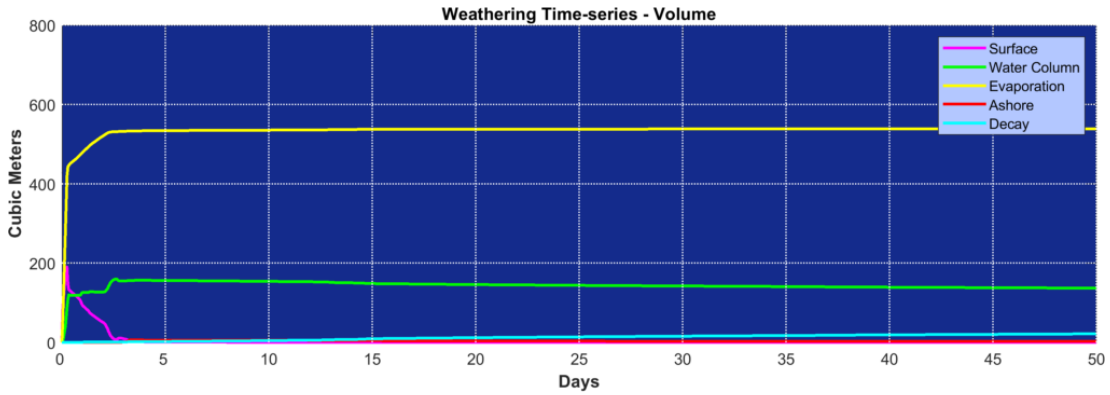

Figure A-01: Predicted Weathering and Fates of 700m^3 surface release of MDO

Figure A-02 presents the predicted weathering and fates of a 1,125m^3 surface release of MDO. By the end of the simulation, 1,072 m^3 (95% of the total release volume) was lost to the atmosphere through evaporation and 35.5 m^3 (3%) of the oil was predicted to have decayed. At the conclusion of the simulation approximately 15 m^3 (2%) was predicted to remain in the water column. There was no oil predicted on the water surface at the end of the 50-day simulation. No shoreline contact was predicted.

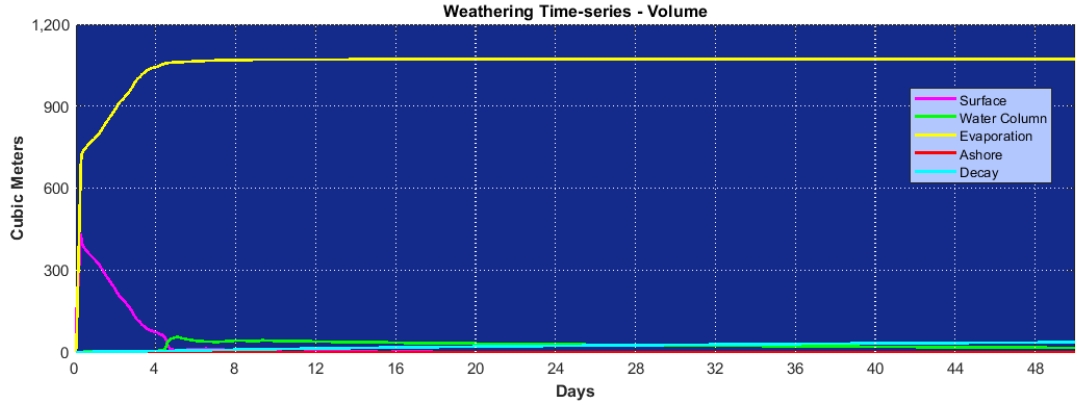

Figure A-02: Predicted Weathering and Fates of 1,125m^3 surface release of MDO

ATTACHMENT B: RESPONSE PREPAREDNESS, RESOURCES AND SUPPORT SUMMARY

Santos (ABU-W) response preparedness, resources and support arrangements for this OPEP are outlined in **Table B-1**. Contact details for each organisation are available through the Santos (ABU-W) Emergency Contacts Directory which contains the contact numbers for external personnel and facilities. The Emergency Contacts Directory is reviewed and updated every six months.

Table B-1: Santos (ABU-W) Spill Response Support Summary

Organisation	Relevant tier	Services provided	Relevant plan	Contract details	Maintenance of capability
AMOSC	Tier 2 and Tier 3	• Manned 24/7 Duty Officer support; • AMOSC Staff availability – 8 staff provided at best endeavours within 3 hours and guaranteed onsite (terrestrially) within 12 hours as per AMOSC website • Equipment availability per monthly status reporting at; http://amosc.com.au/member-login/ & performance indicators as per AMOSC website • Core Group availability per monthly reporting status at; http://amosc.com.au/member-login/ • Mutual aid for equipment per http://amosc.com.au/member-login/ • Access to the National Plan via AMSA within 1 hour on a 24/7 basis • Access to the Fixed Wing Aerial Dispersant capability within 1 hour on a 24/7 basis • Access to RPS Trajectory Modelling within 60 minutes	AMOSPlan	Santos holds a current agreement and pays an annual participating company subscription	Monthly AMOSC Core Group report for personnel availability distributed to member companies monthly Annual Joint Industry Audit by member companies, including auditing of systems, controls, competencies and equipment stockpiles

Organisation	Relevant tier	Services provided	Relevant plan	Contract details	Maintenance of capability
		• Access to KSAT Satellite imagery within 60 minutes of notification – imagery to be determined at the time of request will dictate supply timeframes depending on satellite availability			
	Mobilisation	Refer to **Table 5-1** for activation instructions.			
OSRL	Tier 2 and Tier 3	Contracted oil spill response equipment and personnel appropriate to the required tier to support response strategy deployment, satellite surveillance and operational monitoring. As a member of OSRL, Santos has access to OSRL's full range of equipment[1] and is entitled to 50% of the OSRL global stockpile	N/A	Santos holds a current service agreement and pays an annual subscription	OSRL conduct an annual self-audit
	Mobilisation	Refer to **Table 5-1** for activation instructions.			
RPS Group	All Tiers	Spill modelling to determine real-time predictions at the time of the spill. The spill trajectory and probability information is used in planning and implementing response options.	N/A	313169.MSA.AUSW.COPA	RPS Group maintain records of call outs and time to respond with initial results.

[1] OSRL's full inventory of equipment can be found at https://www.oilspillresponse.com/globalassets/technical-library/publications-2017/2017-mobilisation-fact-file.pdf

Organisation	Relevant tier	Services provided	Relevant plan	Contract details	Maintenance of capability
	Mobilisation	Santos has an agreement in place with RPS 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 Tier 1. AMOSC can also run modelling on behalf of Santos, if required, as part of contracting arrangements with RPS. Refer to **Table 5-1** for activation instructions.			
AMSA	Tier 2 or 3	AMSA manage the National Plan and can provide both oil spill response equipment and personnel as appropriate, for Commonwealth waters.	The National Plan, for Maritime Environmental Emergencies	N/A	AMSA coordinates National Plan exercises to test and assess the preparedness of Commonwealth, State and Territory responders under the National Plan.
	Mobilisation	Refer to **Table 6-1** for activation instructions.			
Mermaid Marine Tidewater	All Tiers	Supply vessels to convey and deploy oil spill equipment.	N/A	309621.VCA.AUSW.COPA MMA Offshore Vessel Operations COPA.MAA.84556 Tidewater Marine International	Santos (ABU-W) Australia holds contract for exclusive use and vessels are available 24/7

Organisation	Relevant tier	Services provided	Relevant plan	Contract details	Maintenance of capability
	Mobilisation	IMT IC to mobilise as per contract arrangements.			
Aerial surveillance contractors	Tier 2 and 3	Aerial logistical support for aerial surveillance and spill assessment.	N/A	Additional logistical support provided by the Santos (ABU-W) IMT	Santos (ABU-W) Australia holds contract for exclusive use and aircraft are available 24/7
	Mobilisation	Helicopter aerial surveillance aircraft will be contracted through Babcock Helicopters. Additional aviation support may be provided through AMSA.			
Waste management contractor	All Tiers	Waste and hazardous waste collection and disposal, including oily water.	Bayu-Undan Decommissioning Waste Management Strategy (DCOM-453-EN-STR-00001	Veolia Waste Management (primary waste manager) (ABU-WA.MAA.62230) Toll (ABU-WA.MAA.38829)	
	Mobilisation	IMT IC to mobilise as per contract arrangements			

Organisation	Relevant tier	Services provided	Relevant plan	Contract details	Maintenance of capability
Environmental Service Provider(s)	Tier 2/3	Deliver the activated OMPs and SMPs for the duration of the Project. The services will include operational readiness to enable fast deployment of personnel and resources during a response.	ABU OSMP (ALL/HSE/PLN/032)	Environmental Service Provider Panel Contractors: Jacobs (COPA.MSA.317582) CDM Smith (COPA.MSA.317581) ERM (COPA.MSA.317580)	Conduct quarterly capability checks of key providers.
	Mobilisation	IMT IC to give direction to the EUL to mobilise as per contract arrangements			

ATTACHMENT C: AERIAL SURVEILLANCE OBSERVATION LOG

Date	Incident	Aircraft type	Call sign	Start time	End time	Av altitude/ air speed
Wind speed (kts)	**Wind direction**	**Visibility (nm)**	**Cloud base (ft)**	**Sea state**	**Observer name/s**	**Spill source**
Survey start /end coordinates	**Survey start time**	**Survey end time**	**Time high tide**	**Time low tide**	**Current speed (nm)**	**Current direction**
Notes (e.g. wildlife or sensitive receptors observed, any response activities observed):						

SLICK DETAILS

Slick	Time local	Slick (centre or start)		Slick (end)		Slick Orient Degrees	Oil slick length			Oil slick width			Area km^2	Coverage %	Oiled area km^2
		LAT N/S	LONG E/W	LAT N/S	LONG E/W		SOG KT	Time seconds	Distance km	SOG KT	Time seconds	Distance km			
A															
B															
C															
D															
E															

Slick	Oil appearance coverage - %						Minimum volume - m^3	Maximum volume - m^3	Type of detection (etc. visual, IR)	Edge description (clear or blurred)	General description (windrows/patches)	The Bonn Agreement Oil Appearance Code (BAOAC)			
	1	2	3	4	5	other						No	Oil appearance	Min. Volume m3 / km2	Max. Volume m3 / km2
A															

B												1	Sheen	0.04	0.30
C												2	Rainbow	0.30	5.00
D												3	Metallic	5.00	50.0
E												4	Discontinuous true colour	50.0	200
												5	True colour	200	>200

NOTE: Ground Speed (SOG) is the speed of the aircraft relative to the ground (sea) measured in knots (kt). One knot is one nautical mile (nm) per hour. 1 kt = 1 nm per hour = 1.85 Kilometres (km) per hour = 0.03 km (31m) per minute = 0.0005 km per second

ATTACHMENT D: OPERATIONAL AND SCIENTIFIC MONITORING PLANS

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time
Operational Monitoring Plans					
OMP01	Hydrocarbon spill modelling	To utilise computer-based and first principal forecasting methods to predict spill movement and guide the management and execution of spill response operations to maximise the protection of environmental and other resources at risk.	• Tier 2 or tier 3 hydrocarbon spill tor marine or coastal waters	• The IMT/EMT Incident Commander (or delegate) considers that continuation of monitoring under this OMP will not result in a change to the scale or location of active response options; or • The IMT/EMT Incident Commander (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; or • This OMP is no longer contributing to or influencing spill response decision-making; or • Relevant scientific monitoring components initiation criteria have been triggered.	• < 2 hours after OMP initiated
OMP02	Hydrocarbon properties and weathering	To provide in field information on the hydrocarbon properties, behaviour and weathering of the spilled hydrocarbon to	• Tier 2 or tier 3 hydrocarbon spill	• The IMT Incident Commander (or delegate) considers that continuation of monitoring	• Preparation to deploy field personnel and equipment will commence on

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time
	behaviour at sea	assist in spill response activities		under this OMP will not result in a change to the scale or location of active response options; or • The IMT Incident Commander (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; or • This OMP is no longer contributing to or influencing spill response decision-making; or • Relevant scientific monitoring components initiation criteria have been triggered.	notification from Santos (ABU-W) IMT that the OMP has been triggered • Deployment of field personnel and equipment into the field within 7 days of receipt of notification
OMP03	Pre-emptive assessment of sensitive receptors at risk	To undertake a rapid assessment of the presence, extent and current status of sensitive receptors based on a desktop review, prior to contact from a hydrocarbon spill	• A probable hydrocarbon impact (or impact of dispersed hydrocarbon) on a resource, habitat or shoreline is anticipated on the	• Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; or	< 24 hours

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time
			basis of trajectory modelling or other assessment of the incident; or • Damage to a natural resource or sensitive receptor is possible as a result of that impact	• The assessment of sensitive receptors that were identified as being potentially impacted/contact by the hydrocarbon spill are completed	
OMP04	Shoreline clean-up assessment technique (SCAT)	To provide in field information on the physical and biological characteristics of shorelines within the predicted trajectory of the hydrocarbon spill or that have been exposed to the spill. It also provides a baseline for determining the effectiveness of the response	• The Santos (ABU-W) IMT has determined that Tier 2 or 3 hydrocarbon spill to marine or coastal waters has occurred; and • Analysis of data from hydrocarbon spill modelling, monitoring, evaluation and/or surveillance predicts an exposure of hydrocarbon to shoreline habitat; or • Relevant response activities are being undertaken	• This OMP will not result in a change to the scale or location of active response options; or • Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; or • Continuation of monitoring of this OMP is likely to increase overall environmental impact; or • Relevant scientific monitoring components initiation criteria have been triggered	• Preparation to deploy field personnel and equipment will commence on notification from Santos (ABU-W) IMT that the OMP has been triggered • Deployment of field personnel and equipment into the field within 7 days of receipt of notification

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time
OMP05	Water quality assessment	To provide a rapid assessment of the presence, type, concentrations and character of hydrocarbons and dispersants (if applicable) in marine water to assess the extent of spill contact and verify trajectory predictions to inform other monitoring plans	• The Santos (ABU-W) IMT has determined that Tier 2 or 3 hydrocarbon spill to marine or coastal waters has occurred	• The IMT Incident Commander (or delegate) considers that continuation of monitoring under this OMP will not result in a change to the scale or location of active response options; or • The IMT Incident Commander (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; or • The spill is or is likely to be below visible criteria for surface hydrocarbon and low thresholds for entrained and dissolved hydrocarbon concentrations; or • The Monitoring Coordinator (or delegate) considers that continuation of monitoring under this OMP is likely to increase overall	• Preparation to deploy field personnel and equipment will commence on notification from Santos (ABU-W) IMT that the OMP has been triggered. • Deployment of field personnel and equipment into the field within 7 days of receipt of notification

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time
				environmental impact; or • Relevant scientific monitoring components initiation triggers have been assessed	
OMP06	Sediment quality assessment	To provide a rapid assessment of the presence, type, concentrations and character of hydrocarbons in marine sediments to assess the extent of spill contact and verify trajectory predictions to inform other monitoring plans	• The Santos (ABU-W) IMT has determined that Tier 2 or 3 hydrocarbon spill to marine or coastal waters has occurred; and • Modelling and/or analysis of data from surveillance activities predicts an exposure of hydrocarbon to marine and/or coastal sediment	• The IMT Incident Commander (or delegate) considers that continuation of monitoring under this OMP will not result in a change to the scale or location of active response options; or • The IMT Incident Commander (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; or • The Monitoring Coordinator (or delegate) considers that continuation of monitoring under this OMP is likely to increase overall environmental impact; or • Relevant scientific	• Preparation to deploy field personnel and equipment will commence on notification from Santos (ABU-W) IMT that the OMP has been triggered. • Deployment of field personnel and equipment into the field within 7 days of receipt of notification

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time
				monitoring components initiation triggers have been assessed	
OMP07	Marine fauna assessment	To undertake a rapid assessment of marine fauna at risk to assist in decisions on appropriate management and response actions during a hydrocarbon spill event to minimise the potential impact on marine fauna	• The IMT/EMT has determined that Tier 2 or 3 hydrocarbon spill to marine or coastal waters has occurred, and • Modelling and/or analysis of data from surveillance activities predicts, or has reported, an exposure of hydrocarbon to known sensitive fauna habitat	• The IMT/EMT Incident Commander (or delegate) considers that continuation of monitoring under this OMP will not result in a change to the scale or location of active response options; or • The IMT/EMT Incident Commander (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; or • The Monitoring Coordinator (or delegate) considers that continuation of monitoring under this OMP is likely to increase overall environmental impact; or • Relevant scientific monitoring components initiation triggers have	• Preparation to deploy field personnel and equipment will commence on notification from Santos (ABU-W) IMT that the OMP has been triggered • Deployment of field personnel and equipment into the field within 7 days of receipt of notification

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				been assessed	
OMP 8	Air quality modelling (responder health and safety)	To assess the impact of the hydrocarbon spill on human health, particularly that of the public and response personnel	• The Santos (ABU-W) IMT has determined that Tier 2 or 3 hydrocarbon spill to marine or coastal waters has occurred; and • Response activities that may pose a risk to the air quality of response personnel and/or public will occur	• Completion of the gas, vapour and hydrocarbon discharge, hydrocarbon containment and recovery, dispersant operations and shoreline clean-up activities; or • Continuing hazardous and noxious plume detection and monitoring has a low probability of contributing or influencing spill response decision making	• Commence within 12 hours
Scientific Monitoring Plans					
SMP01	Water quality impact assessment	Detect and monitor the presence, concentration and persistence of hydrocarbons in marine waters following the spill and associated response activities. The specific objectives of this SMP are as follows: • Assess and document the temporal and spatial distribution of hydrocarbons and dispersants in marine waters; and	• Operational monitoring has indicated that contact on a sensitive resource is possible and it is considered likely that ongoing (scientific) monitoring of impacts will be required, supported by scientifically rigorous water quality monitoring;	• Hydrocarbon concentrations in marine waters are below benchmark levels which can be defined as: ○ ANZECC Water Quality Objectives for the Protection of Aquatic Ecosystems, or ○ The relevant regulatory site-specific trigger level (where these exist);	• Preparation to deploy field personnel and equipment will commence on notification from Santos (ABU-W) IMT that the SMP has been triggered. • Deployment of field personnel and equipment into the field within 7 days of receipt of notification

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time
		• Consider the potential sources of any identified hydrocarbons; and • Verify the presence and extent of hydrocarbons (both on water and in water) that may be directly linked to the source of the spill; and • Assess hydrocarbon/dispersant content of water samples against accepted environmental guidelines or benchmarks to predict potential areas of impact; and • Provide information that may be used to interpret potential cause and effect drivers for environmental impacts recorded for sensitive receptors monitored under other SMPs	or • Water quality monitoring (OMP04) has identified hydrocarbon and/or dispersant concentrations exceed accepted guidelines and benchmarks; or • Chemical dispersants have been applied as part of the spill response program	or ○ Below baseline levels, or ○ Reference site values (whichever is applicable); or • When appropriate, meaningful and defensible scientific monitoring results have been achieved for marine waters	
SMP02	Sediment quality impact assessment	Detect and monitor the presence, concentration and persistence of hydrocarbons in sediments following the spill and associated response	• Sediment quality monitoring (OMP05) has identified hydrocarbon concentrations	• All hydrocarbon concentrations in sediments are below benchmark levels, which can be defined as:	• Preparation to deploy field personnel and equipment will commence on notification from

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time
		activities. The specific objectives of this SMP are as follows: • Assess and document the temporal and spatial distribution of hydrocarbons in marine sediments; and • Consider the potential sources of any identified hydrocarbons; and • Verify the presence and extent of hydrocarbons that may be directly linked to the source of the spill; and • Assess hydrocarbon content of sediment samples against accepted environmental guidelines or benchmarks to predict potential areas of impact; and • Provide information that may be used to interpret potential cause and effect drivers for environmental impacts recorded for sensitive receptors monitored under other	exceed accepted guidelines and benchmarks; and • Operational monitoring has indicated that an impact on a sensitive resource that is closely linked to marine sediments is possible, and it is considered likely that ongoing (scientific) monitoring of a biological parameter will be required that supported by scientifically rigorous sediment quality monitoring	○ Revised ANZECC/ARMCANZ sediment quality guidelines related to petroleum hydrocarbons (Simpson et al.,2013); or ○ The relevant regulatory site-specific trigger level (where these exist); or ○ Below baseline levels; or ○ Reference site values (whichever is applicable); or • No ongoing impacts to biological receptors can be linked to sediment quality	Santos (ABU-W) IMT that the SMP has been triggered. • Deployment of field personnel and equipment into the field within 7 days of receipt of notification

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time
		SMPs			
SMP03	Intertidal and coastal habitat assessment	To assess the impact (extent, severity, and persistence) and subsequent recovery of intertidal and coastal habitats and associated biological communities in response to a hydrocarbon release and associated response activities	• Operational monitoring predicts or confirms exposure of coastal or intertidal habitats or communities to hydrocarbons	• There has been no demonstrable impact to coastal and intertidal habitats and associated biological communities (confirmation that habitats and species were not exposed to hydrocarbons); or • Measured parameters of coastal and intertidal habitats and associated biological communities impacted by hydrocarbons spills have returned to within the expected natural dynamics of baseline state (taking into account natural variability) and/or reference sites	• Preparation to deploy field personnel and equipment will commence on notification from Santos (ABU-W) IMT that the SMP has been triggered • Deployment of field personnel and equipment into the field within 7 days of receipt of notification
SMP04	Benthic habitat assessment	To assess the impact (extent, severity, and persistence) and subsequent recovery of subtidal benthic habitats and associated biological communities in response to a hydrocarbon release and	• Operational monitoring predicts or confirms exposure of benthic habitats or communities to hydrocarbons	• There has been no demonstrable impact to benthic habitats and associated biological communities (confirmation that benthic habitats were not exposed	• Preparation to deploy field personnel and equipment will commence on notification from Santos (ABU-W) IMT

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time
		associated response activities		to hydrocarbons); or • Measured parameters of benthic habitats and associated biological communities impacted by hydrocarbons spills have returned to within the expected natural dynamics of baseline state (taking into account natural variability) and/or reference sites.	that the SMP has been triggered • Deployment of field personnel and equipment into the field within 7 days of receipt of notification
SMP05	Seabird and shorebird assessment	Document and quantify shorebird and seabird presence; and any impacts and potential recovery from hydrocarbon exposure. The objectives are to: • Identify and quantify, if time allows, the post-spill/pre-impact presence and status (e.g. foraging and/or nesting activity) of shorebirds and seabirds in the study area; and • Observe, and if possible quantify and assess, the impacts from exposure of shorebirds and seabirds to hydrocarbons (i.e.	• Operational monitoring predicts contact is possible to seabirds or shorebird populations or any of their habitats of importance for breeding, nesting or foraging; or • Operational monitoring has identified contact or an impact to seabirds or shorebird populations as a result of the hydrocarbon spill; or	• There has been no demonstrable evidence of an impact on seabirds and/or shorebirds or key biological activities from the hydrocarbon spill; or • Key seabird and shorebird behaviour and breeding activities have been quantified in the zone of exposure and are comparable to reference sites; or • Measured parameters have returned to baseline conditions (taking into account natural variability) in terms of	• Preparation to deploy field personnel and equipment will commence on notification from Santos (ABU-W) IMT that the SMP has been triggered • Deployment of field personnel and equipment into the field within 7 days of receipt of notification

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		post-impact) and to the response activities, including abundance, oiling, mortality, and sub-lethal effects; and • Identify, quantify and evaluate the post-impact status and if applicable, recovery of key behaviour and breeding activities of shorebirds and seabirds (e.g. foraging and/or nesting activity and reproductive success) over time and with regard to reference sites	• There are reports or scientific evidence of oiled seabirds or shorebird populations	breeding population (for seabirds) or counts (for shorebirds) and impacts on species and taxa are no longer detectable, with regard to reference sites	
SMP06	Marine mega-fauna assessment	Document and quantify the status and recovery of marine megafauna related to a hydrocarbon spill. The objectives are to: • Observe and quantify the post-impact presence of marine megafauna within the areas that have been exposed to the hydrocarbon spill; and • Observe and record any changes in the levels of	• Operational monitoring predicts contact is possible to marine megafauna populations or any of their habitats of importance for breeding or foraging; or • Operational monitoring has identified contact or an impact to marine megafauna	• There has been no demonstrable evidence of an impact on marine megafauna or key biological activities from the hydrocarbon spill; or • The extent of damage of impacted marine mega-fauna has been quantified; and • Key biological processes (e.g. abundance, distribution, breeding) are	• Preparation to deploy field personnel and equipment will commence on notification from Santos (ABU-W) IMT that the SMP has been triggered • Deployment of field personnel and equipment into the field within 7 days of receipt of notification

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		marine fauna stranding's; and • Assess and quantify lethal and/or sub-lethal impacts to indicator marine megafauna species (e.g. behaviour, body condition changes, disease level changes, reproductive success) directly related to the spill or related response activities; and • Identify, quantify and evaluate the post-impact status and if applicable, recovery of key biological activities (e.g. foraging activity, breeding etc.) for indicator marine megafauna; and • Investigate short term or long term environmental effects on marine megafauna which may have resulted from a hydrocarbon spill	populations as a result of the hydrocarbon spill; or • There are reports or scientific evidence of oiled marine megafauna	similar to pre-spill or reference sites	
SMP07	Demersal fish assessment	To assess the impacts to and subsequent recovery of demersal fish assemblages (for which baseline fish assemblage	• Operational monitoring predicts or confirms exposure to habitats known to	• There has been no demonstrable impact on fish and fish assemblage structure; or	• Preparation to deploy field personnel and equipment will commence on

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time
		data exist) in response to a hydrocarbon release and associated response activities. The specific objectives of this SMP are as follows: • Characterise the status of resident fish populations associated with habitats monitored in SMP04 (for which baseline fish assemblage data exist) that are exposed/contacted by released hydrocarbons; and • Quantify any impacts to species (e.g. abundance, richness and density) and resident fish assemblage structure (representative functional trophic groups); and • Determine and monitor the impact of the released hydrocarbons and potential subsequent recovery to residual demersal fish assemblages.	support demersal fish assemblages.	• Measured parameters of fish, fish habitat, and/or fish assemblage structure impacted by hydrocarbon spills have returned to within the expected natural dynamics of baseline state and/or reference sites.	notification from Santos (ABU-W) IMT that the SMP has been triggered • Deployment of field personnel and equipment into the field within 7 days of receipt of notification

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SMP08	Fisheries assessment	To monitor potential contamination and tainting of important finfish and shellfish species from commercial, aquaculture and recreational fisheries to evaluate the likelihood that a hydrocarbon spill will have an impact on the fishing and/or aquaculture industry. The specific objectives of this SMP are as follows: • Assess any physiological impacts to important fish and shellfish species and if applicable, seafood quality and safety; and • Assess targeted fish and shellfish species for hydrocarbon contamination; and • Provide information that can be used to make inferences on the health of fisheries and the potential magnitude of impacts to fishing industries (commercial, aquaculture and recreational)	• Operational monitoring predicts contact is possible to commercial, recreational, traditional species and or aquaculture species; or • Advice has been provided to government to restrict, ban or close a fishery; or • Declarations of intent by commercial fisheries or government agencies to seek compensation for alleged or possible damage	• Contamination in the edible portion or in the stomach/intestinal contents attributable to the spill is no longer detected; or • No differences are detected in commercial, recreational or aquaculture fisheries from reference and impact sites; or • The physiological and biochemical parameters of commercial, traditional, recreational or aquaculture species are comparable between reference and impact sites; or • Evidence that catch rates, species composition, community abundance, distribution and age structure of commercial fisheries and by-catches have returned to baseline levels (taking into account natural variability); or	• Preparation to deploy field personnel and equipment will commence on notification from Santos (ABU-W) IMT that the SMP has been triggered • Deployment of field personnel and equipment into the field within 7 days of receipt of notification

Plan	Title	Aim	Initiation Criteria	Termination Criteria	Approximate mobilisation time
				• Agreement has been reached with the relevant Jurisdictional Authorities to cease monitoring of fisheries	