WESTERN GAS

SASANOF-1 EXPLORATION DRILLING PROGRAM

OIL POLLUTION EMERGENCY PLAN

Document No.:	**WG-EHS-PLN-003**	**Revision:**	**3**
Revision Date:	**November 2021**	**Copy No:**	**N/A**

DOCUMENT INFORMATION

Document No:	WG-EHS-PLN-003	**Revision:**	3
Document Owner:	Western Gas Sasanof-1 Project Manager		

REVISION HISTORY

Rev.	Description	Prepared by	Reviewed by	Approved by	Date
0	For public comment submission to NOPSEMA	PH	MS	PR	7/7/21
1	Incorporating consultation and feedback from public comments	PH	CM	RB	18/8/21
2	Incorporating responses from NOPSEMA RFI	PH	LD	CM	15/10/21
3	Incorporating responses from NOPSEMA OMR	PH	LD	CM	22/11/21

TABLE OF CONTENTS

Contents

FIGURES

TABLES

ACRONYMS

Abbreviation	Description
AHS	Australian Hydrographic Service
AIIMS	Australasian Inter-Service Incident Management System
AMOSC	Australian Marine Oil Spill Centre
AMSA	Australian Maritime Safety Authority
BOP	Blowout Preventer
CAA	Company Approved Authority
CMT	Crisis Management Team
CMP	Crisis Management Plan
DAWE	Department of Agriculture, Water and the Environment
DBCA	Department of Biodiversity, Conservation and Attractions
DEE	Department of Environment and Energy
DIMT	Drilling Incident Management Team
DISER	Department of Industry, Science, Energy and Resources
DMIRS	Department of Mines, Industry, Regulation and Safety
DoT	Department of Transport
DWER	Department of Water and Environment Regulation
EMBA	Environment that May Be Affected
EP	Environmental Plan
EPBC	Environment Protection and Biodiversity Conservation
ERP	Emergency Response Plan
HMA	Hazard Management Agency
IAP	Incident Action Plan

Abbreviation	Description
IC	Incident Commander
ICR	Incident Command Room
JRCC	Joint Rescue Coordination Centre
JSCC	Joint Strategic Coordination Committee
LOWC	Loss of Well Control
MARPOL	International Convention for the Prevention of Pollution from Ships
MDO	Marine Diesel Oil
MEE	Maritime Environmental Emergencies
MEECC	Maritime Environmental Emergency Coordination Centre
MEER	Maritime Environmental Emergency Response
MES	Monitoring, Evaluation and Surveillance
NES	Matters of National Environmental Significance
MODU	Mobile offshore Drilling Unit
MoU	Memorandum of Understanding
NEBA	Net Environmental Benefit Analysis
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Authority
OIM	Offshore Installation Manager
OMP	Operational Monitoring Plan
OPEP	Oil Pollution Emergency Plan
OPGGS	Offshore Petroleum and Greenhouse Gas Storage

Abbreviation	Description
OPGGS(E)R	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations
ORT	On-site Response Teams
OSMP	Operational and Scientific Monitoring Plan
OSRL	Oil Spill Response Ltd
OSTM	Oil Spill Trajectory Modelling
OSWMP	Oil Spill Waste Management Plan
OWR	Oiled Wildlife Response
ROV	Remotely Operated Vehicle
SCERP	Source Control Emergency Response Plan
SFRT	Subsea First Response Toolkit
SMP	Scientific Monitoring Plan
SMPC	State Marine Pollution Coordinator
SOPEP	Ship Oil Pollution Emergency Plan
WA	Western Australia
WAOWRP	Western Australian Oiled Wildlife Response Plan
WOMP	Well Operations Management Plans

1 INTRODUCTION

1.1 ACTIVITY DESCRIPTION

Western Gas (519P) Pty Ltd (Western Gas) proposes to undertake a single-well exploration drilling program (Sasanof-1) in permit area WA-519-P, targeting a gas condensate reservoir in the Carnarvon Basin in the North West Shelf (Figure 1-1).

The permit area is wholly within offshore Commonwealth waters, approximately 335 km west of Karratha, Western Australia (WA), in water depths of approximately 1070 m. The Operational Area is defined as a 3 km x 3 km area centered on the planned Sasanof-1 well location with a duration of 25 days after which the well will be plugged and abandoned (P&A).

The drilling activity will be carried out using a semi-submersible mobile offshore drilling unit (MODU) with support vessels and helicopters. The EP covers the drilling activities and all MODU, vessel and helicopter operations within the Operational Area (the activity). A 500 m Petroleum Safety Zone will be established around the Sasanof-1 well location. Refer to Section 3 of the Sasanof-1 Exploration Drilling EP (WG-EHS-PLN-002) for detail on the activity.

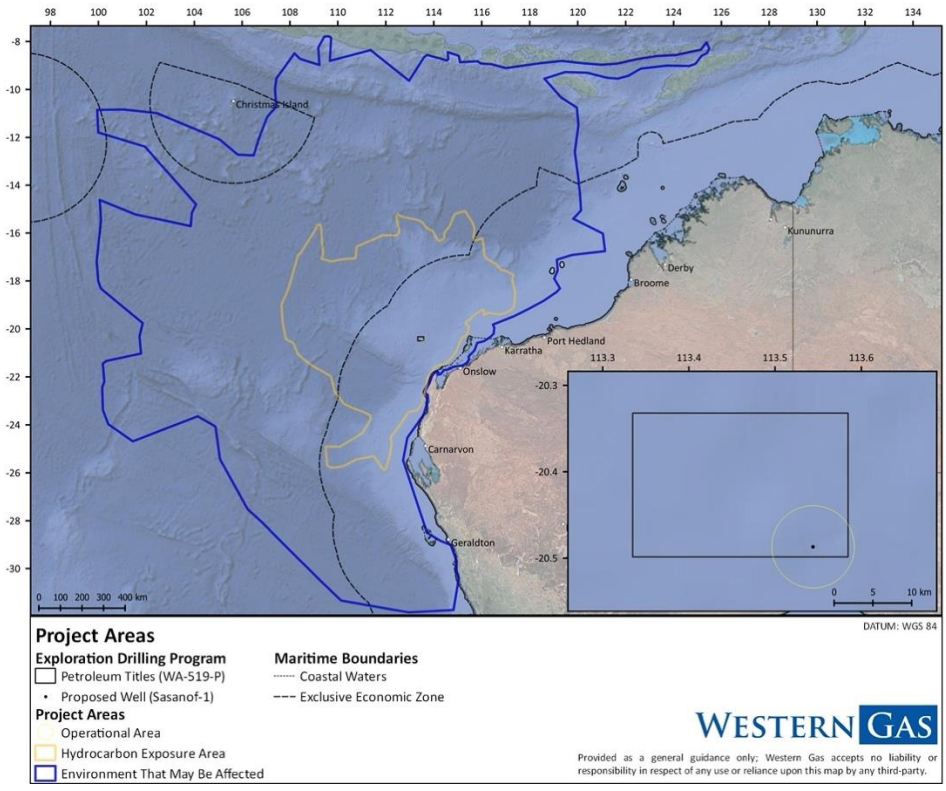


Figure 1-1 Location of Exploration Permit WA-519-P and Sasanof-1 well

1.2 PURPOSE

This Oil Pollution Emergency Plan (OPEP) has been prepared in accordance with Regulation 14(8) and Regulation 14(8AA) of the *Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (OPGGS(E)R). The OPEP has been prepared to integrate with the National Plan for Maritime Environmental Emergencies (National Plan) and the Western Australian (WA) State Hazard Plan: Maritime Environmental Emergencies (MEE).

This OPEP is designed to be an operational response document used in the event of a hydrocarbon spill event associated with Western Gas' exploration drilling activities in WA-519-P, as described in the Sasanof-1 Exploration Drilling Program Environment Plan (WG-EHS-PLN-002) (the EP).

The objectives of this OPEP are to:

- Support the timely implementation of pre-determined response strategies as outlined in this OPEP.
- Ensure that the management of the response is consistent with the Commonwealth National Plan for Maritime Environmental Emergencies (National Plan), the Western Australian (WA) State Hazard Plan: Maritime Environmental Emergencies (MEE) and the Australian Industry Cooperative Oil Spill Response Arrangements (AMOSPlan).
- Ensure effective integration and use of industry/government response efforts and resources.
- Ensure Western Gas has timely access to appropriately trained people and resources in order to effectively respond to and manage an oil spill response.

1.3 SCOPE

Western Gas identified two potential hydrocarbon spill scenarios that have the potential to require a coordinated spill response, as outlined in this OPEP:

- A vessel loss of containment resulting in a release of Marine Diesel Oil (MDO) to the sea surface.
- A spill from the Mobile Offshore Drilling Unit (MODU), the worst-case scenario being a total loss of well control (LOWC) resulting in a subsea release of gas and condensate.

Excluded from the scope of this OPEP are vessels transiting to or from the Operational Area (as described in the EP). These vessels are deemed to be operating under the Commonwealth *Navigation Act 2012* and not engaged in petroleum-related activity.

1.4 SPILL RESPONSE AND OPEP STRUCTURE

The structure of this OPEP is organised to follow the sequence of response activities (Figure 1-2).

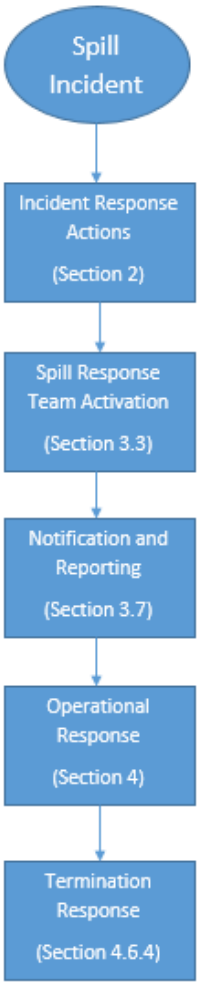


Figure 1-2 Spill Response Actions and Requirements

2 INITIAL RESPONSE GUIDES

The following initial response guides include immediate actions to be undertaken following the detection of a spill from a vessel (Table 2-1) or associated with a loss of containment from the MODU, the worst-case scenario being a total LOWC incident (Table 2-2).

Table 2-3 also includes actions in the initial phase of spill response to guide the Incident Commander (IC) and AGR Drilling Incident Management Team (DIMT) following activation.

These initial response guides are intended as guides only and are not considered an exhaustive list of actions that will be undertaken – they are subject to change based on the specific parameters and conditions at the time of the incident.

The initial response guides are consistent with the strategic response priorities detailed in the National Plan and WA State Hazard Plan – Maritime Environmental Emergencies (refer also to Section 4.6.1 of this OPEP). In the initial phase of a spill, the primary protection priority is human health and safety.

2.1 INITIAL RESPONSE GUIDE – SPILL FROM VESSEL

Table 2-1: Initial Response Guide – MDO Spill from Vessel

Step	Action	Responsibility	Indicative Timing	Additional Information
1	On discovery of a spill from the vessel - notify the Vessel Master	Spill Observer	Immediate	SOPEP
2	Manage the safety of all personnel Secure sources of ignition and alert all personnel (appropriate to the level of the spill)	Vessel Master	Immediate	SOPEP
3	If safe, stop the spill through source control actions Assess incident and prevent further spillage if possible / safe	Vessel Master	Immediate	SOPEP
4	Determine spill parameters: • What is it - oil type/group/properties? • Where is it - lat/long, leading edge (if known) • How big is it - area/volume? • What is happening to it - status of release i.e. continuing or under control? • Weather conditions at site (wind/currents)	Vessel Master	As soon as practible	SOPEP
5	Determine Spill Response Level required: Level 1 or 2: • If Level 1: Vessel Master to act as Incident Commander and refer to SOPEP • If Level 2: Contact AGR Drilling Supervisor who will contact AGR Drilling Superintendent to request DIMT Leader assume role of Incident Commander, with Vessel Master becoming On-scene Commander	Vessel Master	As soon as practible	SOPEP / OPEP
6	In the event of a significant (Level 2) spill, deploy the oil spill tracking Buoy(s), following the deployment instructions	Vessel Master	As soon as practicable	
7	Complete tasks outlined in Table 2-3 – Initial Response Guide – IC and DIMT	Vessel Master / AGR Drilling Superintendent	Refer to Table 2-3	Section 2.3
8	Continue to assess spill parameters - provide regular reports to the IC regarding appearance and behaviour of surface spill, weather (surface wind speed, direction, sea state, current speed and direction), tidal conditions and any changes to release status	Vessel Master	Ongoing until terminated	SOPEP

2.2 INITIAL RESPONSE GUIDE – SPILL FROM MODU (LOWC)

Table 2-2: Initial Response Guide – Gas Condensate Spill from MODU

Step	Action	Responsibility	Indicative Timing	Additional Information
1	On discovery of a hydrocarbon release - immediately notify the Offshore Installation Manager (OIM).	Spill Observer	Immediate	MODU ERP
2	Activate MODU Emergency Response Plan (ERP) and this OPEP. Notify AGR Drilling Supervisor.	OIM	As soon as practicable	MODU ERP
3	Manage the safety of all personnel. Secure sources of ignition and alert all personnel (appropriate to the level of the spill).	OIM	Immediate	MODU ERP
4	If safe, stop the spill through source control actions. Assess incident and prevent further spillage if possible / safe.	OIM	Immediate	MODU ERP Section 4.2
5	Determine spill parameters and issue POLREP: • What is it - oil type/group/properties? • Where is it - lat/long, leading edge (if known)? • How big is it - area/volume? • What is happening to it - status of release i.e. continuing or under control? • Weather conditions at site (wind/current)?	OIM or delegate	As soon as practible	Section 4.3
6	Determine Spill Response Level required: Level 2 or 3: Contact AGR Drilling Superintendent and confirm he will assume role of Incident Commander Rig OIM assuming role of On-scene Commander in consultation with the with AGR Drilling Supervisor.	AGR Drilling Supervisor / OIM	ASAP but within 30 minutes of notification	Section 3.1
7	Issue alerts and initiate spill tracking: • Deploy the Oil Spill Tracking Buoy following the deployment instructions; • Alert support vessels; • Alert supply base; and • Alert helicopters provider.	AGR Drilling Supervisor / OIM or delegate	As soon as practible	Section 4.3
8	Complete tasks outlined in Table 2-3 – Initial Response Guide – IC and DIMT.	AGR Drilling Superintendent	Refer Table 2-3	Section 2.3
9	Initiate Source Control – activate Source Control Emergency Response Plan (SCERP).	AGR Drilling Supervisor / OIM / IC	As soon as practicable	Section 4.2
10	Provide regular SITREPs to the DIMT IC (as agreed) regarding the appearance and behaviour of surface spill.	AGR Drilling Supervisor / OIM or delegate	Ongoing as agreed with IC	Section 4.6

Step	Action	Responsibility	Indicative Timing	Additional Information
	and weather (surface wind speed, direction, sea state, current speed and direction) and tidal conditions			

2.3 INITIAL RESPONSE GUIDE – INCIDENT COMMANDER AND DIMT

Table 2-3: Initial Response Guide – IC and DIMT

Step	Action	Responsibility	Indicative Timing	Additional Information
1	Upon notification from site, determine if Incident Commander role being assumed by shoreside (AGR Drilling Superintendent. If yes, Vessel Master / AGR Drilling Supervisor assuming role of On-scene Commander in consultation with the Rig OIM. If no, AGR Drilling Superintendent to monitor situation pending change in status of response.	Incident Commander.	On notification	Section 3.5
2	Notify DIMT members to standby or mobilise to Incident Command Room (ICR) and set up Incident Control Room and advise Western Gas Duty CMT Manager.	Incident Commander.	90 minutes from notification	Section 3.3
3	Establish a reliable communications line with the incident site / On-scene Commander.	Incident Commander.	Following notification	Sasanof-1 Bridging ERP
4	Confirm with On-scene Commander: • Muster numbers and status of personnel; • POLREP showing current situation with release: ○ Shutdown and isolation; ○ Continuing or under control; ○ Material and quantity released; ○ Agreed SITREP frequency.	Incident Commander.	90 minutes from notification	Sasanof-1 Bridging ERP
5	Set up regular briefing of Western Gas Duty CMT Manager	Incident Commander.	ASAP following notification from OSC.	Sasanof-1 Bridging ERP
6	Undertake regulatory notifications and other stakeholder notifications (as required).	Incident Commander or delegate.	Refer Table 3-4	Table 3-4
7	Implement the Sasanof-1 Exploration Drilling Program Bridging ERP. Establish Incident Command Post	Incident Commander.	90 minutes from notification	Sasanof-1 Bridging ERP
8	Determine spill trajectory – weather conditions and perform initial vector analysis	Incident Commander or	Within 90 minutes from	4.3.2

Step	Action	Responsibility	Indicative Timing	Additional Information
	• Where is it going - Weather conditions/currents/tides? • What is in the way - Resources at risk? • When will it get there - Weather conditions/currents/tides? Activate Monitoring, Evaluation and Surveillance tactics.	DIMT Planning Section.	DIMT activation.	
9	Based on the preliminary spill assessment provided by OIM/Vessel Master and operational monitoring data: • Assess response required; and • Implement spill response commensurate to the size and level of risk.	Incident Commander.	90 minutes from notification	Section 4.6
10	Activate Source Control ERP: • Engage well control specialists and prepare for mobilisation; and • Initiate APPEA MoU: Mutual Assistance to facilitate relief rig.	Incident Commander or delegate.	Refer to 4.2	Section 4.2
11	If DoT to assume control as Control Agency, assist in completion of DoT Incident Control Handover Checklist.	IC	As required	Section 3.5.3
12	Notify oil spill response contractor(s) and determine level of support required based on the escalation potential of the incident: • Activate AMOSC Member Agreement to support the response, if appropriate; and • Engage Clarksons Vessel Broker to identify additional support / surveillance vessels.	Incident Commander or delegate. AMOSC: Pre-approved Company Approved Authority (CAA)	As soon as practicable	Table 3-4: Hydrocarbon Spill Notification Requirements
13	Prepare for potential evacuation of personnel from the incident site.	Incident Commander.	Refer to Bridging ERP	Sasanof-1 Bridging ERP
14	Establish spatial context of the spill: • Obtain all necessary maps/modelling from GIS software and establish sensitivity mapping; and • Identify protection priorities and confirm response options via NEBA.	Planning Section Chief (or delegate).	90 minutes from notification	Section 4.1 Section 4.6
15	Support incident action plan (IAP) (as required) in consultation with AMOSC and Control Agency (DoT, if applicable)	Incident Commander.	Ongoing	Section 4.6
16	Review OSMP to determine which rapid assessments initiation criteria are triggered, and direct personnel to undertake required assessments.	Planning Section Chief (or delegate).	Refer to OSMP	Section 4.7

3 SPILL RESPONSE FRAMEWORK

3.1 SPILL CLASSIFICATION

The National Plan classifies incidents to provide direction on the potential consequence and impact of an incident. This assists in guiding agency readiness levels, incident notifications, response actions and potential response escalations. The classification consists of three levels, which are based on the size and/or complexity of the incident (Table 3-1).

Table 3-1: Spill Level Classification (Adapted from the National Plan)

Characteristic	Level 1	Level 2	Level 3
MANAGEMENT			
Jurisdiction	Single jurisdiction	Multiple jurisdiction	Multiple jurisdictions including international
No. of agencies	First Response Agency	Routine multi-agency response	Agencies from across government and industry
Incident Action Plan	Simple/Outline	Outline	Detailed
Resources	Onsite resources required only	Requires intra-state resources	Requires national or international resources
TYPE OF INCIDENT			
Type of response	First Strike	Escalated	Campaign
Duration	Single shift	Multiple shifts - days to weeks	Extended response - weeks to months
Hazards	Single Hazard	Single Hazard	Multiple Hazards
RESOURCES AT RISK			
Human	Potential for serious injuries	Potential for loss of life	Potential for multiple loss of life
Environment	Isolated impacts with natural recovery in a few weeks	Significant impacts, recovery may take months. Remediation required.	Significant area, recovery may take months. Remediation required.
Wildlife	Individual fauna	Groups of fauna or threatened fauna	Large numbers of fauna
Economy	Business level disruption	Business failure	Disruption to a sector
Social	Reduced services	Ongoing reduced services	Reduced quality of life
Infrastructure	Short term failure	Medium term failure	Severe impairment
Public Affairs	Local and regional media coverage	National media coverage	International media coverage

3.2 JURISDICTIONAL AUTHORITY AND CONTROL AGENCIES

Western Gas will be the Control Agency for spills from the MODU or support vessels within the Operational Area. In accordance with the State Hazard Plan – MEE, there are certain circumstances where the Department of Transport (DoT) (WA) will assume control of the incident as Control Agency in State waters:

- The incident occurred in Commonwealth waters, but has impacted (or is likely to impact) State waters (i.e. a Level 2/3 spill);
- The Control Agency has requested State assistance; and
- The State believes that Western Gas is not implementing an appropriate response to the incident

If the DoT assumes the role of Control Agency, it is responsible for that portion of the response activities that occur within State waters and will form a separate Incident Management Team (IMT). Western Gas will support the Control Agency by providing equipment, trained personnel, technical specialists etc. in accordance with this OPEP. If the DoT assumes control as Control Agency, Western Gas will provide the 10 required DIMT personnel to support the DoT IMT, as outlined in the State Hazard Plan – MEE. Further personnel will be provided as requested by DoT.

Western Gas will also appoint a Liaison Officer for the DoT IMT to facilitate efficient and rapid exchange of information. Western Gas will remain the Control Agency for the response activities in Commonwealth waters and undertake a coordinated response effort.

Note that the worst case credible spill trajectory modelling does not predict sea surface or dissolved hydrocarbon exposure or any shoreline contact above the low threshold to reach WA State Waters. There is a 29% and 8 % probability respectively, that entrained low and high hydrocarbon threshholds will be reached in the September to March summer season.

Table 3-2 outlines the Statutory and Control Agencies relevant to Western Gas' activities and potential oil spill scenarios.

Table 3-2: Statutory and Control Agencies

Location	Source	Statutory Authority	Control Agency
Commonwealth Waters	Shipping (vessel)	AMSA	AMSA
	Offshore petroleum activities	NOPSEMA	Western Gas
State Waters	Shipping (vessel)	DoT	DoT

3.2.1 Cross-Jurisdictional Response

The management and coordination of cross-border incidents will follow the National Plan Coordination of Cross-border Incidents Guideline (NP-GUI-023) (AMSA 2017). To facilitate effective coordination in the event of a Level 2/3 spill, a Joint Strategic Coordination Committee (JRCC) will be established. The JSCC will be jointly chaired by the State Maritime Environmental Emergency Coordinator (SMEEC) and a senior representative from the Western Gas Crisis Management Team.

3.3 SPILL RESPONSE TEAM ACTIVATION

All those that may be required to assist in an emergency are to be notified as early as possible. The following notification process is to be followed:

1. The incident is reported to the AGR Drilling Superintendent via the duty phone number (Sasanof-1 Exploration Drilling Bridging Emergency Response Plan Contacts directory). Should the Drilling Superintendent not be immediately available, a Duty Manager can be contacted via on-call phone number (refer to Contacts Directory). At this point, if the incident has escalated beyond a Level 1, the person contacted will confirm they are assuming the role of Incident Commander and, as such, becomes accountable for managing the Western Gas response to the incident. The lead in the field (e.g. Vessel Master or OIM in consultation with AGR Drilling Supervisor) will become the On-Scene Commander.
2. After consulting with the On-scene Commander, the Incident Commander will notify the Drilling Incident Management Team (DIMT) members to either standby or mobilise to Incident Command Room (ICR).
3. The DIMT will conduct all relevant notifications, action any appropriate response plans and mobilise the required resources for the incident.

The Sasanof-1 Exploration Drilling Program DIMT is on 24-hour call and can be stood up within 1 hour. Additional support can be drawn from the AMOSC Core Group, which can supply up to 30 additional staff to support the DIMT, and other service providers under Contract Service Agreements with Western Gas (see Section 5.1). Upon notification of a Level 2 or 3 incident, the DIMT will scale appropriately in size and scope (operational and tactical levels, as applicable) to manage the impending response of the incident.

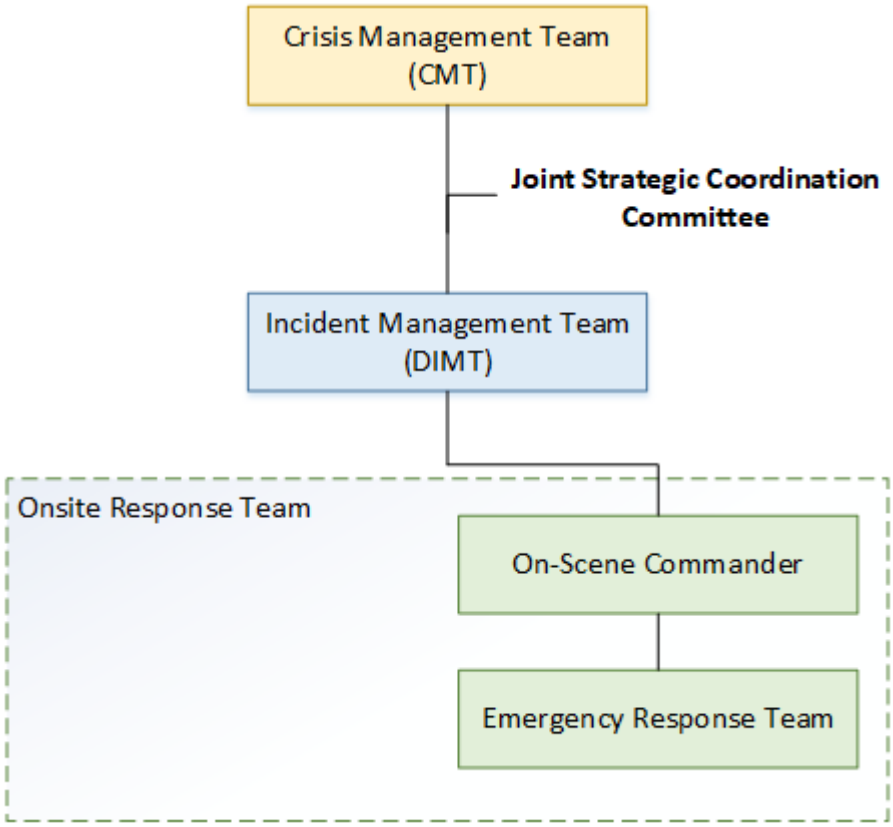


Figure 3-1 Sasanof-1 Exploration Drilling Program Incident Management Teams

The oil spill response management arrangements and Incident Management System outlined in this OPEP reflect the Australasian Inter-Service Incident Management System (AIIMS). This allows for a standardised and consistent approach to emergency response across Western Gas, AGR, contractors and relevant State and Commonwealth government agencies.

Figure 3-1 and Figure 3-2 outline Western Gas' Incident Management System, however it should be noted that the structure shown is intended to be adaptable, scalable and flexible. The size and structure of the DIMT reflects the complexity of the incident and is expected to vary throughout the various stages of response and recovery. For further details on the expanded Western Gas DIMT needs analysis and resourcing assumptions, refer to Appendix B.

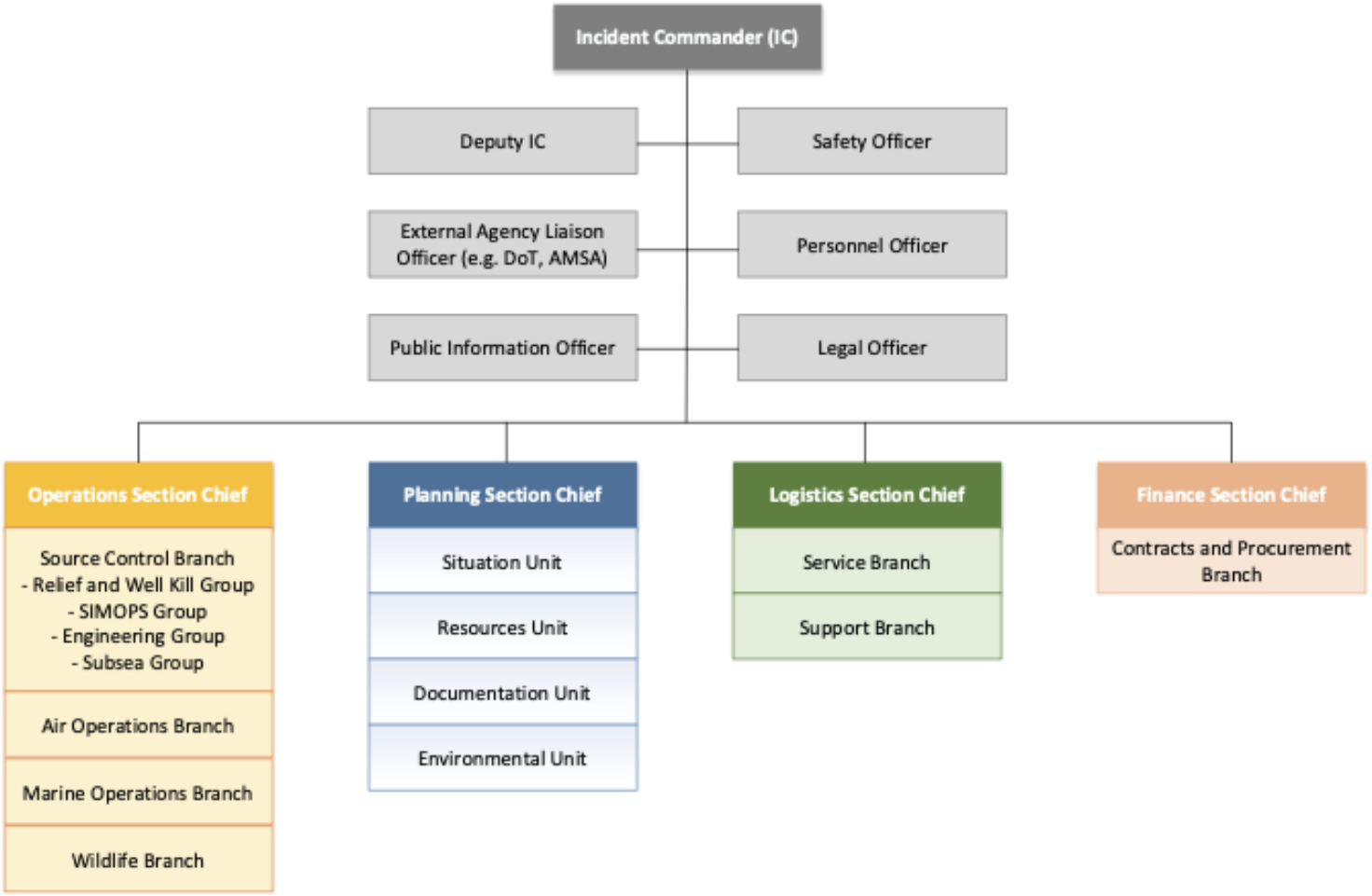


Figure 3-2 Western Gas Sasanof-1 Incident Command Structure

3.4 WESTERN GAS INCIDENT MANAGEMENT DOCUMENTATION

Western Gas will manage any incident resulting from its offshore petroleum activities in accordance with the Sasanof-1 Exploration Drilling Program Bridging Emergency Response Plan (ERP) will be prepared prior to the commencement of the drilling activities. This plan will refer to this OPEP as the operational document for use in the event of an oil spill.

The interfaces of relevant documentation within Western Gas, AGR and external oil spill response plans is shown in Figure 3-3, and described in Table 3-3.

Table 3-3 Western Gas Sasanof-1 Exploration Drilling Program Document Interfaces

Document	Description
National Plan for Maritime Environmental Emergencies (National Plan)	The umbrella contingency planning and response arrangement for Australia and is administered by the Australian Maritime Safety Authority (AMSA). The National Plan defines national arrangements, principles and policies for responding to maritime emergencies.
Australian Industry Cooperative Oil Spill Response Arrangements (AMOSPlan)	Describes mutual aid arrangements of the petroleum industry coordinated by AMOSC. It outlines membership arrangements, activation procedures and interfaces with other plans.
State Hazard Plan – Maritime Environmental Emergencies (MEE)	Describes management arrangements for the prevention of, preparation for, response to and recovery from a marine oil pollution emergency in order to minimise the impacts of marine oil pollution from vessels, offshore petroleum activities and other sources in WA State waters.
Sasanof-1 Exploration Drilling Program Environment Plan (EP)	Describes the petroleum activity, existing environment, risk assessment and environmental performance outcomes. Prepared to meet the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009*.
Sasanof-1 Exploration Drilling Program Well Operations Management Plan (WOMP)	Details well integrity aspects for Sasanof-1 and includes Western Gas' emergency management systems and well intervention strategies. As accepted by NOPSEMA under the *Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011*.
Sasanof-1 Exploration Drilling Program Safety Case Revision (SCR)	Details the Major Accident Event (MAE) and Safety Critical Control details for the safety aspects for the Sasanof-1 Exploration Drilling Program. The document is prepared by AGR and the MODU Drilling Contractor and submitted by the MODU Drilling Contractor as the registered facility operator to NOPSEMA in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009*.

Document	Description
Source Control Emergency Response Plan (SCERP) for Sasanof-1 Exploration Drilling Program	The SCERP includes an initial investigation stage with provision for escalation including the mobilisation of a rig to undertake relief well activities. The SCERP provides the Source Control Branch within the DIMT with guidance and checklists in the event of a LOWC to implement source control strategies including well capping, hydrostatic well kills and wellhead fluid containment.
Operational and Scientific Monitoring Plan (OSMP) for Sasanof-1 Exploration Drilling Program	The OSMP describes a program of monitoring oil pollution that will be enacted in the event of an emergency condition. The OSMP is the principal tool for determining the extent, severity, and persistence of environmental impacts from a marine hydrocarbon spill and inform remediation activities. The OSMP addresses the requirements of Regulation 14 (8D) of the *Offshore Petroleum and Greenhouse Gas (Environment) Regulations 2009.*
MODU Contractor Emergency Response Plan (ERP)	The ERP outlines the organizational responsibilities, actions, reporting requirements and resources required should an emergency situation unfold during routine and source control operations.
Sasanof-1 Exploration Drilling Program Bridging Emergency Response Plan (ERP)	The purpose of the Bridging ERP is to provide the DIMT with the necessary information to respond to any emergency associated with the Sasanof-1 Exploration Drilling Program, including, but not limited to, hydrocarbon spills. The Bridging ERP provides details on the interfaces between the activity emergency response teams as well as the specific DIMT roles and responsibilities. It describes the emergency notification and management process, the response management process, lists the roles and responsibilities for the DIMT members, and provides useful resources (e.g. forms, templates) that can be used to store and organise information during an emergency situation.
Western Gas Crisis Management and Emergency Respone Plan (CMERP)	The CMERP defines the organizational responsibilities, actions, reporting requirements and resources required to manage a crisis.
Vessel and MODU SOPEP	A Ship Oil Pollution Emergency Plan (SOPEP) is required under the International Convention for the Prevention of Pollution from Ships (MARPOL), for vessels >400t. The SOPEP includes vessel specifications, procedures to follow for notification and spill response, and a list of spill equipment and locations.

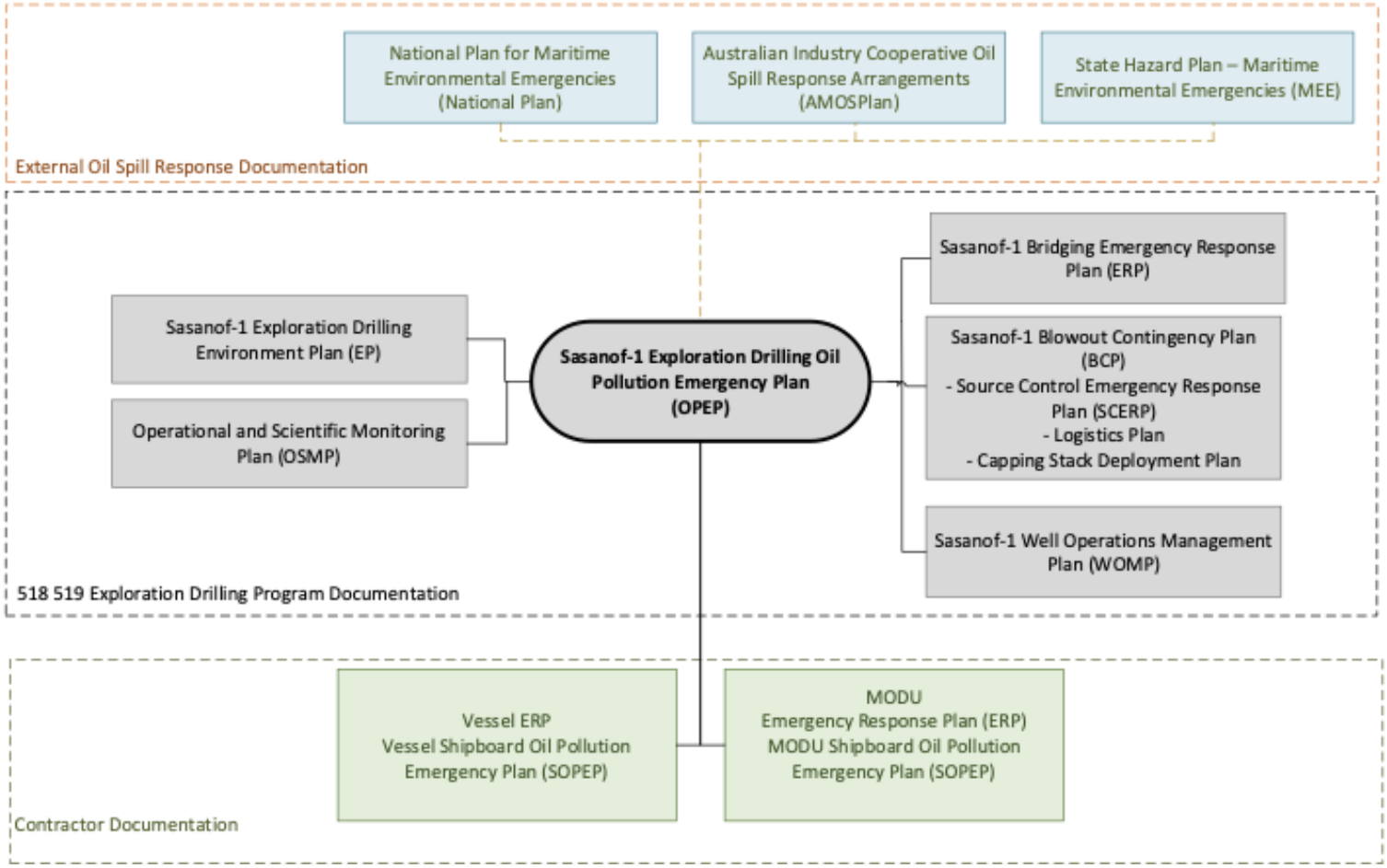


Figure 3-3 Western Gas Sasanof-1 Exploration Drilling Program Emergency Management Framework

3.5 COMMUNICATION AND INTEGRATION WITH OTHER ORGANISATIONS AND PLANS

The Western Gas DIMT is responsible for both internal (i.e. CMT, ERT/SCT) and external communications related to the spill response (e.g. AMOSC, DoT etc). The Western Gas CMT is responsible for external communcations related to government regulatory bodies, media liaison and related stakeholders. Dependent on the size of the spill and jurisdiction, Western Gas has support from a range of mutual support agencies and organisations, of which some of the key agencies and organisations are outlined in the following sub-sections.

3.5.1 Australian Maritime Safety Authority (AMSA) and NatPlan

NatPlan sets out the national arrangements, policies, and roles and responsibilities of states, territories and industry in managing maritime environmental emergencies. NatPlan integrates Commonwealth and State government oil spill response framework to facilitate effective response to marine pollution incidents. AMSA manages the National Plan and works with State governments (who manage the equivalent State plans that integrate into the NatPlan), shipping, petroleum, chemical industry and emergency services to optimise Australia's marine pollution response capability. This plan applies to all hydrocarbon spills in Commonwealth waters seaward of the State water limit while the WA State Hazard Plan – MEE applies in State waters within 3 nautical miles (nm) of the territorial sea baseline. The National Plan is Australia's key maritime emergency contingency and response plan.

3.5.2 Australian Marine Oil Spill Centre (AMOSC) and AMOSPlan

Western Gas will have access to AMOSC oil spill recovery and response equipment, dispersant and technical (human) capabilities along with those resources held by member companies as outlined in the AMOSPlan on a 24-hour, 7-days a week basis before and throughout drilling operations. The AMOSPlan details the Australian industry cooperative arrangements in a series of international agreements and relationships designed to support the petroleum industry during a Level 3 response. Western Gas' primary interface with the AMOSPlan during an oil spill response is via AMOSC's 24/7 Duty Officer, who will provide the initial point of contact for oil spill responses that require AMOSC assistance.

The Sasanof-1 OPEP has been structured to interface with the AMOSC CV19 Response Plan and the AMOSC Service Delivery under a COVID19 environment note to members. AMOSC is a member of the Global Response Network.

3.5.3 WA Department of Transport (DoT) and WA State Hazard Plan

The WA State Hazard Plan – Maritime Environmental Emergencies (MEE) sets out arrangements for managing marine oil pollution and marine transport emergencies in WA. The WA State Hazard Plan – MEE prescribes management arrangements for the prevention of, preparation for, response to and recovery from a marine oil pollution incident in order to minimise the impacts of oil spill incidents from vessels, offshore petroleum activities and other sources in State waters.

Where a spill enters or is predicted to enter from Commonwealth to State waters, the Hazard Management Agency (HMA)(DoT Chief Executive Officer, or their designated proxy) will assume the role as the State Maritime Pollution Coordinator (SMPC), and the DoT will take on the role of Controlling Agency for response actions in State waters. The HMA has overall responsibility for ensuring there is an adequate response to spill incidents in State waters, including those resulting from a petroleum activity and from a vessel originating in Commonwealth waters. The SMPC provides overall strategic management response and executive level support and guidance to the Incident Control.

For a spill that crosses from Commonwealth to State waters, it is an expectation that Western Gas will conduct initial response actions in State waters as necessary in accordance with this OPEP and continue to manage those operations until formal incident control can be established by WA DoT. Western Gas will notify the WA DoT Maritime Environmental Emergency Response (MEER) unit as soon as practicable as per Section 3.7. On notification, the HMA will establish and operate the Maritime Environmental Emergency Coordination Centre (MEECC) and activate the WA DoT IMT.

Western Gas and DoT will establish separate IMTs to manage response activities in Commonwealth and State waters, respectively, with one of the IMTs adopting the role of ‘Lead IMT’ for some response functions. Unless otherwise agreed through the Joint Strategic Coordination Committee (JSCC), the allocation of IMT function and designation of ‘Lead IMT’ will be as detailed in Appendix 2 of the Offshore Petroleum Industry Guidance Note: Marine Oil Pollution - Response and Consultation Arrangements (DoT, 2020).

To facilitate effective coordination between DoT and Western Gas and their respective IMTs in the event of a cross-jurisdictional response (e.g. if Western Gas remains Controlling Agency for those responses in Commonwealth marine waters with the WA DoT the Controlling Agency in State waters), the JSCC will be established. The JSCC is a committee, not a team operating from a specified location. The JSCC will be jointly chaired by the SMPC and a nominated senior Western Gas representative, and will comprise individuals deemed necessary by the chairs to ensure an effective coordinated response across both jurisdictions and to provide a mechanism for de-

conflicting competing priorities and requests for resources. The key functions of the JSCC are set out within Section 6.5.1 of DoT's Offshore Petroleum Industry Guidance Note: Marine Oil Pollution Response and Consultation Arrangements (DoT, 2020).

In the event that WA DoT is required to establish an IMT, at the request of the SMPC, Western Gas will comply with WA DoT's Offshore Petroleum Industry Guidance Note: Marine Oil Pollution - Response and Consultation Arrangements (DoT, 2020) and provide the necessary resourcing including equipment and personnel, to assist the WA DoT's IMT in performing duties as a Controlling Agency. Western Gas will initially make available 11 appropriately qualified persons to work within the DoT IMT (as described in Appendix 3 and 4 of the Offshore Petroleum Industry Guidance Note: Marine Oil Pollution - Response and Consultation Arrangements (DoT, 2020).

In addition to the IMT roles, Western Gas will also provide appropriately qualified personnel (e.g. AMOSC core group and specialist consultants) to assist with field operational activities, such as oiled wildlife response. DoT may also opt to deploy field response personnel through the State Response Team and request National Response Team support.

3.5.4 WA Department of Biodiversity, Conservation and Attractions (DBCA) and WAOWRP

The DBCA has responsibility and statutory authority to protect wildlife as outlined in the WA Biodiversity Conservation Act 2016. It also has legislative requirement to ensure the humane treatment, housing and release or euthanising of fauna under the Animal Welfare Act 2002.

For spills in State waters, WA DoT is the Controlling Agency and DBCA is the Jurisdictional Authority for OWR and lead agency for OWR. The role of DBCA (formerly DPaW) in an OWR is outlined in the WA Oiled Wildlife Response Plan (WAOWRP) and regional sub-plans. The WAOWRP (DPaW, 2014a) sets out the minimum standard required for an OWR in WA in both State and Commonwealth waters. The Pilbara Region Oiled Wildlife Response Plan (PROWRP) (DPaW, 2014b) outlines specific 'on ground' information required to carry out OWR specific to this region (e.g. environmental values, high risk environmental areas, designated oiled wildlife facilities, equipment lists and resource lists, contact lists).

For a spill originating from petroleum activities in Commonwealth waters that moves into State waters, Western Gas retains command until formal incident control is established by WA DoT. In the event that wildlife has been impacted or there is imminent threat of impact requiring OWR, the WAOWRP and PROWRP will be activated. A Wildlife Division Coordinator (WDC) will be established and will liaise with the WA DoT to identify and coordinate the necessary OWR functional units of the Oiled Wildlife Division (OWD), as per the WAOWRP. In the event of oiled wildlife, DBCA will provide

an Oiled Wildlife Advisor (OWA) to advise. The OWA and WDC will provide advice to the WA DoT on the level of OWR required and will ensure provision of resources to support OWR operations.

Once WA DoT becomes the Controlling Agency, they will be responsible for overall command of an OWR. Western Gas will provide necessary resources (equipment and personnel, primarily through Western Gas' AMOSC membership), as directed by WA DoT to support their functions.

During a Level 3 spill from petroleum activities and that impacts only Commonwealth waters, DBCA will similarly provide advice on OWR to the Western Gas DIMT through a nominated OWA.

3.5.5 Australian Petroleum Production and Exploration Association (APPEA)

APPEA is the peak national body representing Australia's oil and gas exploration and production industry. It has about 60 full member companies, and about 140 associate member companies of which Western Gas is an Associate Member. Western Gas will engage with other APPEA members via a signed Mutual Aid Memorandum of Understanding (MoU) and source assistance from nearby operators.

3.6 ADDITIONAL SUPPORT FOR DIMT (SURGE CAPACITY)

In the event of a large spill requiring resources exceeding those of the Western Gas organisation, additional personnel and resources will be obtained from:

- Third party contract services and agency hire.
- Industry organisations (e.g. AMOSC).
- APPEA Mutual Aid MoU.

Additional resources will be under the control of the relevant DIMT Section Chiefs. An indication of the potential positions and delegation of responsibilities that may occur in a large spill scenario are described in Appendix B.

3.7 EXTERNAL NOTIFICATION AND REPORTING

A spill which may result from the Western Gas Sasanof-1 Exploration Drilling Program activities is required to be reported to a range of stakeholders. Table 3-4 provides information relevant to external notification and reporting requirements, including the responsible party and any additional information required, including contact details and links to the required notification and reporting forms.

Notifications and reporting should be undertaken by the Incident Commander or CMT delegate.

Table 3-4: Hydrocarbon Spill Notification Requirements

Spill type	From	To	Reporting Trigger	Type	Timing	Supporting Information
Level 1 spill	Vessel Master or OIM	AGR Drilling Supervisor	All spills (or probable spills) to the marine environment	Verbal	Immediately	-
		AMSA – Commonwealth Waters (> 3nm)	All spills (or probable spills) to the marine environment	Verbal	Immediately	Report verbally or by email if phone contact is not possible to AMSA immediately: Ph: +61 2 62306811 or 1800 641 792 Email: mdo@amsa.gov.au
				Written notification	ASAP	POLREP available at: https://amsa-forms.nogginoca.com/public/
				Written updates	As requested, or every 24 hours	SITREP / POLREP available at https://amsa-forms.nogginoca.com/public/ and IAP
Level 2 MDO spill from vessel within 500m PSZ	Vessel Master	AGR Drilling Supervisor	All spills	Verbal	Immediately	-
	AGR Drilling Supervisor (or delegate)	AMSA – Commonwealth Waters (> 3nm)	Level 2 vessel spills in Commonwealth waters	Verbal	Immediately	Report verbally or by email if phone contact is not possible to AMSA immediately: Ph: +61 2 62306811 Email: mdo@amsa.gov.au
				Written notification	ASAP	POLREP form available at: https://amsa-forms.nogginoca.com/public/
				Written updates	As requested, or every 24 hours	SITREP / POLREP form available at https://amsa-forms.nogginoca.com/public/ and IAP
			Spill has caused, or has	Verbal	As soon as practicable and no later than 2 hours	Ph: 08 6461 7090

Spill type	From	To	Reporting Trigger	Type	Timing	Supporting Information
		NOPSEMA Commonwealth Waters (> 3 nm)	the potential to cause, moderate to more serious than moderate environmental damage (refer to activity-specific spill risk assessment in EP)	Written notification	As soon as practicable after oral notification	Form available at: https://www.nopsema.gov.au/assets/Forms/N-03000-FM0831-Report-of-an-Accident-Dangerous-Occurrence-or-Environmental-Incident-Rev-8-Jan-2015-MS-Word-2010.docx Email: submissions@nopsema.gov.au Copy also to NOPTA Email: info@nopta.gov.au
				Written report	As soon as practicable, but within 3 days of incident	NOPSEMA Form N-03000-FM0831 Email: submissions@nopsema.gov.au Copy also to NOPTA Email: info@nopta.gov.au
		Port Authorities	Level 2 vessel spills (threatening State waters)	Verbal	ASAP	Port authorities details available at: https://www.transport.wa.gov.au/Freight-Ports/port-authorities.asp
		DoT Maritime Environmental Emergency Response (MEER) Unit – State Waters (< 3nm)	Level 2 vessel spills (threatening State waters)	Verbal and Written	As soon as practicable and no later than 2 hours	DoT MEER Unit: Ph: (08) 9480 9924 (24 hours) POLREP Incident form available at: www.transport.wa.gov.au/imarine/report-marine-oil-pollution.asp Email: marine.pollution@transport.wa.gov.au
		Department of Agriculture, Water and the Environment (DAWE)	Spill has potential to cause significant impact to a matter of	Verbal and Written	Verbal within 24hrs of detection for death or injury of Listed Fauna / within 48hrs of detection of impact on matters of NES Written within 3 days	Ph: +61 2 6274 1372 or 1800 110 395 Email: compliance@environment.gov.au

Spill type	From	To	Reporting Trigger	Type	Timing	Supporting Information
			national environmental significance (NES) Death or injury of individual(s) from a Listed Species			
Level 2/3 spill from MODU	Offshore Installation Manager (OIM)	Incident Commander	All spills	Verbal	Immediately	DIMT Duty Roster
	IC or delegate	NOPSEMA Commonwealth Waters (> 3 nm)	Level 2/3 spill or Spill has caused, or has the potential to cause, moderate to more serious than moderate environmental damage (refer to activity-specific spill risk assessment in EP)	Verbal	As soon as practicable and no later than 2 hours	Ph: 08 6461 7090
				Written notification	As soon as practicable after oral notification	Form available at: https://www.nopsema.gov.au/assets/Forms/N-03000-FM0831-Report-of-an-Accident-Dangerous-Occurrence-or-Environmental-Incident-Rev-8-Jan-2015-MS-Word-2010.docx Email: submissions@nopsema.gov.au Copy also to NOPTA Email: info@nopta.gov.au
				Written report	As soon as practicable, but within 3 days of incident	NOPSEMA Form N-03000-FM0831 Email: submissions@nopsema.gov.au Copy also to NOPTA Email: info@nopta.gov.au
		DoT Maritime Environmental Emergency Response (MEER) Unit – State Waters (< 3nm)	Level 2/3 spill or Spill has caused, or has	Verbal and Written	As soon as practicable and no later than 2 hours	DoT MEER Unit: Ph: (08) 9480 9924 (24 hours)

Spill type	From	To	Reporting Trigger	Type	Timing	Supporting Information
			the potential to cause, moderate to more serious than moderate environmental damage (refer to activity-specific EP spill risk assessment)			POLREP Incident form available at: www.transport.wa.gov.au/imarine/report-marine-oil-pollution.asp Email: marine.pollution@transport.wa.gov.au
		AMOSC - Mutual Aid	Level 2/3 spill requiring additional support / resources	Verbal	As soon as practicable	Ph: 0438 379 328 Email: amosc@amosc.com.au
			Level 2/3 spill requiring additional support / resources	Verbal and Written	As soon as practicable	
		Oil Spill Modelling Service Provider	Level 2/3 spill	Verbal and Written	As soon as practicable	Provide all relevant and available spill information, spill modelling request form. Sasanof-1 Exploration Drilling Program Contacts directory
		AMSA	Level 2/3 spill requiring additional support and resources under MoU	Verbal	Immediately	Report verbally or by email if phone contact is not possible to AMSA immediately: Ph: +61 2 62306811 Email: mdo@amsa.gov.au
		Other Resources/Contractors	Level 2/3 spill	Verbal	As directed	Sasanof-1 Exploration Drilling Program Contacts directory

Spill type	From	To	Reporting Trigger	Type	Timing	Supporting Information
		AHO	Level 2/3 spill	Verbal / Email	As directed	+61 (0) 2 4223 6500 datacentre@hydro.gov.au
		Other Marine Users	Level 2/3 spill	Verbal	As directed	Western Gas Stakeholder Database
		Port Authorities	Level 2 vessel spills (threatening State waters)	Verbal	ASAP	Port authorities details available at: https://www.transport.wa.gov.au/Freight-Ports/port-authorities.asp
		Department of Agriculture, Water and the Environment (DAWE)	Spill has potential to cause significant impact to a matter of national environmental significance (NES) Death or injury of individual(s) from a Listed Species	Verbal and Written	Verbal within 24hrs of detection for death or injury of Listed Fauna / within 48hrs of detection of impact on matters of NES Written within 3 days	Ph: +61 2 6274 1372 or 1800 110 395 Email: compliance@environment.gov.au
		Director of National Parks, DAWE	An oil spill that may impact upon Marine Parks; and/or an oil spill response action (including monitoring and remediation)	Verbal and Written	ASAP	Notification should include: • Titleholder details • Time and location of the incident (including name of marine park likely to be effected) • Proposed response arrangements as per the Oil Pollution Emergency Plan (e.g. dispersant, containment, etc.)

Spill type	From	To	Reporting Trigger	Type	Timing	Supporting Information
			occurring within a Marine Park.			• Confirmation of providing access to relevant monitoring and evaluation reports when available; and • Contact details for the response coordinator. Note that the DNP may request daily or weekly Situation Reports, depending on the scale and severity of the pollution incident. Marine Park Duty Compliance Officer: 0419 293 465 E: marineparks@awe.gov.au
		Department of Foreign Affairs and Trade (DFAT)	If spill is predicted to enter Indonesian or Timor Leste waters	Email	ASAP	sea.law@dfat.gov.au
		Department of Industry, Science, Energy and Resources (DISER)	Spill in Commonwealth Waters	Verbal	ASAP	+61 2 6213 6000 resourcesandenergy@industry.gov.au
		WA DWER Pollution Response Unit	If temporary waste storage areas are required	Verbal	ASAP	24/7 Ph: 1300 784 782
		WA DBCA	If spill has affected, or has the potential to affect wildlife and require oiled wildlife response	Verbal	ASAP	Marine Emergencies: +61 8 9474 9055

Spill type	From	To	Reporting Trigger	Type	Timing	Supporting Information
			Spill may enter State marine parks			
		Department of Mines, Industry, Resources and Safety (DMIRS)	Spill may enter State waters	Email	ASAP	petroleum.environment@dmp.wa.gov.au

4 OPERATIONAL RESPONSE

4.1 SPILL RESPONSE STRATEGY SELECTION

A preliminary Net Environmental Benefit Analysis (NEBA) was conducted using hydrocarbon spill modelling of the worst-case spill scenarios identified for the Sasanof-1 Exploration Drilling program (refer to Section 4.2 of the EP). The preliminary NEBA considered the effectiveness of response strategies for the potential spill parameters, the benefit(s), potential environmental impacts and risks and the operational/functional constraints of the response option. The following key considerations, operational limitations and assumptions led the decision-making process during the preliminary NEBA:

- No shoreline contact above modelled thresholds is predicted. Due to the low waxy content expected for the condensate (less than 5%, compared to 11% for Montara hydrocarbons), waxy residues are not expected to form. Therefore, containment and recovery, shoreline protection and clean up are not expected for this type of spill event.
- Gas condensate and marine diesel oil have limited persistence and upon release the surface expression are expected to rapidly evaporate and disperse.
- Dispersant application (both surface and subsurface) is not considered suitable for hydrocarbons which are non-persistent and highly evaporative.
- Given the location and water depth of the drilling program and no shoreline contact above modelled thresholds predicted, any spill is expected to have limited impacts to wildlife. Oiled Wildlife Response is included as a secondary response option, should monitoring and evaluation of the spill parameters suggest it is required.

Table 4-1 outlines the response strategies assessed as applicable for the Sasanof-1 Exploration Drilling Program, and whether they will be applied as a primary or secondary response option.

Table 4-1 Western Gas Sasanof-1 Exploration Drilling Program – Hydrocarbon Response Strategies

Worst-case Spill Scenario	Primary Response Strategies	Secondary Response Strategies
Diesel spill from vessel: *Credible worst-case scenario: Ruptured fuel tank of 250 m^3 instantaneous release.*	1. Monitoring, Evaluation and Surveillance (MES). 2. Waste Management.	1. Oiled Wildlife Response
Loss of well control: *Credible worst-case scenario: Flow of condensate from well of estimated 22,542 bbl / day for 80 days*	1. Source Control – ROV Intervention. 2. Debris clearance. 3. Source Control – Capping and Containment.	1. Oiled Wildlife Response

Worst-case Spill Scenario	Primary Response Strategies	Secondary Response Strategies
	4. Source Control – Relief Well. 5. MES. 6. Waste Management.	

In the event of a spill, the assessment of response options will be reviewed and verified prior to implementation to ensure that the assumptions made in the planning process are valid. This process is described in Section 4.6.

4.2 SOURCE CONTROL

4.2.1 Overview

The initial and highest priority response to a spill incident is to prevent or limit further loss of hydrocarbons into the marine environment. This will only be attempted if the safety of personnel is not compromised and the source control activity does not cause any further risk or impact to the environment. In most circumstances, the net benefit of source control outweighs the risks and impacts from further hydrocarbons being released.

This section provides an overview of the Western Gas Source Control Emergency Response Plan (SCERP) for a Level 3 spill (Table 4-2) and Figure 4-2 provides the timeline for its implementation. The Western Gas Source Control Emergency Response Plan (SCERP) will be supported by a Source Control Emergency Response Plan (SCERP), Logistics Plan and Capping Stack Deployment Plan and contains additional high level IMT guidance. For a Level 3 spill due to a loss of well containment, Western Gas will be the controlling agency for the source control response. A review of the source control strategy selection ALARP evaluation methodology and analysis is provided in Appendix C.

4.2.2 Source Control Methods

In the event of a spill from a vessel, the Vessel Master will enact the SOPEP.

In the event of a loss of well control, the immediate response is dependent on the level of damage to the wellhead infrastructure and the rate of flow of hydrocarbons. The source control activities that may be undertaken in the event of a loss of well control during the Sasanof-1 Exploration Drilling Program include:

- ROV emergency BOP intervention;
- Site survey and debris clearance;
- Well capping and containment; and
- Relief well installation.

The following tables provide information regarding the activation of source control tactics, the relevant documentation for implementation, and outlines the applicability and capability to implement those tactics for the drilling program. Further information regarding response capability is provided in Section 5.1.

Table 4-2 Sasanof-1 Exploration Drilling Program – Source Control – BOP Emergency Intervention

	BOP Emergency Intervention
Relevant Implementation / Activation Documentation	Sasanof-1 Exploration Drilling Bridging Emergency Response Plan. Sasanof-1 Exploration Drilling Source Control Emergency Response Plan. Drilling Contractor Well Control Bridging Document. WWC Source Control Emergency Response Plan (SCERP). Clarksons Support Vessel Database.
Applicability	Involves the use of response vessels and work-class ROVs with BOP intervention tooling to attempt to close the shear rams of the BOP and cease flow of hydrocarbons from the well.
Dependencies	BOP Emergency Intervention activities depend on the state of the wellhead and may require debris clearance to be undertaken prior (which would be determined by observation of the condition of the wellhead / site survey techniques).
Activation Procedure	DIMT to activate WWC and prepare for mobilisation of equipment and personnel (as per Table 2-3: Initial Response Guide – IC and DIMT).
Capability Provider	The location and availability of support vessels with ROV and BOP tooling capability will be tracked on the Clarksons Vessel Database which is updated continuously. BOP Intervention tooling is readily available and will be mobilised with the vessel with ROV capability.
Availability / Timeframe	Western Gas will preferentially mobilise work-class ROV for any response activities so the vessel / ROV spread would be capable of undertaking BOP intervention, reducing potential further mobilisation requirements.

Table 4-3 Sasanof-1 Exploration Drilling Program – Source Control – Site Survey and Debris Clearance

	Site Survey and Debris Clearance
Relevant Implementation / Activation Documentation	Support Vessel Register.
Applicability	A site survey may be required to undertake visual observations of the well location and surrounds. Debris clearance may be required, depending on the state of the wellhead, and involves the use of equipment to clean around the wellhead to enable intervention, prepare for relief well drilling and if appropriate, installation of a capping device.

	Site Survey and Debris Clearance
Dependencies	A site survey would require a support vessel with ROV spread and crew, to undertake visual and/or sonar observations. Debris clearance would require a construction support vessel with lifting equipment rated to approximately 150 T with a work-class ROV.
Activation Procedure	DIMT to activate Clarksons Vessel Broker to support in contracting / mobilisation of vessels to site (as per Table 2-3: Initial Response Guide – IC and DIMT).
Capability Provider	The location and availability of support vessels with ROVs and Construction Support Vessels will be tracked on a register which is updated on a monthly basis. Register to include vessel Safety Case status / information. Wild Well Control maintains a debris removal package, located in Singapore which will be activated.
Availability / Timeframe	Typically, several support vessels with ROV capability are located in the North West region and would be preferentially contracted to reduce mobilisation time. Construction Support Vessels would be preferentially contracted from within Australia, or the Asia-Pacific region. The Wild Well Control Debris Removal Package is located in Singapore and could be mobilised within 15 days to site.

Item	Maximum Duration (days)	Comments
Mobilize crews and equipment to Port	0-1	Based on previous simulations. Concurrently source capping stack construction vessel with Australian safety case. Commence Safety Case Revision.
Continue to source and mobilise vessel to Singapore	0-7	Typical response time based on market knowledge of suitable vessels in SE Asia. A suitable vessel register will be updated on a monthly basis prior to spud.
Loadout debris clearance equipment on construction vessel	7-8	
Transit capping stack directly to well location	8-14	Estimated transit time from Port to location
Deployment of Debris clearing equipment	15	
Total	15	
Safety Case Revision Timelines (assumes Debris Clearance Tool deployed separately from Capping Stack Deployment Vessel)		
Item	**Duration (days)**	**Comments**

	Site Survey and Debris Clearance	
Identify vessel	1	
Safety Case Revision Kick off	1	Commence SCR plan. Engage with NOPSEMA to prioritise
Develop SCR	7	Perform HAZID. Complete SCR
Submit SCR	0	NOPSEMA review SCR
SCR review process	7	Ongoing dialogue with NOPSEMA to optimise RFFWI response
SCR Accepted	0	
Total	**16**	

Table 4-4 Sasanof-1 Exploration Drilling Program – Source Control – Capping and Containment

	Capping and Containment	
Relevant Implementation / Activation Documentation	Sasanof-1 Exploration Drilling Program Capping and Containment Plan.	
Applicability	Involves the use of a heavy lift vessel with work-class ROV capability to lower and latch the capping stack onto the damaged well to stem flow of hydrocarbons. The effectiveness of capping and containment is largely dependent on the conditions at the time of a well control incident.	
Dependencies	The safe and effective deployment of capping and containment equipment is subject to sea state operating limits.	
Activation Procedure	DIMT to activate Well Control Provider well control specialists and prepare for mobilisation of equipment and personnel (as per Table 2-3: Initial Response Guide – IC and DIMT).	
Capability Provider	WG maintains a contractual agreement with Well Control/Capping stack provider, which provides capping and containment capability with the ability to escalate the scale of equipment needed based on the incident.	
Availability / Timeframe	16 days from activation	
Item	**Maximum Duration (days)**	**Comments**
Mobilize crews and equipment to Port	0-3.5	Based on previous simulations. Concurrently source capping stack construction vessel with Australian safety case. Commence Safety Case Revision.
Stack up and test Capping Stack	3.5-7.5	Most recent exercise reduced this time to 2.8 days.

	Capping and Containment	
Continue to source and mobilise vessel to Singapore	0-7.5	Typical response time based on market knowledge of suitable vessels in SE Asia. A suitable vessel register will be updated on a monthly basis prior to spud.
Loadout capping stack to construction vessel	7.5-9.5	Conservative estimate with 1 day achievable
Transit capping stack directly to well location	9.5-15.5	Estimated transit time from Port to location
Awaiting SCR	0-16	
Conduct Debris Clearance activities	16	Assumes debris clearance has not been conducted prior to Capping Stack arrival.
Deployment of capping stack	16-21	Assumes vertical access is possible. Additional time to allow for adverse weather.
Total	**21**	
Safety Case Revision Timelines		
Item	**Duration (days)**	**Comments**
Identify vessel	1	
Safety Case Revision Kick off	1	Commence SCR plan. Engage with NOPSEMA to prioritise
Develop SCR	7	Perform HAZID. Complete SCR
Submit SCR	0	NOPSEMA review SCR
SCR review process	7	Ongoing dialogue with NOPSEMA to optimise RFFWI response
SCR Accepted	0	
Total	**16**	

Table 4-5 Sasanof-1 Exploration Drilling Program – Source Control – Relief Well

	Relief Well
Relevant Implementation / Activation Documentation	Sasanof-1 Exploration Drilling Program Relief Well Plan. Relief Well Drilling Unit Register. Source Control Emergency Response Plan (SCERP).
Applicability	In the event that a loss of well control cannot be contained by BOP emergency intervention, the drilling of a relief well is the primary source of well control, to be achieved by intersecting the well bore below the release location, circulating kill weight drilling fluid to stem the flow of hydrocarbons.

	Relief Well
Dependencies	The drilling of a relief well requires availability of a suitable MODU and a NOPSEMA accepted Safety Case. A Safety Case Revision will be prepared following identification of an appropriate MODU during the demobilisation / mobilisation process.
Activation Procedure	DIMT will contact operators of suitable drilling units identified through the Relief Well Drilling Unit Register under the APPEA MoU: Mutual Assistance (as per Table 2-3: Initial Response Guide – IC and DIMT).
Capability Provider	Western Gas is a member of the APPEA MOU for Mutual Assistance to share drilling units during an emergency. Suitable relief well drilling units will be tracked by AGR on a register which is updated on a monthly basis. Register to include Safety Case status / information.
Availability / Timeframe	80 days.

Item	**Duration (days)**	**Comments**
Identify suitable MODU	0-1	Suitable MODU's are identified 2 months prior to spud and updated monthly. Signatory to APPEA MOU.
SCR Schedule developed	1-2	Meet NOPSEMA to discuss imminent SCR and its urgency
SCR submitted	2-16	SCR Submitted to NOPSEMA.
SCR Review process	16-23	Ongoing dialogue with NOPSEMA to optimise RFFWI response
MODU mobilised	20-23	Spud equipment loaded to MODU. Specialised equipment mobilised.
SCR Accepted	24	
MODU Drills relief well	24-80	Well Killed
Total	**80**	

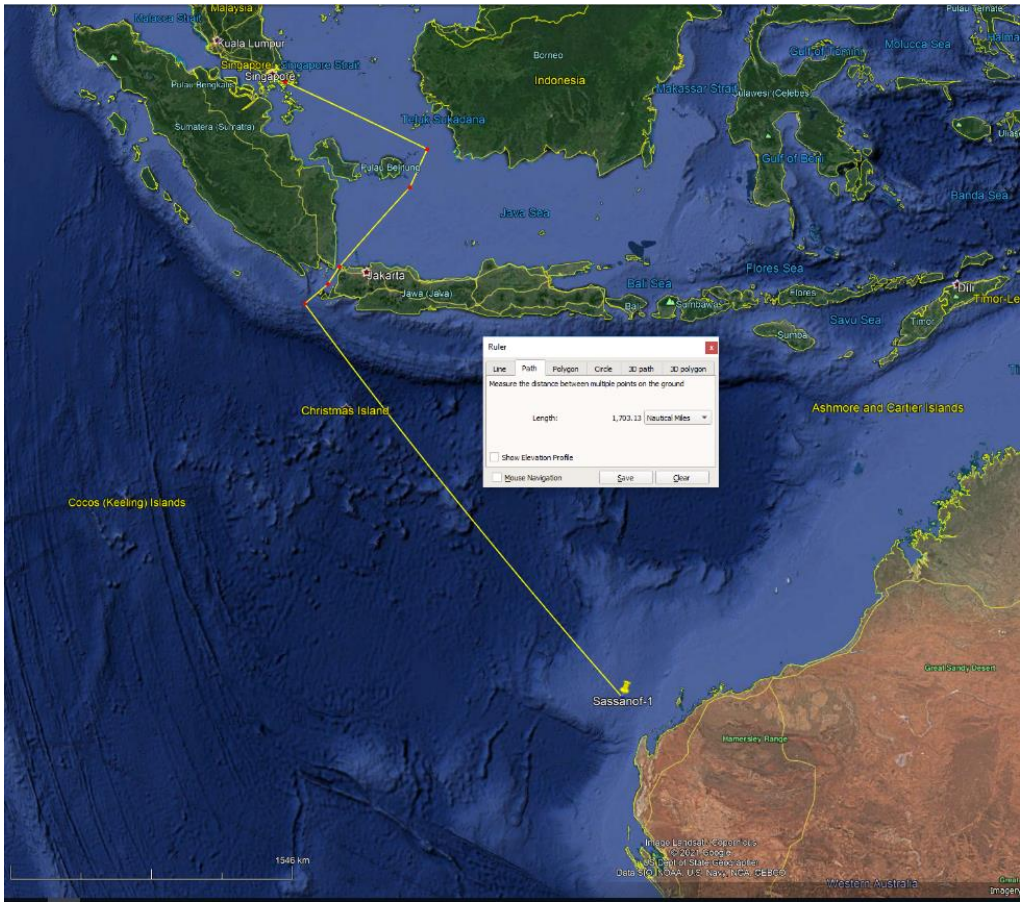


Figure 4-1 Capping Stack and Debris Clearance Journey Passage

4.2.3 Source Control Performance Standards and Measurement Criteria

The Environmental Performance Outcome for Source Controls is to contain the unplanned release of hydrocarbons from a Level 3 spill. The required Control Measures (CM), Environmental Performance Standards (EPS) and Measurement Criteria are detailed in Table 4-6. Refer to EP Table 6-12 for Environmental Performance Outcomes, Performance Standards and Measurement Criteria relating to potential environmental risks from implementation of oil spill response.

Table 4-6 Source Control Performance Standards and Measurement Criteria

Control Measure	Performance Standard	Measurement Criteria
Source Control Planning - General	The AGR Project Drilling Manager will ensure that the SCERP is developed consistent with IOGP 594 (2019) and endorsed by Well Control Provider at least 3 months prior to commencement of the Activity.	SCERP endorsed by Well Control Provider at least 3 months prior to commencement of the Activity.

Control Measure	Performance Standard	Measurement Criteria
	Source Control Personnel Resourcing Plan included within SCERP: • Identifies required position / roles for Source Control Team; and • Describes personnel sourcing arrangements to assure resourcing capability.	SCERP demonstrates resourcing capability to meet source control personnel requirements for well containment activities.
	The AGR Project Drilling Manager will ensure that regular vessel / MODU availability forecasting is in place at least three months prior to the commencement of the Activity.	Monthly vessel / MODU availability forecasts for Activity period commence at least three months prior to commencement of the Activity.
	SC Logistics Plan addresses: • Availability of vessel / MODU for the Activity period based on forecasting and live vessel surveillance (via tracking/brokerage) during the Activity • IMS risk for primary "likely" response vessels. • Source control personnel mobilisation (including quarantine) arrangements to assure resourcing capability within required timeframes in the event of an incident.	1. SC Logistics Plan that incorporates: • Vessel/MODU availability for Activity period; • Completed IMS risk assessments; • Mobilisation arrangements / constraints and associated timelines; and • Capping Stack deployment feasibility. Live vessel tracking / brokerage software in place.
	The AGR Project Drilling Manager will ensure that an exercise is conducted to test the SCERP prior to the commencement of the Activity and that any learnings are fed back into the SCERP and any associated sub-plans.	1. Exercise Report issued. 2. Learnings captured in the AGR Project Action Tracker Register.
	The AGR Project Drilling Manager will ensure that Executed contract with Well Control Provider remains active throughout the Activity for provision of well intervention services.	AGR Executed contract with Well Control Provider.
Emergency BOP Intervention	Initiation of emergency BOP intervention by ROV within 9 days of LOWC	SCERP demonstrates capability to meet required timelines per Figure 4-2 for well containment activities.

Control Measure	Performance Standard	Measurement Criteria
	The AGR Project Drilling Manager will ensure that Emergency ROV BOP Intervention (if Rig cannot deploy and separate vessel is required) Safety Case Revision preparatory works if the deployment vessel is defined as a Facility.	AGR maintains in-house experienced / qualified Safety Case expertise for completion of vessel-based Emergency ROV BOP Intervention.
Debris Clearance	Mobilisation of debris clearance equipment to site within 21 days	SCERP demonstrates capability to meet required timelines per Figure 4-2 for well containment activities.
	The AGR Project Drilling Manager will ensure that debris removal equipment is available during the Activity on a call-off basis within the required timeframe.	Executed call-off contract for debris removal equipment with Well Control Provider.
Capping Stack Deployment	Deployable capping stack (with suitable vessel) available on site within 21 days	Incident Action Plan records.
	The AGR Project Drilling Manager will ensure that capping stack is available during the Activity.	SCERP demonstrates capability to meet required timelines per Figure 4-2 for well containment activities.
	The AGR Project Drilling Manager will ensure that capping stack Safety Case preparatory works, addressing any relevant learnings from the DISC and industry knowledge on comparable activities, are completed prior to entering the reservoir.	AGR maintains in-house experienced / qualified Safety Case expertise for completion of Capping Stack Safety Case Revision preparatory works.
	In the event that no Capping Stack ISVs are forecast to be in Australia during Activity, an ISV Mobilisation Plan developed at least 3 months prior to the Activity, that: • Identifies suitable alternative ISV(s) • Evaluates reactivation / mobilisation • Associated Safety Case and IMS approvals • Demonstrates capability to meet SCERP timelines for relief well drilling.	ISV Mobilisation Plan identifies suitable ISV, and associated Safety Case requirements, mobilisation timelines.

Control Measure	Performance Standard	Measurement Criteria
Relief Well Drilling	Relief well drilled and dynamic kill, within 80 days	Mutual Aid agreement MoU in place with other operators to allow use of their MODU, where available, for drilling relief well.
	Relief well casing and wellhead pre-arranged prior to the Activity.	Agreement(s) in place.
	Geophysical site survey, mooring analysis and conductor fatigue analysis conducted for relief well location/MODU prior to entering the reservoir that address: • Most onerous MODU mooring; and • Heaviest feasible BOP.	1. Site survey report incorporating primary and relief well locations. 2. Mooring analysis report. 3. Conductor analysis report.
	Mutual Aid agreement MoU in place with other operators to allow use of their MODU, where available, for drilling relief well.	Signed APPEA Mutual Aid MoU.
	IC initiates WCP within 3 hours of loss of well control notification.	Incident response logs.
	The AGR Project Drilling Manager will ensure that Relief Well Safety Case Revision preparatory works are completed prior to entering the reservoir.	AGR maintains in-house experienced / qualified Safety Case expertise for completion of Safety Case Revision preparatory works after primary MODU safety case is issued and prior to entering the reservoir.
	In the event that no MoU-MODUs are forecast to be in Australia during Activity, a MODU Mobilisation Plan developed at least 3 months prior to spud, that: • Identifies suitable alternative MODU(s); • Evaluates reactivation / mobilisation; • Requirements, including tow and associated Safety Case and IMS approvals; and	MODU Mobilisation Plan identifies suitable MODU, and associated Safety Case requirements, importation / reactivation requirements and anticipated timelines.

Control Measure	Performance Standard	Measurement Criteria
	• Demonstrates capability to meet SCERP timelines for relief well drilling[1].	

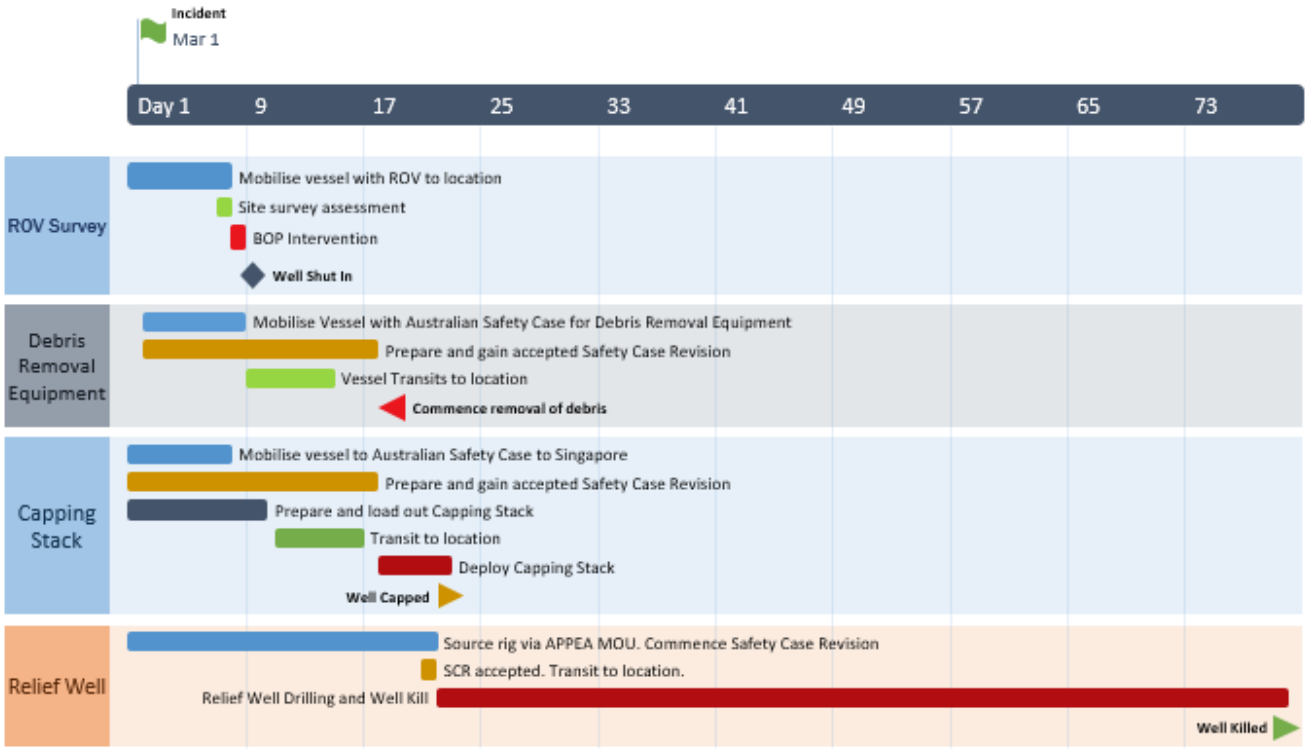


Figure 4-2 Sasanof-1 Source Control Plan Timeline

4.3 MONITORING, EVALUATION AND SURVEILLANCE

4.3.1 Overview

Monitoring, Evaluation and Surveillance (MES) activities are undertaken to assist in anticipating resources at risk of exposure, directing response resources and evaluating the effectiveness of response techniques. MES activities are conducted throughout the incident response. This OPEP includes MES tactics that may be used to evaluate the parameters and potential trajectory of the spill and may include one or more of the following:

1 It is currently expected that at least two and likely additional suitable MODUs will be on long term operational contract in Australian waters at the time of the Activity. MODUs operating within southeast Asia waters could also be mobilised to site within required timeframes. In the extremely unlikely event that no suitable MODU was forecast to be available in Australian waters or the broader region that could be mobilised within the SCERP timelines, the MoC process (EP Section 9.8) will be initiated, and additional / alternative measures considered to ensure risks continue to be managed to ALARP.

- Fate and weathering modelling – computer modelling and computational techniques to estimate the weathering of an oil spill;
- Trajectory modelling – computer models and computational techniques to estimate the speed and direction of movement, weathering and dispersal patterns;
- Visual observation (from aircraft and/or vessels) – observers on aircraft or vessels use standard references to characterise oil slicks; and
- Remote sensing – uses remote sensing technologies, including tracking buoys and satellite imagery, to identify and track surface oil.

Table 4-7 provides guidance for implementing MES for the Sasanof-1 Exploration Drilling Program (this is guidance only and the IC may vary tasks as appropriate). MES tactics will be terminated in accordance with the process detailed in Section 4.6.4.

Table 4-7 Monitoring, Evaluation, and Surveillance Implementation Guide

MES Tactic	Action	Complete
Information gathering	Obtain weather data via of the Bureau of Meteorology (http://www.bom.gov.au/) for the spill location.	

Hydrocarbon, distribution, fate and weathering assessment	Conduct hydrocarbon distribution, fate and weathering assessment to further develop response strategies:
	• Spill fates, weathering and trajectory (for marine spills) modelling – conduct internally, through AMOSC; or conduct through AMSA National Plan arrangements.
	  ○ If using AMSA, complete then email the AMSA Oil Spill Trajectory Modelling (OSTM) request form, available from: http://www.amsa.gov.au/environment/maritime-environmental-emergencies/national-plan/General-Information/SPILLREQUEST/index.asp
	  ○ If using AMOSC – Initiate via AMOSC Duty Manager.
	• Undertake ADIOS modelling using hydrocarbon characteristics detailed in the EP https://response.restoration.noaa.gov/adios
	• Conduct satellite/optical imagery (through AMSA, AMOSC and OSRL)	

Vectoring	Use vectoring to identify predicted spill trajectory. https://response.restoration.noaa.gov/sites/default/files/Trajectory_Analysis_Handbook.pdf	
Tracking Buoy Monitoring	Confirm deployment of satellite tracking buoys (if Level 2/3 incident). Access oil spill tracking buoy live feed data if a buoy has been deployed from the vessel / MODU: • Buoy service will be activated prior to spudding well and vessel and rig operators will be trained on their deployment. • Western Gas – through Metocean Services - can log into the tracking buoy account and monitor location.	
Aerial Observation	Mobilise Aerial Observation aircraft (if Level 2/3 incident) to commence operations in daylight hours (through AMOSC). Initial aerial observation to be conducted from crew change helicopter supplier followed by contractors identified through AMOSC.	
Marine Observation	Obtain vessel observations from any vessels on location / spill source vessel (if appropriate)	

MES Tactic	Action	Complete
Satellite Imagery Observation	Access satellite imagery through AMOSC.	

4.3.2 Oil Spill Trajectory Calculation

Spill Size Estimation

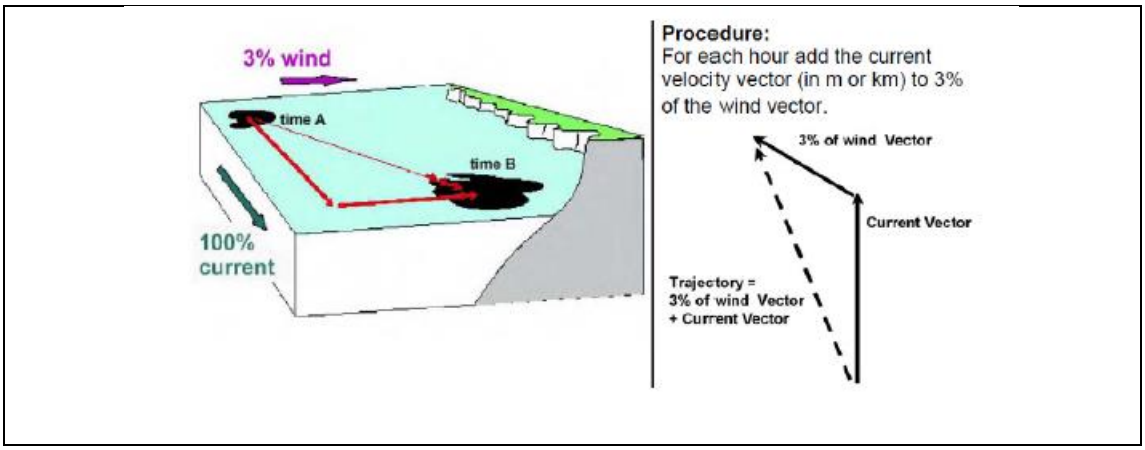
The spill size may be determined based upon the estimated amount of hydrocarbon released from a 'known' hydrocarbon inventory; an estimate of release rates from time of the commencement of the incident; or an estimate of the appearance of oil on the sea surface based upon the likely thickness and type of oil (Table 4-8 and Figure 4-4).

Spill Movement

The movement and behaviour of an oil slick may be manually estimated by undertaking vector calculations. Manual calculations can commence as soon as the preliminary information on the spill is known and proposed within 3 hours of the spill. For spills in close proximity to shore, this method may provide the best option for predicting the likely spill trajectory and timeframes before protection priorities are impacted. Manual estimation of oil trajectory movement applies only to floating oil on the sea surface.

Prior to commencing the calculation, the wind and current data is required. This can be accessed via the Bureau of Meteorology observation station (winds) (http://www.bom.gov.au/wa/observations/waall.shtml).

The calculation is based on the spill moving 100% of the current vector and 3% of the wind vector, as shown in Figure 4-3.



Source: AMSA (2003).

Figure 4-3 Spill vectoring overview

Hydrocarbon Weathering

The Automated Data Inquiry for Oil Spills (ADIOS) can be used to provide weathering predictions of hydrocarbon types for spill volumes at different wind speeds and water temperatures. This computer-based oil spill response tool is available to download from: http://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/response- tools/downloading-installing-and-running-adios.html.

4.3.3 Visual Observation - Aerial Surveillance

In the event of a Level 2 or 3 Gas Condensate or MDO release, surveillance will be carried out via aerial means to gain situational awareness and inform the spill response. Aerial surveillance will be commissioned by the IC.

AMOSC has access to the fixed wing service providers and provide accredited marine pollution aerial observers as part of the AMOSC Core Group.

Requests for aircraft to conduct aerial observations should be made by the IC to the AMOSC.

Trained aerial observers are also available through AMSA (NRT Members). The observers will undertake observations over the spill location and any predicted areas of shoreline contact.

From aerial observations, coarse estimates of spill volume can be made on the basis of its appearance at sea, using the area covered and colour of spill (Table 4-8). Examples of appearance are provided in Figure 4-4. Bonn Agreement Oil Appearance Code.

AMSA provides guidance called 'Identification of Oil on Water – Aerial Observation and Identification Guide' which can be found at: https://www.amsa.gov.au/forms-and-publications/Publications/AMSA22.pdf.

Aerial observations should be documented in the format shown in the Aerial Observer log forms in Appendix A.

Table 4-8 Guidelines for estimating spill volume

Code	Description of appearance	Approximate thickness (µm)	Approximate litres per km^2
1	Silvery	<0.05 to 0.1	
2	Grey	0.1 to 0.30	40-300
3	Rainbow	0.3 to 5.0	300-5,000
4	Metallic	5.0 to 50	5,000-50,000
5	Discontinuous true oil colour (heavy oil)	50 to 200	50,000 – 200,000
6	Continuous true colour (heavy oil)	>200	>200,000
Other	Mousse or emulsion		

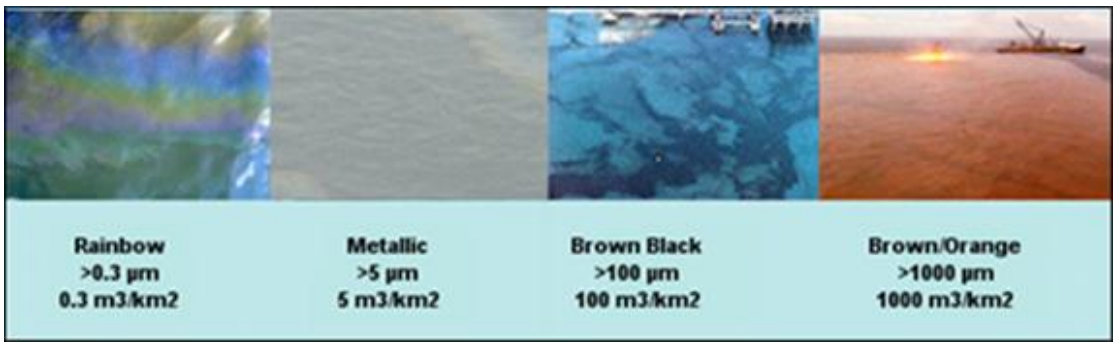


Figure 4-4. Bonn Agreement Oil Appearance Code

Aerial Observer logs that must be completed by the aerial observer and emailed to the DIMT after each flight are available in Appendix A.

Table 4-9 Aerial surveillance resources

Resource	Requirements	Provider
Trained Oil Spill Response personnel	1 x Aerial Observer (trained)	AMOSC AMSA NRT
Air Support	1 x Aircraft & Pilot	AMOSC Contracts

4.3.4 Visual Surveillance – Vessels

For a Level 2 or 3 spill, monitoring and evaluation will be undertaken to assess the natural weathering process and identify the location of the slick. In all cases this will involve visual monitoring from vessels of opportunity (as available) following a spill incident. Contracted vessels could be onsite within 20 hours.

Spill observers may include project team members, vessel crew and in the event of a Level 2 or 3 spill, AMOSC Core Group Resources and / or AMSA NRT members.

Depending on the scale of the spill, additional vessels may need to be chartered for various tasks such as monitoring, deployment of spill deflection and protection equipment and recovery of personnel and equipment.

Any vessel that is chartered must be commercially registered and suitable for its intended purpose. Once a suitable vessel has been identified, the Logistics Officer must organise an official contract for supply.

4.3.5 Oil Spill Tracking Buoys

Both vessels involved in the activity will carry an oil spill tracking buoy for deployment in the event of a Level 2 or 3 spill. Instructions will be provided to Vessel Master for the deployment of the buoy.

At the time of a spill, the monitoring buoy will be activated and deployed overboard to allow for real-time satellite tracking of the spill (Level 2 or 3 only). The buoys' location will be monitored through regular data downloads (every 30 minutes).

4.3.6 Oil Spill Trajectory Modelling

The DIMT is able to assess the movement of a hydrocarbon slick using computerised OSTM using RPS via its arrangements with AMOSC to undertake real-time modelling of an actual spill event to available from AMSA.

OSTM is available through AMOSC, who have a standing contract with RPS APASA or through AMSA upon request (submit an electronic request via the NEMO system, phone AMSA Rescue Coordination Centre 02 6230 6811 (24 hrs) or by request form via the AMSA Contractor Portal/Modelling Access Portal on the National Environmental Maritime Operations (NEMO) (https://amsa-forms.nogginoca.com/). NEMO is AMSA's cloud-based customisable incident management system, designed to manage and monitor all national pollution and maritime casualty incidents. Information is captured from multiple sources and in a variety of formats to provide a real-time common operating picture during maritime environmental emergencies. It delivers information management and decision support tools that assist AMSA and the States / Northern Territory during NatPan activations.

To predict the early movement of larger spills, real-time OSTM will be conducted. Preliminary modelling results are generally available within 2-3 hours of an initial request following a spill event.

For Level 1 spills, Western Gas will not undertake OSTM due to the limitations of using the model near shore with small volumes. Aerial observations will be used to ground-truth the spill location.

Table 4-10 Summary of the MES strategy

Requirement	Spill Level			Outcome	Minimum resources	Provider	Minimum standard
	1	2	3				
Visual observation – vessels of opportunity (VoO)	-	Y	Y	Identify extent and trajectory of spill. Record visual characteristics.	1 x vessel & crew 1 x Observer	Sasanof-1 Project Contracted Support Vessel	VoO onsite within 48 hours

Requirement	Spill Level			Outcome	Minimum resources	Provider	Minimum standard
	1	2	3				
						Sasanof-1 Project Team Contract Personnel	
Visual observation – aircraft	-	Y	Y	Identify the extent and trajectory of the spill, record visual characteristics	1 x Aircraft 1 x Observer	AMOSC AMSA NRT	Onsite within 12 hours of request
Satellite tracking buoys	-	Y	Y	Imagery to identify the trajectory of the spill and ground truth computer modelling	1 x satellite tracking buoy on Survey Support Vessel	Advisian and/or AMOSC	Deployed immediately after a spill support vessel/s
Oil spill vectoring	-	Y	Y	Identify the likely trajectory and fate of spill using real time parameters. Predict timeframes to contact environmental sensitivities.	1 x person with spill assessment training	DIMT Planning Unit or DIMT Intelligence Unit	Undertaken within 3 hours from oil spill notification
OSTM	-	Y	Y	Model the likely trajectory and fate of pill using available data. Predict timeframes to contact environmental sensitivities	Contract with RPS via AMOSC or AMSA.	RPS	Results within 4 hours of spill notification

Requirement	Spill Level			Outcome	Minimum resources	Provider	Minimum standard
	1	2	3				
Satellite Monitoring (note remote sensing only effective if layer is >60 ppm in water)	-	Y	Y	Identify extent and trajectory of spill. Record visual characteristics of surface exposure coverage (>25 micron).	Remote Sensing via AMSA NatPan	AMSA	Will depend which satellite used and varies between 6 – 12 hours

4.3.7 MES Summary & Performance Standards

Table 4-11 provides a summary of the performance standards for the MES strategy.

Table 4-11 MES Performance Standards and Measurement Criteria

Control Measure	Performance Standard	Measurement Criteria
Satellite Tracking Buoys	Satellite tracking buoy deployed from MODU / support vessel within 1 hour of spill.	• MODU / vessels storage logs confirm tracking buoys on-board; • Emails between Vessel Master and DIMT confirm commencement of tracking; • Incident log indicates tracking buoys deployed; • Operational web-based buoy tracking portal; and • Archive of satellite tracking buoy data.
Vessel Surveillance	Surveillance with contracted support vessel(s) undertaken within 30 minutes (if it is available for surveillance activities) of spill notification.	• DIMT logs; • Vessel logs; • Completed OS1 vessel; and • Completed Observation sheets.
	Vessel surveillance with untrained observers within 24 hours of IMT activation.	
	Ongoing vessel surveillance information regularly available until termination criteria met.	

Control Measure	Performance Standard	Measurement Criteria
Aerial Surveillance	Aerial surveillance requested by DIMT within 3 hours and initial survey within 24 hours (daylight permitting) with untrained observers and 48 hours with trained observers.	• DIMT logs; • Flight logs; and • Associate Membership with AMOSC for core • group access.
	Aerial surveillance observations made available to DIMT within 1 hour of completion of flight.	• DIMT logs; • Completed OMS-1 aerial observation data sheets or similar reporting; and • Flight logs.
	Provision of aerial surveillance observations to RPS APASA within 4 hours of receipt.	• Emails between DIMT and OSTM service provider; and • Incident log indicates date and time of aerial surveillance observations sent to RPS APASA.
Satellite Imagery	Satellite imagery provided ad hoc (as required) to DIMT at frequency requested to track spill trajectory.	• Emails between DIMT and AMOSC; • DIMT Incident log; and • Archive of satellite imagery.
	Provision of satellite imagery to RPS APASA within 4 hours of receipt.	• Emails between DIMT and RPS APASA; and • Incident log indicates date and time of satellite imagery sent to RPS APASA.
OSTM	OSTM commissioned within 2 hours of OMS-1 initiation.	• Emails between DIMT, and RPS APASA show date and time of OSTM request; and • Completed SAP OMS-1 initiation checklist.
	OSTM continues until spill source is controlled and no further regions affected by the spill.	• DIMT access-enabled web portal with quasi-real-time modelling results; and • OSTM forecast report(s) to DIMT

4.4 OILED WILDLIFE RESPONSE

4.4.1 Overview

A marine oil pollution incident has the potential to immediately impact wildlife. As such, rapid establishment of the Wildlife Branch, activation of an oiled wildlife response contractor, and the immediate implementation of wildlife response actions are critical for the prevention and mitigation of impact to wildlife and responding to oiled animals through capture and rehabilitation.

The level of escalation of the OWR is determined by the DIMT, informed by advice from Western Gas and Parks and Wildlife Oiled Wildlife Advisors and data collected via initial MES tactics. The OWR will be conducted in accordance with the WA Oiled Wildlife Response Plan (WAOWRP) (Parks and Wildlife & AMOSC 2014). This overarching document provides the framework for OWR, with the regional context and detail required to carry out an OWR provided in seven regional response plans. The relevant Regional Oiled Wildlife Response Plan(s) will be enacted following initial MES information. Table 4-12 provides the steps to be undertaken by the DIMT and is consistent with the OWR framework outlined in the WAOWRP.

Table 4-12 Oiled Wildlife Response Implementation Guide

Tactic	Implementation / Activation Guide	Complete
OWR Activation	Notification of Department of Parks and Wildlife State Duty Officer as per Table 3-4. The State Duty Officer will contact the Parks and Wildlife Oiled Wildlife Advisor (OWA) to provide advice to the Control Agency.	
OWR Plan Activation and Escalation	Activate the relevant Regional Oiled Wildlife Response Plan(s) in accordance with the Western Australian – Oiled Wildlife Response Plan (Parks and Wildlife & AMOSC 2014). https://www.dpaw.wa.gov.au/images/documents/conservation-management/marine/wildlife/West_Australian_Oiled_Wildlife_Response_Plan_V1.1.pdf Notify key stakeholders as outlined in the relevant regional OWR plan, based on preliminary reports and trajectory information.	
Wildlife First Strike Response	Activate the relevant Regional Oiled Wildlife Response Plan in accordance with the Western Australian – Oiled Wildlife Response Plan. Undertake the Wildlife First Strike Response steps outlined in the Western Australian – Oiled Wildlife Response Plan.	
Mobilisation of Resources	Mobilise personnel, equipment and facilities in coordination with AMOSC and Parks and Wildlife.	
Wildlife Reconnaissance	Determine potential wildlife resources at risk based on initial MES data (aerial and marine observation). If shoreline contact is predicted, mobilise personnel to conduct shoreline observations. Focus resources on potential populations at risk, based on trajectory analysis (MES tactics).	

	Information gained from these surveys is key to mounting effective deterrence, search and capture, and response efforts and will be used to determine the scope and scale of wildlife response.	
Incident Action Plan Wildlife Sub-Plan	Develop the Incident Action Plan Wildlife Sub-plan in coordination with regulatory agencies (DAWE, DBCA, WA DoT) and AMOSC based on known conditions and information gathered from wildlife reconnaissance and MES. The sub-plan is to be modified or amended throughout the incident as needed when conditions change. The sub-plan is to include the appropriate response options: • Wildlife priorities for protection from contact with oil; • Deterrence measures; and • Recovery and treatment of oiled wildlife; resourcing of equipment and personnel.	
Wildlife Rescue and Staging	Based on daily wildlife monitoring observations and assessment of oil-impacted wildlife, determine location of wildlife rescue effort locations (where there are known concentrations of impacted animals) and appropriate rescue methods based on individual animal health condition or potential for rapidly declining health secondary to oiling. Mobilise OWR kit(s) and containers managed by AMSA, AMOSC to site.	
Wildlife Rehabilitation	Rehabilitate oiled wildlife immediately after an incident in accordance with the practices outlined in the Western Australian – Oiled Wildlife Response Plan and the Incident Action Plan Wildlife Sub-plan.	
Oiled wildlife carcass collection	Recover dead oiled wildlife at sea as part of ongoing oil recovery operations. Oiled wildlife carcasses will be bagged and labelled and transported in accordance with approved wildlife response plan.	
Marine mammal and turtle sampling/necropsy	Investigate marine mammal and turtle strandings, collect samples and conduct carcass necropsy as determined on a case-by-case basis. WG to request AMOSC assistance whenever needed.	
Waste Management	Refrigerate carcasses to preserve for pathology studies and reduce potential for further contamination. Oil contaminated wastes and carcasses to be managed in accordance with local council and waste contractor requirements.	

4.4.2 Oiled Wildlife Performance Standards

Table 4-13 provides a summary of the performance standards for Oiled Wildlife Response.

Table 4-13 Oiled Wildlife Response Performance Standards

Control Measure	Performance Standard	Measurement Criteria
OWR Planning	Maintain AMOSC Associate membership to ensure that equipment and personnel can be provided.	• AMOSC Associate Membership contract.
	DBCA notified as soon as possible after sighting of oiled wildlife.	DIMT records verify that verbal and/or written notification was provided to DBCA as soon as possible after sighting.

4.5 WASTE MANAGEMENT

Oil spills to the marine environment can generate significant amounts of oily waste that need to be collected and disposed of properly, in accordance with MARPOL 73/78 Annex V – Garbage, relevant Commonwealth and State/Territory laws and regulations.

Immediately upon knowledge of an oil spill, Western Gas will develop an Oil Spill Waste Management Plan (OSWMP) in consultation with AMOSC and the relevant control agency. The OSWMP will ensure the ongoing supply and backload of appropriate waste management equipment.

Based on the hydrocarbon characteristics of diesel and condensate, and the predicted outcomes of the modelling of credible worst-case spill scenarios, large volumes of waste are not expected to be generated. Waste generated from the spill is anticipated to be managed and contained within small transportable waste receptables, suitable for the storage capacity on support vessels and port waste reception facilities.

All waste stored or transferred will be fully documented, including details of exact volume and nature of the waste, date and time, receiver of the waste and destination of the waste, in accordance with vessel Garbage Management Plans and the onshore licenced waste contractor's waste tracking process.

4.6 INCIDENT ACTION PLANNING

The Incident Action Planning process governs the ongoing response following the initial response phase (first 24 hours). During the initial response phase, initial response (or 'first-strike') actions and notifications are undertaken and the required spill response teams are activated.

An Incident Action Plan (IAP) is developed for each Operational Period (as defined by the IC) following the initial response. The IAP informs incident personnel of the objectives for that operational period, the specific resources that will be applied, actions taken during the operational period to achieve the objectives, and other specific operational information (e.g. weather, constraints, limitations, etc). The Initial IAP facilitates the transition from the Initial Response phase to an ongoing incident response (Figure 4-5). IAP Templates are shown in Appendix A.

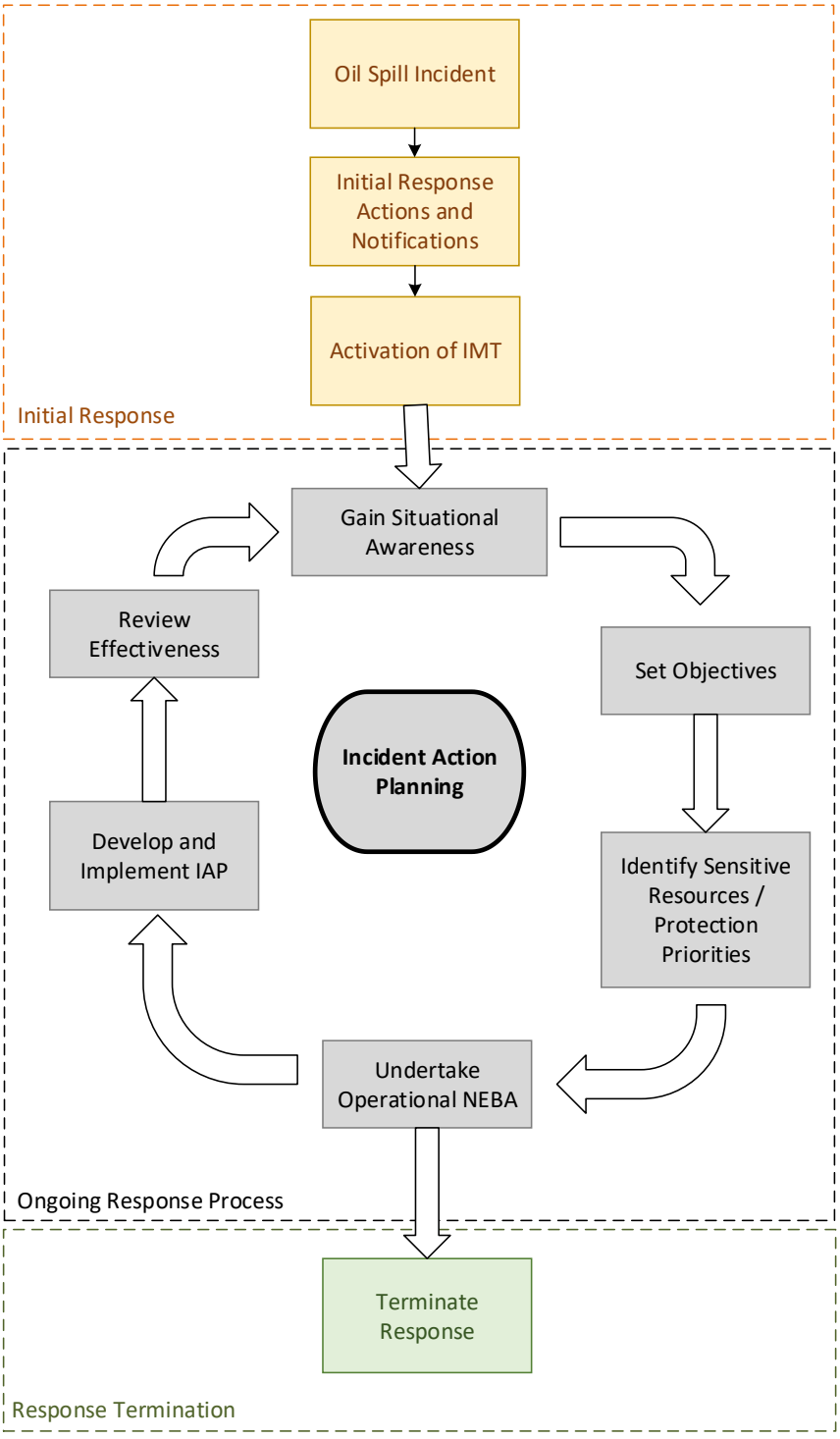


Figure 4-5 Incident Action Planning and Response Phases

4.6.1 Identify Sensitive Resources and Protection Priorities

The following strategic response priorities have been adopted for this OPEP and are consistent with the overall protection priorities detailed in the National Plan and State Hazard Plan – Maritime Environmental Emergencies:

- Priority 1 – Human health and safety;
- Priority 2 – Protected habitats and cultural artefacts;
- Priority 3 – Threatened flora and fauna;
- Priority 4 – Commercial resources; and
- Priority 5 – Recreational and amenity areas.

These priorities provide context to decision-making when evaluating spill response options and selecting the overall response strategy and are continuously reviewed and assessed when reviewing feasibility and effectiveness of response options throughout a spill event.

Western Gas has further adopted the WA Department of Transport protection priority ranking process (DoT 2018) for socio-environmental receptors, to ensure a standardised and consist approach in the event of cross-jurisdictional response management. Each sensitive receptor has been given a classification from Very Low to Very High in order to rank their priority for protection in an oil spill (Table 4-14), taking into consideration the receptor's vulnerability and/or sensitivity to a marine oil spill (DoT 2018).

Table 4-14 Department of Transport Protection Priority Ranking

Protection Priority	Ranking
Very High	5
High	4
Medium	3
Low	2
Very Low	1

The environment that may be affected (EMBA) by an unplanned oil spill event associated with the Sasanof-1 Exploration Drilling Program is detailed in Section 5.0 of the EP. In the event of an oil spill, information from MES tactics will be used to identify potential ecological and socio-economic receptors at risk as detailed in the EP, and their protection priority ranked based on Table 4-14 (DoT 2018). This will be used to inform the IAP process.

4.6.2 Operational Net Environmental Benefit Analysis (NEBA)

A Preliminary NEBA has been conducted for the Sasanof-1 Exploration Drilling Program and is outlined in Section 7.0 of the EP, and the spill response strategies selected detailed in Section 4.1 of this OPEP.

In the event of an oil spill, the DIMT will undertake an Operational NEBA, intended to validate the assumptions made in the Preliminary NEBA, and identify any new parameters which have not been considered. The actual spill event parameters, such as the spill rate and volume, location and current metocean conditions and forecasted metocean and weather conditions, the seasonality of environmental sensitivities, will provide input into the Operational NEBA to assess the applicability and likely effectiveness of spill response tactics, along with the potential impacts and challenges of implementation given the parameters of the spill. An Operational NEBA will be undertaken / reviewed during the development of IAPs.

Any changes to the identified response options included in this OPEP will be assessed in accordance with the Management of Change process described in the EP.

4.6.3 Review Effectiveness

The effectiveness of the response is assessed every Operational Period, based on updated situational awareness (i.e. updates in predictive modelling and MES data, current environmental conditions, hydrocarbon release status and weathering). Where a change to operational conditions has occurred, the effectiveness review process may be conducted using the Operational NEBA. The outcomes of the review of response effectiveness informs the IAP process.

The ‘Review Effectiveness’ process is conducted until the termination criteria have been met (Section 4.6.4). An Operational NEBA will be used to inform the decision to terminate the response.

4.6.4 Terminate Response

The Control Agency is responsible for the decision to terminate response operations. In order to terminate response to a marine oil spill, the following requirements must be met:

- The source of the spill has been stopped;
- The objectives of the IAP have been met; and
- There are no further practicable steps that can be taken to respond to the spill.

This may include a gradual downsizing of response teams, resources and termination of certain response tactics, or complete termination of the response. An Operational NEBA will be conducted with the relevant DIMT members, liaison officers and stakeholders to inform the decision to terminate a particular response strategy. Termination of response in WA State waters will be agreed with DoT.

Key considerations include:

- The efficacy and benefit of the response options implemented against natural attenuation and weathering;
- The significance of the environmental receptor impacted; and
- Potential for environmental damage caused by further response efforts and other detrimental factors such as health and safety risks associated with the activity.

Table 4-15 provides termination criteria for the spill response options included in this OPEP. These termination criteria are intended as guidance and are not considered an exhaustive list. Termination criteria may change due to the actual parameters in the event of a spill, response team / liaison officer advice, or stakeholder engagement during a spill.

Table 4-15 Spill Response Termination Criteria

Response Option	Termination Criteria
Source Control	• Vessel spill - source has been eliminated (e.g. fuel tank is secure) or the leak has been contained and controlled onboard. • LOWC - hydrocarbon release has been contained and well control re-established.
Monitoring, Evaluation and Surveillance	• Source control has terminated (spill source eliminated/contained). • The spill is no longer visible to human observers (silver/grey sheen as defined by the Bonn Agreement (BAOAC 2007) is not observable and 24 hrs has elapsed since the last confirmed observation of surface hydrocarbons). • Modelling results do not predict surface exposures at visible levels.
Oiled wildlife response	• Response is discontinued when all affected/recovered animals are cleaned and rehabilitated as advised by relevant expert bodies. *To be determined in consultation with DAWE, DBCA, WA DoT) and AMOSC.*
Waste management	• All waste generated from spill response activities has been appropriately disposed of.

4.7 OPERATIONAL AND SCIENTIFIC MONITORING PLAN

The Operational and Scientific Monitoring Plan (OSMP) has primarily been developed to achieve operational monitoring 'readiness' in the event of an unplanned Level 2 or Level 3 spill from the activity.

In the unlikely event of a Level 2 or Level 3 incident, Western Gas will immediately initiate OMSs and SMSs according to the relevant monitoring strategy initiation criteria and sensitivities affected or with potential to be affected by an actual spill event.

Responsibilities for managing implementation of the OSMP and delivery of the information required within the context of a coordinated spill response required for a Level 2 or Level 3 spill incident will probably lie within the Environmental Unit (EU) of the DIMT.

The OSMP is triggered when initiation criteria for the various assessment components are met. Those MES tactics that are associated with protecting environmental receptors are addressed in the OSMP, with initiation and termination triggers provided in the OSMP. A summary of the OSMP is provided here

4.7.1 Scope

The Sasanof-1 Exploration Drilling OSMP has been prepared as a separate document in support of this OPEP. The OSMP provides a comprehensive description of the response phase and recovery phase monitoring programs that may be implemented in the event of a Level 2 or Level 3 hydrocarbon spill from the proposed activity. Monitoring methodologies are defined in individual sampling and analysis plans (SAPs) prepared for each response phase and recovery phase monitoring study, which underpin the OSMP in the event of a Level 2 or 3 Gas Condensate or MDO release.

The objectives of the OSMP are to:

- Identify high priority protection areas within the EMBA in real time;
- Specify response phase (operational) and recovery phase (scientific) monitoring methodologies;
- Detail the process that Western Gas and the DIMT will follow to determine the monitoring studies that will be implemented in order to:
- Provide situational awareness and assist in planning and execution of spill response to minimise environmental harm; and
- Provide for short-term and long-term environmental damage and recovery assessments.

In the event of a worst-case scenario where recovery phase monitoring is required for a Level 2 or 3 MDO release, Western Gas will utilise the scientific resources of a qualified marine science contractor to provide the required Principal Investigator (PI) and Monitoring Personnel (MP) outlined in the OSMP. Response phase monitoring would be implemented as part of the DIMT.

4.7.2 OSMP Framework

In the event of a Level 2 or Level 3 hydrocarbon spill during drilling activities, operational monitoring plans (OMPs) will be implemented to inform spill response and quantify the extent of the spill impact. In addition, scientific monitoring plans (SMPs) will be implemented to evaluate the potential environmental impacts to the marine environment. OMPs and SMPs are developed based on:

- The values and sensitivities of receptors within the EMBA and hydrocarbon exposure area;
- The potential impacts and risks of MDO and gas/condensate spills;
- The assessment of spill response options and selection of an overall spill response strategy.

The OSMP includes:

- Monitoring strategies for OMPs and SMPs that have been deem relevant for this activity. The strategies provide details on the monitoring performance outcomes, monitoring standards, measurement criteria, initiation triggers, and termination criteria.
- Referenced Sampling and Analysis Plans (SAPs) to detail the technical aspects of each of the monitoring studies such as field methodology, data analysis and reporting.

4.7.3 Monitoring Studies

OMPs and SMPs to be implemented in the event of a Level 2 or Level 3 spill during drilling activities are summarised in Table 4-16.

Table 4-16 - List of OSMP Studies

Study ID	Study Name	Monitoring Outcome	Study Initiated
Operational Monitoring Studies			
OMP-1	Operational Forecast Modelling	Carry out daily real-time predictions (forecasts) of the temporal / spatial distribution and concentrations of hydrocarbons on the surface and within the water column via numerical modelling.	
OMP-2	Desktop pre-emptive assessment of receptors at risk.	Desktop assessment to assist in the development of response priorities: • Sensitive areas to be identified to assess potential impact and effects; and • Potential impact to sensitive areas determines priorities for protection, response or clean-up.	
OMP-3	Hydrocarbon Spill Surveillance and Tracking	Conduct surveillance and tracking of surface hydrocarbon spill distribution	
OMP-4	Hydrocarbon Characterisation and Weathering Assessment	To determine the physical and chemical properties of hydrocarbon as it weathers to characterize temporal decrease in toxicity	
OMP-4	Water Quality Assessment	Conduct intertidal and subtidal water quality monitoring to provide a rapid assessment of the presence, type and concentrations of oil (and	

Study ID	Study Name	Monitoring Outcome	Study Initiated
		dispersant chemicals where relevant) in offshore and intertidal waters and provide data to validate forecast / hindcast modelling.	
OMP-6	Sediment Quality Assessment	Conduct intertidal and subtidal sediment quality monitoring to provide a rapid assessment of the presence, type and concentrations of oil (and dispersant chemicals where relevant) in subtidal and intertidal sediments.	
OMP-7	Marine Fauna Surveillance	Conduct fauna surveillance to provide a rapid assessment of the presence, type and location of oiled marine fauna.	
Scientific Monitoring Studies			
SMP-1	Ecotoxicology Assessment of Hydrocarbons	Undertake eco-toxicological studies to establish hydrocarbon exposure thresholds for sensitive biotic receptors to assist with the assessment of impacts to environmental sensitivities affected by the spill.	
SMP-2	Water Quality Monitoring	Monitor hydrocarbons in marine waters at subtidal and offshore intertidal impact sites (which may include where relevant: priority/sensitive locations, State or Commonwealth marine protected areas, pelagic sites, commercial fishery areas) and reference sites to support the assessment of environmental impacts and recovery.	
SMP-3	Sediment Quality Monitoring	Monitor hydrocarbons in marine sediments at subtidal (rocky reef), pelagic sites, commercial fishery areas and reference sites to support assessment of environmental impacts and recovery.	
SMP-4	Benthic Habitat Monitoring	Monitor subtidal and intertidal habitats (e.g. sponge gardens) including demersal fish and priority sensitive locations and one reference site to support the assessment of environmental impacts and recovery.	
SMP-5	Seabird Population Monitoring	Monitor seabird populations to assess potential impacts to, and subsequent recovery following a hydrocarbon release.	
SMP-6	Marine Megafauna (reptiles) Surveys	• To observe and quantify the presence of marine reptiles (including life stage) within the area affected by hydrocarbons; and • Where possible, assess and quantify lethal impacts and/or sub-lethal impacts directly related to the hydrocarbon spill or other secondary spill-related impacts (including vessel strike and/or use of dispersants).	
SMP-7	Marine mega-fauna (mammals) monitoring	Monitor short and long-term environmental effects on marine mammals that may have resulted from the hydrocarbon spill and associated response.	
SMP-8	Marine fish assemblage monitoring	Provide information to help understand the impacts to benthic habitats from hydrocarbons and/or associated response activities and should inform any restoration or remediation activities that may need to be implemented.	
SMP-9	Fisheries monitoring	To monitor potential contamination and tainting of important finfish and shellfish species from commercial, aquaculture and recreational fisheries	

Study ID	Study Name	Monitoring Outcome	Study Initiated
		to evaluate the likelihood that a hydrocarbon spill will have an impact on the fishing and/or aquaculture industry.	

4.7.1 OSMP Environmental Performance Outcomes

The environmental performance outcomes, standards and measurement criteria related to the Sasanof-1 OSMP are shown below in have been defined in Table 4-17.

Table 4-17 OSMP Environmental Performance Measurement

Environmental Performance Outcome	Control Measure	Environmental Performance Standard	Measurement Criteria
Undertake oil spill response in a manner that will not result in additional impacts to marine environment, coastal habitat and oiled wildlife.	NOPSEMA accepted Operational and Scientific Monitoring Plan	Operational and scientific monitoring capability shall be maintained in accordance with the OSMP: • A month prior to the commencement of drilling a review of the contracted OSMP provider/s capability will be undertaken by Western Gas to ensure that the OSMP requirements can be met by the contracted OSMP provider/s. • The contracted OSMP provider/s will provide a report to show that capability as detailed in the OSMP is maintained one week prior to commencement of drilling (As drilling program is only 25 days, no further reports required unless change in OSMP provider capability). • The contracted OSMP provider/s capability to meet the requirements detailed in the OSMP will be tested prior to commencing drilling.	Outcomes of internal audits and tests demonstrate preparedness

5 SPILL RESPONSE RESOURCES

5.1 CAPABILITY AND COMPETENCIES

A response to a Level 2 or Level 3 spill will require specialist skills for an extended period of time. As per Table 5-1, the initial response DIMT manning will be fulfilled by personnel from AGR and other contracted organisations along with provision of additional support to provide complete coverage of all DIMT positions.

Western Gas has conducted an analysis of peak DIMT resourcing requirements and competencies to manage the response in the event of an extended duration 'worst case discharge' scenario, and the capacity to meet those requirements, which is detailed in the tables in Appendix B.

The DIMT can activate several internal and external support agencies if additional support is required. Table 5-1 describes internal and external support agencies, the capability they provide, and the relevant activation procedures.

Table 5-1 Oil Spill Response Support Services and Activation

Support Resource	Support Services Capability	Activation Procedure
Internal Support Resources		
Sasanof-1 Drilling Incident Management Team (DIMT)	Personnel trained in emergency response and crisis management.	DIMT Activation (as described in Section 3.3)
Sasanof-1 Source Control Operations Team	Established for a LOWC Level 2 and above response.	Source Control Emergency Response Plan.
External Support Agencies		
Wild Well Control Well Control Specialist.	Third-party well control first responders: • Mobilising Well Control Specialists and Engineers to the well site and to the AGR Perth office; • Provide logistics support for well control equipment; • Planning and implementation of intervention procedures; • Planning and drilling of relief wells; • Design and implementation of dynamic kills or other special kill procedures. **Equipment:** • Debris Removal Package; and • Subsea Capping Stack System.	Source Control Emergency Response Plan.

Support Resource	Support Services Capability	Activation Procedure

Australian Marine Oil Spill Centre Pty Ltd (AMOSC)	Western Gas is an associate member company in AMOSC and can call on AMOSC personnel and equipment to support oil spill response. Under the AMOSPlan, Western Gas can access mutual aid from other industry company resources (equipment and personnel).
	
	Equipment:
	AMOSC's stockpiles of equipment include dispersant, containment, recovery, cleaning, absorbent, and communications equipment (located in Geelong, Fremantle, and Exmouth).
	• OSTM Tracking buoys; and
	• Australian Subsea First Response Toolkit (SFRT) – Perth.
	Oiled Wildlife Equipment (WA):
	• 2 × Oiled Wildlife Response Kits (Broome, Exmouth);
	• 1 × Oiled Wildlife Container (Fremantle); and
	• Additional equipment based in Geelong, if required.
	Personnel:
	• AMOSC Core Group personnel (approx. 120 persons);
	• Oiled Wildlife personnel (10 personnel trained to Level 2-4 [WA Department of Parks and Wildlife]);
	• Trained OWR personnel (AMOSC developed relationship with):
	  • Blue Planet Marine (Capacity 10-20 OWR responders);
	  • Massey University (Capacity 4-6 OWR responders);
	  • International Bird Rescue (Capacity 4 OWR responders);
	  • Oiled Wildlife Response Kits (Fremantle, Geelong) – 50 units per day; and
	  • Oiled Wildlife Response Containers (Fremantle, Geelong) – 100 units per day;
	• Trained aerial/vessel observers.
	
	Services
	• Spill fates, weathering and trajectory modelling;
	• Hindcast modelling;
	• ADIOS Modelling;
	• Aerial Surveillance; and
	• Satellite imagery.
		First call as early as possible to 24-hour AMOSC Duty Manager emergency number:
		+61 (0) 438 379 328

Australian Maritime Safety Authority (AMSA)	Request for assistance can be made through activation of the National Plan. **Equipment:**	A request should be made initially through the Environment Protection Duty Officer via the Emergency Response Centre on **1800 641 792 or (02) 6230 6811.**

Support Resource	Support Services Capability	Activation Procedure
	AMSA maintains nine strategic equipment stockpiles (WA locations include Fremantle, Exmouth, Dampier, and Broome), including the following resources: • Aerial surveillance support; • Dispersants; • 2 × Oiled Wildlife Response Kits (Fremantle, Karratha); • Oiled Wildlife Response Containers (Dampier, Darwin, Townsville, Karratha, Tasmania) – 100 units per day; and • OSTM Tracking buoys. **Personnel and Services:** • Advisory services and response personnel; • Spill fates, weathering and trajectory modelling; • Satellite/optical imagery.	This request must be followed by written confirmation within three hours of the verbal request.
Department of Transport (WA) (DoT)	There is a State Response Team, Regional Response Team, and a National Response Team that can rapidly deploy. Each Port Authority and Maritime Export Facility holds a quantity of DoT-owned Level 1 containment and recovery equipment.	DoT Maritime Environmental Emergency Response Unit (MEER) 24-hour number: (08) 9480 9924
Department of Biodiversity, Conservation and Attractions (DBCA)	DBCA are the WA State control agency for oiled wildlife response and have equipment and trained personnel capability.	P +61 8 9219 9108
Department of Parks and Wildlife	• Oiled Wildlife Advisor (OWA) - advisory role to IMP • Personnel to assist in coordination of wildlife response (advisors, licencing)	Notify State Duty Officer +61 (0) 8 9219 9108
Aircraft providers	Western Gas is capable of contracting on an as needs basis with aviation. Contracts will not be entered into prior as this does not guarantee supply or impact the mobilisation times.	First call as early as possible to 24-hour AMOSC Duty Manager emergency number: +61 (0) 438 379 328
Vessel providers	Western Gas is capable of contracting on an as needs basis with a range of marine providers including Mermaid Marine, Bhagwan Marine, Australian Marine Services, Offshore Unlimited, Broadsword Marine, Fugro TSM, DOF Subsea, Go Marine Group. Companies able to provide dive support vessels and divers include Neptune Marine, Hallin Marine and CalDive. Western Gas has engaged Clarksons vessel brokers to assist in contracting vessels during a response.	Source Control Emergency Response Plan
ROV providers	Western Gas will have a contract in place with to provide ROV's and ROV project Management Services. Other specialist companies that can provide ROVs include Subsea 7, Deeplink, Intervention Engineering,	Source Control Emergency Response Plan

Support Resource	Support Services Capability	Activation Procedure
	Neptune Marine Services, Tamboritha and Total Marine Technology.	
Licensed Waste Management Contractor (to be contracted)	A licensed Waste Management Contractor will be contracted prior to commencement of the drilling program, and the scope will include management of waste in the event of an oil spill, in accordance with MARPOL 73/78 Annex V – Garbage, relevant Commonwealth and State/Territory laws and regulations.	Sasanof-1 Exploration Drilling Project HSE Plan
Mutual Aid Resources	APPEA MoU: Mutual Assistance for transfer of drilling units for emergency situations.	Source Control Emergency Response Plan
Operational and Scientific Monitoring Services Provider	Principal Investigators (PI) and Monitoring Personnel (MP) as outlined in the Sasanof-1 OSMP.	Astron / BMT M + 61 (0) TBC pre-OPEP Exercise.
Xodus Group	Western Gas has a contract in place with Xodus for environmental support (including response and OSMP implementation). Xodus has access to additional resources if required.	M +61 (0) 458 887 791

The availability of key spill response plant, equipment and personnel from external organisations (e.g. WWC, AMOSC, Astron / BMT) and mobilisation timeframes referred to this OPEP will be confirmed and related contractual arrangements and / or agreements will be in place prior to mobilisation activities commence for the Sasanof-1 Exploration Drilling Program. The peak DIMT sesourcing requirements will be independently analysed and validated by AMOSC and will be subject to testing in an OSR exercise.

6 DEMOBILISATION

6.1 DEMOBILISATION/STAND-DOWN PROCEDURES

6.1.1 Incident Control

Upon conclusion of the spill response operations, the following tasks will be undertaken by the DIMT IC (and/or delegate):

- Advise all relevant contractors and Sasanof-1 project management personnel;
- Advise all relevant government authorities;
- Prepare detailed reports on the response activities and outcomes and collate all documents for secure storage and/or submission to regulators;
- Undertake an inventory of consumables and prepare accounts;
- Arrange for the return and/or refurbishment of equipment;
- Conduct an investigation into the cause of the incident and report to relevant authorities; and
- Assess environmental monitoring requirements.

6.1.2 Return of Equipment

Upon completion of the spill response operation, the DIMT IC (or delegate) will:

- Arrange recovery of all equipment and unused materials;
- Ensure that all equipment is cleaned, to the extent that available facilities allow; and
- Ensure that all equipment is returned to the owner by the quickest possible means (having regard to costs).

6.1.3 Servicing of Equipment

Upon its return to the owner, equipment shall be thoroughly serviced or replaced in accordance with equipment maintenance schedules prior to being stored.

6.1.4 Marine Support Activities

Upon receipt of response termination, the DIMT will ensure that:

- All personnel are accounted for;
- All equipment is recovered and cleaned;
- All vessels return to their respective berths;
- Equipment is safely offloaded and transported to a site for cleaning or repair;
- All equipment returned is logged; and

- All equipment is returned to the correct owner/ location.

6.2 RESPONSE DEBRIEF/CRITIQUE

6.2.1 Analysis

The NatPan Guidelines for the Conduct of Post-Incident Analysis (https://www.amsa.gov.au/marine-environment/national-plan-maritime-environmental-emergencies/np-gui-004-national-plan-conduct) and Lessons Management Handbook 8 (AEMI) (https://knowledge.aidr.org.au/resources/lessons-management-handbook/) provide the framework for the debrief and analysis process.

6.2.2 Hot debriefs with key personnel

Prior to deactivation, the DIMT should conduct separate hot debriefs with key personnel with the aim of recording lessons learned from the response.

6.2.3 Incident debrief and post incident reporting

The DIMT IC will lead a comprehensive debrief following termination of the incident response. All agencies involved in the response should be represented in the debrief process.

Outcomes of the debrief will be documented and disseminated to relevant stakeholders. The debrief should include discussion of:

- Details of the incident (initial notification/oil type/volume/location);
- Timeliness of response activation;
- Effectiveness of tactics and strategies;
- Equipment suitability and availability;
- Health and safety issues;
- Communications;
- Integration of plans and procedures with other response agencies;
- Suggested improvements to contingency plans and procedures;
- Strategic considerations;
- Environmental impacts; and
- Cultural heritage impacts.

6.2.4 Post-incident report

The DIMT IC will prepare a formal post-incident report following the debrief. The report will include a description of:

- Response operations;
- Challenges;
- A lessons management process; and
- Feedback from debriefs to improve future responses.

7 PLAN DISTRIBUTION, REVIEW AND UPDATE

7.1 REVIEW PROCEDURES

Given the short duration of the proposed activity, this document shall be revised only in the event of regulator feedback, a project delay (which may result in the need for a legislative review) or a spill event.

Any revisions to this OPEP will be undertaken utilising Western Gas Management of Change Procedure, recognising the EP revision triggers in the OPGGS(E). Trigger thresholds for an EP revision include:

- Inclusion of a new activity;
- If there is a significant modification or new stage to an activity;
- If a significant new environmental impact or risk, or significant increase in existing environmental impact or risk is identified for the proposed activity;
- If there is a series of new environmental impacts or risks or a series of increases in existing environmental impacts or risks, which when taken together, results in a significant new environmental impact or risk; or a significant increase in existing environmental impact or risk not provided for in the EP; or
- If there is a change in titleholder, which results in a change in the manner in which environmental impacts and risks are managed.

7.2 ELECTRONIC ACCESS

This document is maintained on the Western Gas SharePoint system.

7.3 TRAINING AND TESTING

In accordance with Regulation 14 (8A) & (8C) of the OPGGS(E)R, the response arrangements will be tested:

- When they are introduced;
- When they are significantly amended;
- Not later than 12 months after the most recent test;
- If a new location for the activity is added to the EP after the response arrangements have been tested, and before the next test is conducted – testing the response arrangement in relation to the new location as soon as practicable after it is added to the plan; and
- If a facility becomes operational after the response arrangements have been tested and before the next test is conducted – testing the response arrangements in relation to the facility when it becomes operational.

As required by the Environment Regulation 14(8A), the testing must relate to the nature and scale of the risk of oil pollution relevant to this exploration drilling activity.

Western Gas will conduct a series of exercises (notification, communication, tabletop) to test / validate the OPEP and contractor ERPs and SOPEPs for emergency response scenarios detailed in Section 6 of the EP. The full-scale oil-spill response exercise will occur 3 months prior to earliest spud date to allow for lesson learnt to be incorporated into the OPEP and supporting documents.

Training and Testing arrangements appropriate to the nature and scale of Western Gas's activities are included in Table 7-1.

Table 7-1 Sasanof-1 OPEP Training and Testing Schedule

Timing	Training / Exercise	Objectives / Summary	Exercise Type	Duration	Team
4Q21	Training	Oil spill response training for Core DIMT members to a level equivalent to IMO II (or IMO III for IC), where appropriate per Appendix B (completed October 2021).	Training	3 days	DIMT
4Q21	Training	Crisis Communication Training focused on notifications and communications protocols. Test the call out and interface functionality between PIO and CMT Crisis Communications Department.	N/A	2 hours	CMT
1Q22	Test	Test of hubbed IMT support including remote DIMT Members, AGR Aberdeen Support, AMOSC Hubbed Support and including Virtual DIMT Facilitator.	Computer based	2 hours	DIMT / CMT / AMOSC IMT
1Q22	Training	Familiarisation sessions with AMOSC, Source Control and OSMP providers call-out, mobilisation and integration.	N/A	~ 4 hours	Perth DIMT Command and Section Chiefs
3 months prior to	Training and Exercise	Incident Control System (ICS) refresher training and DIMT duties related to Sasanof-1 OPEP and/or associated	Tabletop	4 hours	AGR Core DIMT

Timing	Training / Exercise	Objectives / Summary	Exercise Type	Duration	Team
spud date.		emergency response training exercises as appropriate for DIMT roles.			
3 months prior to spud date.	Exercise	Check currency of emergency contact numbers. Test DIMT Call-Out / Messaging Process for key contacts.	Notification	½ hour	DIMT / CMT
3 months prior to spud date.	Training	Functional specific sessional training / workshops to validate DIMT roles & responsibilities specific to oil spills.	N/A	1-2 hours each for section heads	IMT Command, Section Chiefs and Branch Directors.
2 months prior to spud date.	Exercise	Sasanof-1 LOWC exercise with focus on initial reactive phase response actions. Test notifications of internal / external supports including OSMP provider. Equipment / personnel logistics plans and charters etc with regards to COVID19 to be tested if applicable. Validate familiarity with response procedures of personnel involved in the Activity.	Tabletop	½ day	CMT / DIMT / AMOSC / OSMP Provider.

Timing	Training / Exercise	Objectives / Summary	Exercise Type	Duration	Team
2 months prior to spud date.	Training	Sasanof-1 OPEP familiarisation session for AGR Aberdeen personnel supporting the Core DIMT.	N/A	2 hours	AGR Aberdeen Remote IMT support
2 months prior to spud.	Training / Exercise	Test of SCERP logistics plans to confirm vessel and MODU availability and forecast of likely changes to this during the duration of the Activity.	Tabletop	2 hours	Source Control Provider IMT
Pre-spud.	Exercise	Communication & notification to test call-out response from MODU, including internal and external support. Test availability timeframes (within COVID restrictions if applicable).	Tabletop	30 minutes	DIMT Source Control IMT MODU IMT

8 REFERENCES

AMOSPlan Australian Industry Cooperative Oil Spill Response Arrangements (2017). Accessed at https://amosc.com.au/wp-content/uploads/2018/01/AMOSPlan-2017.pdf

AMOSC CV19 Response Plan (May 2020)

AMOSC Service Delivery under a COVID19 environment, Version 1.0, 17/8/2020

Australian Maritime Safety Authority (AMSA) 2019. National Plan for Maritime Environmental Emergencies. Accessed at: https://www.amsa.gov.au/marine-environment/national-plan-maritime-environmental-emergencies/national-plan-maritime

AMSA 2017. NP-GUI-023. National Plan Coordination of Cross Border Incidents. Accessed at: https://www.amsa.gov.au/files/gui023-coordination-cross-border-incidentspdf

Department of Parks and Wildlife and AMOSC 2014. Western Australian Oiled Wildlife Response Plan. Department of Parks and Wildlife, Perth, WA.

Department of Transport 2018. DOT307215 Provision of Western Australian Marine Oil Pollution Risk Assessment – Protection Priorities. Protection Priority Assessment for Zone 1: Kimberley – Draft Report. Department of Transport, Perth, WA.

BAOAC 2007 Bonn Agreement Oil Appearance Code. Bonn Agreement Aerial Operations Handbook.

Appendix A Forms

The following forms are available on AGR's Network Drive:

- **POLREP & SITREP**
- **Status Board Form 1 - Incident Details**
- **Status Board Form 2 - Initial Assessment**
- **Status Board Form 3 – Notifications and Contacts**
- **Status Board Form 4 - Initial Actions**
- **Status Board Form 5 - Resources at Risk / Protection Priorities / Strategies**
- **Status Board Form 6 - Incident Action Plan**
- **Status Board Form 7 – Tactics**
- **Status Board Form 8 – Resources**
- **Status Board Guidance**
- **Sampling Guideline Form**

Appendix B Expanded DMIT Resourcing Roles & Responsibilities

B.1 General

The Western Gas DIMT structure is designed to be scalable to meet the particular requirements of any credible spill scenario during the Sasanof-1 drilling campaign program. The expanded (peak) IMT structure to manage the 'worst case' (low levels of entrained hydrocarbons in State waters) i.e. the 0-10m water depth due to a LOWC. The Western Gas DIMT will use an ICS structure and a planning process to execute field activities consistent with the requirements of this OPEP, including for source control.

To provide Western Gas with assurance of adequate personnel availability for the peak DIMT structure, the associated maximum DIMT resourcing requirements have been evaluated in consultation with AMOSC.

The evaluation scope included the following:

- Provision of human resources to the WA DoT IMT that can act as a link to Western Gas's incident operations, provide logistics / equipment / human resources support to the state, and technical expertise / information.
- Scalability that would allow the DIMT the capacity and capability to mount operations that meets the range of incident scenarios described in the OPEP, and more broadly the EP. In particular, this means sustaining arrangements for a period of many weeks to meet the IMT tasking demands should a loss of well control occur. 'Peak' and 'sustained' manning levels need to be identified, as well as recommendations for competency building for persons undertaking those roles.
- Gaps between need and availability are to be highlighted and solutions proposed.
- For the oil spill response activities described in the OPEP, these are able to be undertaken by AMOSC, at the direction of the Western Gas IMT. Similarly, the source control / well intervention will activities undertaken by Western Gas' contracted Source Control Contractor, Operational & Scientific Monitoring Provider and AMOSC MES services by AMOSC, at the direction of the Western Gas DIMT.

B.2 Western Gas DIMT requirements

To implement a successful oil spill response, upon notification of an incident, Western Gas will stand up its DIMT which is then required to progress through a number of stages:

- Establish the severity of an oil spill incident, including an assessment of the possible environmental consequences and options to reduce these consequences;
- Draft an incident action plan that details the spill response strategies to be put in place in the field;
- Provide oversight and execute the plan;
- Review the ongoing implementation of the plan for success against incident objectives and Western Gas's environmental commitments (contained within its permissioning documents); and
- Continue or cease field incident response operations, depending on level of success against objectives.

These stages are detailed above in Section 2 of this OPEP.

Section 4.1 also outlines the pre-determined spill response strategies which will be put in place. These pre-determined strategies are based on:

1) Careful consideration of the likely fate and weathering of the expected oils that may be spilt;
2) The field operations that can be safely and proportionately put in place to minimise/prevent environmental damage.

By determining:

- The maximum field capacity that could be implemented to execute chosen oil spill strategies for the worse case discharge;
- The incident management team tasks required to determine, support and execute those strategies; and
- The duration of the response.

the DIMT 'need' can be determined. Against this need, working within Western Gas' chosen IMS, resources pools can be assigned from Western Gas, AGR, AMOSC, Source Control Contractor, OSMP Services provider and other parties.

B.3 OPEP Pre-determined field capacity

Given the hydrocarbon properties (predominately dry gas) and the very rapid weathering that would come with a spill of any size of this type of hydrocarbon, the primary field operations are limited to:

- Source control;
- Monitoring, Evaluation and Surveillance (MES);
- Execution of the Sasanof-1 OSMP.

The only likely secondary strategy that may be considered is an oiled wildlife response, which would be in support of the Western Australian Government's DBCA.

The maximum field capacity is a limited suite of operations as detailed in that include the following:

Table B 1 Peak field resourcing requirements

Strategy	Tactics	Peak Field Capacity Description	Provider	Time to initiate	Peak resourcing
Primary Response Strategies					
(1) Source control (SC)	• Emergency BOP Intervention	• Relief Well Group • Well Kill Group • SIMOPS Group	Contracted Source Control Provider	Immediate	Week 3

Strategy	Tactics	Peak Field Capacity Description	Provider	Time to initiate	Peak resourcing
	• Debris Clearance • Capping and containment • Relief well drilling	• Decontamination and Demobilisation Group • Engineering Support Group • Well Containment Group • Site Survey Group • BOP Intervention Group • Debris Removal Group • Capping Unit.			
(2) Monitoring, Evaluation & Surveillance.	• Vessel based visual observation • Overflights of the spill • Trajectory modelling • Tracker Buoy data • Satellite Data	• 2 x daily overflights of the oil spill. • 1 x aerial observers, with reporting and data production requirements (supported by AMOSC remote resources).	• Aerial observers & remote resource support – AMOSC staff & CG. • Rotary Wing Aircraft and vessels – Western Gas. • Fixed Wing aircraft via AMOSC contracts.	Immediate	Day 2
(3) Operational and Scientific Monitoring (OSMP)	• Water & Sediment Sampling and Monitoring • Megafauna surveillance and monitoring • Benthic habitat monitoring • Seabird monitoring • Fish assemblage monitoring • Fisheries monitoring	• 1 x vessel with sampling crews initially, escalation as required up to 7 vessels. • Third party resource provision	Contracted OSMP provider	Immediate	Week 2
Secondary Response Strategies					

Strategy	Tactics	Peak Field Capacity Description	Provider	Time to initiate	Peak resourcing
(1) Oiled Wildlife Response (OWR)	Identification, impact mitigation and collection of impacted wildlife	• 1 x reconnaissance team (2 X personnel) • 1 x collection team (4 x personnel) • 1 x FOB Coordinator (supported by an AMOSC remote resource).	• Oiled wildlife strike team - AMOSC • Oiled wildlife response equipment – AMOSC • Aircraft and / or vessel – Western Gas. • Overseen/directed by DBCA.	Scenario specific	Dependent on impact

Other strategies were considered through the Sasanof-1 OPEP / EP development process, however, have been disregarded through the Western Gas preparedness NEBA/SIMA and ALARP assessment process. Conditions around the management of change for these other strategies may be considered through the EP, and/or the dynamic incident action planning process put in place by the Western Gas DIMT for the spill that occurs at the time.

B.4 Staging of field and DIMT operations

The Western Gas DIMT will work to immediately execute the primary strategies above (SC, MES, and OSMP) should a LOWC, WCCS spill occur:

- MES planning for field activities (aerial observation) are to take place immediately, supported by deterministic OSTM, the launching of a satellite tracking buoy, and satellite photography.
- SC planning and field activities are to commence immediately, directed by the actions detailed in the Sasanof-1 Source Control Emergency Response Plan (SCERP).
- OSMP planning and field activities are to commence immediately, directed by the actions detailed in the Sasanof-1 OSMP.

The preparedness stochastic oil spill modelling and overlaid zone of potential impact suggests that only very small quantities of entrained oil will impact state waters, and that the likelihood of this occurring is very low. Should state waters impacts (or threats to state waters) occur, the Western Gas DIMT will consider and execute:

- OWR field activities, comprising the provision of staff two x field teams and an FOB commander, working under the auspices of the DBCA OWR activities.

On the basis of the field oil spill response assets detailed in Table B2, the (OSPR) operational response will require selected use of Tier 2 resources, all of which are available within Australia, and are able to be coordinated / provided for using AMOSC for equipment, people and technical services.

Tier 3 providers (Western Gas' Source Control Contractor) will be relied upon for source control activities.

B.4 DIMT size and tasking requirements to meet Sasanof-1 WCD Scenario

Based on the needs detailed above, the Western Gas DIMT will be required to:

- Activate and mobilise DIMT resources to meet the scale of the response,
- Determine, resource & direct:
  - Source Control;
  - MES; and
  - OSMP activities.
- All of the above are undertaken by contracted external organisations;
- Determine, resource & direct the Oiled Wildlife Response in conjunction with DBCA (AMOSC);
- Coordinate and support the WA DoT and provide the staff to meet the DoT IMT Industry Guidance Note (IGN) requirements.

The DIMT will implement this using the IAP development and planning process as outlined under Section 4.6 of the OPEP. The DIMT will take the form as outlined in Section 3.3 of the OPEP. The DIMT and the field operations will run for the duration of the response, so has a requirement to sustain these operations for up to 11 weeks (relief well source control completion timeframe).

The core constant functional sections of the DIMT during the response will be those outlined below in Table B2:

Table B2 - Core DIMT Functions

Function	Sub - Function	Outputs	Outcomes
Incident Control	Control	Safe and efficient response structure and organisation.	A response is put in place that meets the requirements of Sasanof-1 OPEP (EPO's & EPS).

Function	Sub - Function	Outputs	Outcomes
			People and process in place that meets the above.
	Safety	Development and implement a plan that assesses and manages the safety risk of the response.	Safety risks assessed and mitigation plans/processes in place
	Public Information	Develop messaging and manage external information flows to stakeholders and members of the public.	Relevant and timely public information distributed across all relevant platforms
	Liaison Officers	External/Government/stakeholder affairs are managed.	Key stakeholders (government, regulatory and community) are informed of the incident and have their concerns acknowledged and addressed by the response organisation.
	DIMT Facilitator	The Western Gas DIMT – especially a remote platform for information transfer and operating an IMT in a hubbed environment is in place and operational. Coaching to the IC and other DIMT members on the use of	The incident management planning process is able to function remotely.

Function	Sub - Function	Outputs	Outcomes
		technology is available and in place.	
Planning	Planning Section Chief	Drive the planning process that develops the IAP. Tracking resources. Overseeing the Enviro, Situation Units, Forecasting and OSMP functions.	Response analysis and planning that fits best the scenario (oil type, weather, fates, locations, sensitivities), to mitigate the consequences most effectively.
	Environmental Unit	OSPR strategies are chosen consistent with good global practice, accounting for the benefit and dis-benefits of each strategy. Assessment of environmental risk.	Daily NEBA / SIMA analysis. Analysis of the resources at risk. Deployment of OSPR MES and technical advice into the DIMT. Deployment of OSMP contractor.
	Situation Unit	Common operating picture developed – situational assessment (intelligence).	Common Operating Picture established via GIS system and promulgated to stakeholders.

Function	Sub - Function	Outputs	Outcomes
	Trajectory Forecasting	Using modelling data, determine the likely trajectory of spilt oil.	Deterministic modelling of spilt hydrocarbons in the ocean.
	OSMP Coordinator	Data that tracks the environmental impacts of spilt oil is collected, analysed and notated. Operational monitoring programmes are used to monitor and vary the IAP.	Deployment of OSMP contractor.
Operations		Develop tactics to execute strategies in the field; run the operations in the field. Provide technical input to the production of the next operational period IAP. Draft the daily operational orders for each field team (ICS204, 204s and 204e or equivalences.) Provide tech input to the safety plans.	Run the current operations in the field – the execution of the IAP for that operational period.
Logistics	Logistics Section Chief	Acquire resources, operational locations and materials that match the operational need, as sought by AMOSC and Astron / BMT, and WWC if needed.	'For-purpose' resources are acquired and deployed as needed, consistent with the IAP.

Function	Sub - Function	Outputs	Outcomes
	Supply Unit (aviation & marine)	Platforms for response operations are contracted to Western Gas consistent with IAP requirements.	Aviation and marine platforms are sourced and provided.
	Facilities & Ground support (Operationally based)	Coordinate the delivery of field-based logistical support that supports the operational responders.	Field logistics are coordinated.
Finance & Administration		Tracks all costs and provides financial oversight consistent with the control agency requirements.	Financial and administrative management process in place for the response.

B.5 Manner of the DIMT

Delivery of the above tasks, and the 'deep dive' into operational outputs will be undertaken using a remote, virtual DIMT. It will be led by AGR staff and consultants including contractors (Xodus) based in Perth, supported by remote teams from AMOSC based in Geelong / Fremantle, and WWC based in Singapore, Malaysia & Perth. Outputs and direction from this group will be provided to the FOB (based on the North West Shelf, likely to be from Dampier).

This manner of IMT is consistent with the IPEICA Remote / Support Model as outlined below (modified to fit):

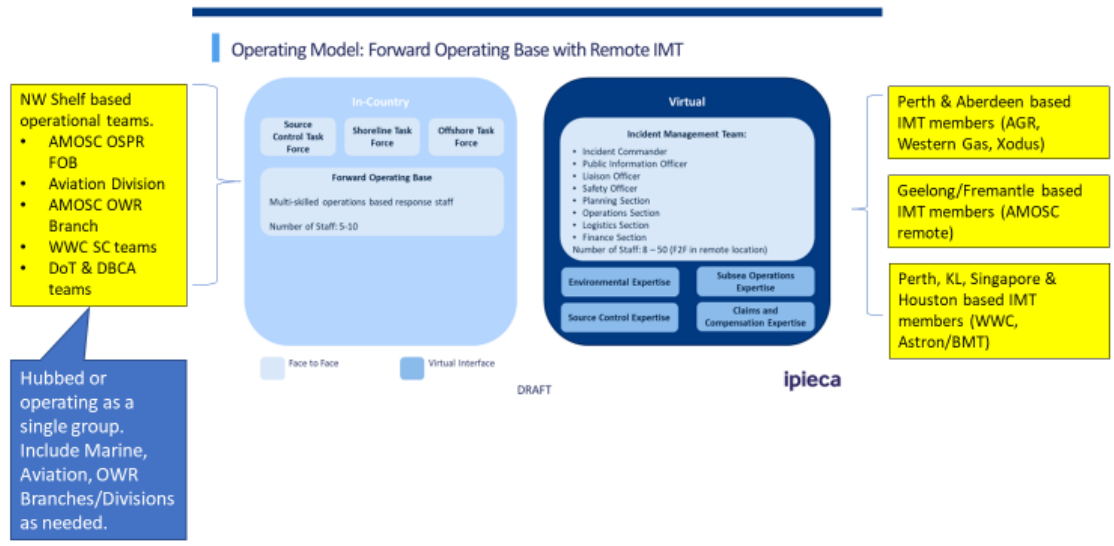


*Figure Two – IPEICA remote IMT delivery model – mapping (yellow boxes) for Western Gas (*Source: 'IPEICA Oil Spill Group – Pandemic Working Group')

Figure B 1 IPEICA Remote/Support Model

Specific tasking will be devolved to subject matter expert third parties, and then as close to operational tasking as possible. In practical terms, this means that the Western Gas DIMT will

- Determine and set high level response objectives;
- Build picture of situational awareness;
- Determine the environmental spill risk consequences and response priorities;
- Activate contractual arrangements with AMOSC, WWC and Astron / BMT;
- Provide direction setting and resources (by request) to those organisations; and
- Monitor the achievement of objectives.

Diagrammatically, these relationships are shown in Figure B-2:

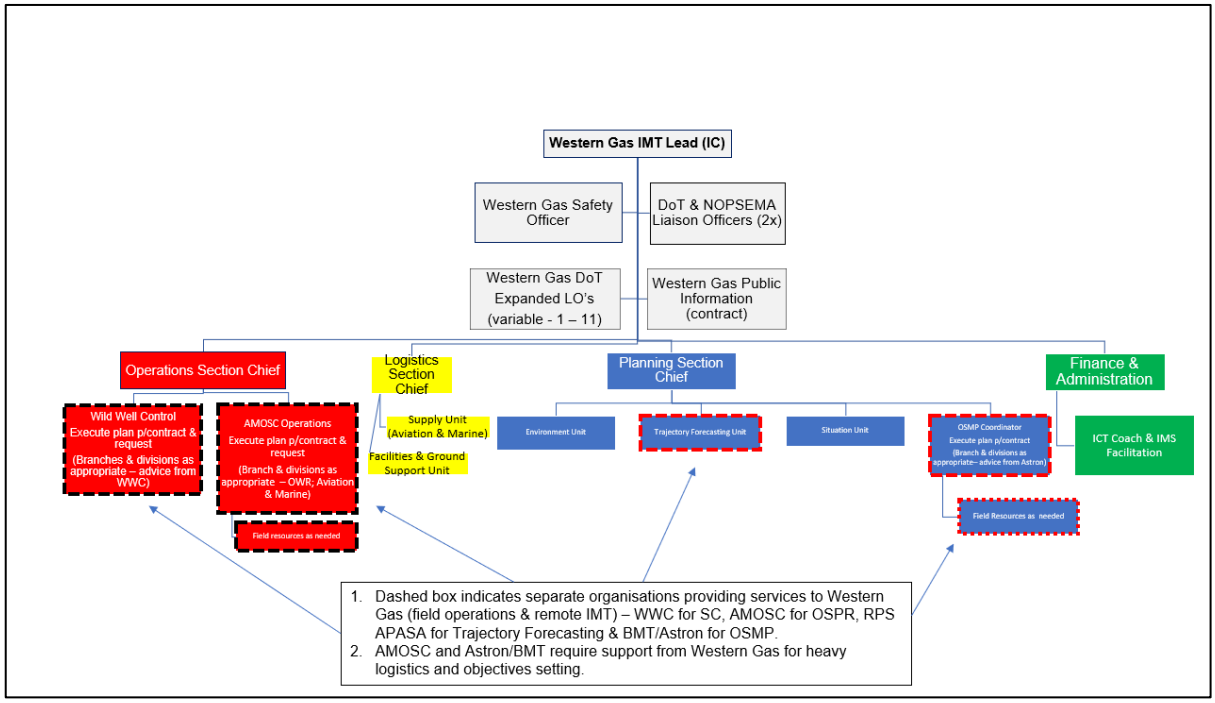


Figure B 2 IPEICA Western Gas DIMT Hubbed Organisation

For control, planning and operations:

The Western Gas DIMT on-site staff (Perth based) will prepare an initial incident briefing sheet that comprises:

- Incident maps;
- Summary of Incident & Current Actions;
- Current Response Organisation;
- Resources Summary; and
- Site safety & controls.

They will also be completing the high-level components of the IAP that includes Incident Briefing and Response Objectives. This will be undertaken by the Western Gas DIMT IC, Planning, Operations, and Logistics Officers who are employees of AGR, contracted by Western Gas to undertake the drilling campaign. Intelligence (Environmental) support will be provided from either Xodus or remotely from AMOSC.

High level planning and operational functions will be undertaken by this group, with discipline specific planning and operations undertaken by AMOSC for OSPR, Xodus for OSMP and WWC for source control and well intervention.

For logistics functions:

WWC will undertake their own logistics planning and execution for any emergency response. AMOSC and Astron will rely on the provision of heavy logistics (aircraft, vessels, operating FOBs) to be provided for by the Western Gas DIMT. De-confliction or cross-purpose coordination of assets sharing is to be undertaken by the Western Gas DIMT.

Communications and IT functions, facilities management, sustenance and messing will be provided for by Western Gas/AGR's Business As Usual (BAU) requirements. A specialised Medical Unit lead (Covid infection control) will be in place at field level reporting to the Logistics Section of the DIMT to coordinate/provide site support. The DIMT Facilities & Ground Support lead (based in the field) will provide field support & coordination.

For media and public information:

Western Gas will task this to a dedicated specialist third party, who will work with Western Gas' CMT, the IC, and the DoT public information section to provide up to date public statements. This third party will also provide support to field (local government) LO/PIO needs, with field personnel assigned to the FOB as needed.

For the initial State (WA) LO function:

This will be provided initially though the placement of Western Gas contractors into DoT (from AGR, Xodus and AMOSC), escalating to serve the needs of the DoT IGN as needed. For ongoing responses, remote support to the DoT IMT may also be provided from the AMOSC Core Group. Remote support to Federal Government LO agency needs will be served remotely through direct communication with the Western Gas IC. Should the response escalate, a senior AMOSC resource can be used to service the need of the OPICC in conjunction with the Western Gas IC.

For oil spill response operations:

AMOSC will be issued (under contract) a request to stand up its IMT and response operations commensurate with the objectives at the time. Western Gas will communicate to AMOSC its objectives via the IAP Response Objectives. These may include aerial observation and oiled wildlife response and other response strategies as required. To undertake these operations, AMOSC will use its systems to undertake planning and execution of operations that will be outlined in the taskings and operational daily orders, the air operations plan for aerial observation), the Site Safety plan specific to the operations. If required, AMOSC will develop and execute the marine operations plan. OWR plans will be undertaken with the WA DBCA.

AMOSC will also undertake NEBA/SIMA, and environmental analysis, in conjunction with the Western Gas DIMT Planning & Environment/Intelligence Officer.

For source control operations:

Western Gas will stand up WWC, who will source and provide all elements under the Source Control Operations Function.

For implementation of the Operational & Scientific Monitoring Plan:

Western Gas will stand up Astron/BMT, who will execute the field based OSMP activities. The outputs and control of this will be through the Western Gas Planning/Environment Function.

B.6 Peak Manning Levels – Western Gas

Based on the specific workloads required to run the Western Gas peak field operations by the remote IMT, the number of personnel required is significantly less than a 'normal', oil or liquid petroleum spill, due to the scope of the predicted operations. For OSPR, only day time operations will be in place; Source Control activities will run around the clock based on the criticality of the task at the time and be run by WWC remotely - the need for this can be met remotely by the Western Gas DIMT or using 'on-call' arrangements, rather than a fully staffed, 24/7 IMT.

There are four distinct work groups providing services remotely, under the umbrella of the Western Gas DIMT:

- The Western Gas DIMT (core);
- The AMOSC IMT and operational functions;
- The WWC IMT and operational functions; and
- The Astron/BMT IMT and operational functions.

'Peak Resourcing' occurs in two stages – the first being the initial stage when situational awareness is required, external initial briefing to government agencies, risk analysis, and then initial IAP development and objective setting occurs. This would occur in the first two – five days of operations, during the re-active phase of the response, and before requirements settle into a steady state. After this phase, planning function units could be combined and the AMOSC IMT could pick up these tasks.

The second is in the very unlikely occurrence of state water impact, the earliest being entrained oil at around 20 days. This may require deployment of resources to the DoT IMT as per the IGN, and will be guided by the trajectory and forecasting of oil spill, as determined in

the initial stages. Surging for this stage will be based on feedback from the DoT at the time of the spill, and Western Gas is ready to meet this need.

When analysing the numbers of staff required for each of the functional roles in the Western Gas IMT, and the pools of resources available for those roles, it is clear that Western Gas has access to sufficient resources to fill these roles. This includes in the very unlikely outcome that the full compliment of LO's is called upon to assist in the DoT IMT. Sufficient resources have been identified to fill the roles required of the IMT for the first 'swing' of fourteen days, including all DoT IGN positions, with further surge identified for the full compliment of DoT IGN positions (day 20 onwards).

After 14 days, a second swing shift of IMT responders will offer relief. These will be drawn from

- UK based AGR personnel (8 trained personnel);
- AGR's Consultancy Services database (18 trained personnel);
- AMOSC Core Group (remote – up to 35);
- Xodus (4 personnel); and
- BMT/Astron (8 personnel).

The DIMT Peak Resourcing Requirements is summarised in Table B3 below.

Table B 3 DIMT Peak Resourcing Requirements

IMT Functional Role	Day shift need	Night shift need	Total Need	Pool size (location)	Source	Sufficient?
Western Gas Drilling IMT						
Incident Commander	1	1 (UK remote)	2	**6** (3 AGR Perth, 3 AGR UK)	AGR Staff / Consultants	Yes
Virtual DIMT Facilitator	1	0	1	**1**	AGR Contracted IT Resource	
Safety Officer	1	1 (UK remote)	2	**3** (2 Perth, 1 AGR UK)	AGR Consultancy Services Pool / AGR Staff	
Public Information Officer	1	0	1	**1** (3rd party service provider)	Platform Communications (WG contracted)	
DoT and NOSPEMA LO (initial)	2	0	2	**3** (AGR Perth)	Assigned from pool surplus initially then supplemented by AMOSC	
Operation Officer Source Control	1	1 (UK remote)	2	**5** (3 AGR Perth, 2 AGR UK)	AGR Staff / Consultants	
Planning Officer	1	1 (UK remote)	2	**5** (1 AGR Perth, 2 AGR Melbourne, 2 AGR UK)	AGR Staff / Consultants	
Environmental Unit	1	0	1	**2** (Perth based)	Xodus	
Trajectory Forecasting	1	0	1	**1** (3rd party)	RPS APASA	
Situation Unit	1	0	1	**2** (Perth based)	Xodus	
OSMP Coordinator	1	0	1	**1** (3rd party)	Astron / BMT	
Logistics Officer	1	0	1	**3** (3 AGR Perth)	AGR Staff / Consultants	
Source Control Logistics Lead	1	0	1	**1** (WWC)	WWC	
Supply Unit (aviation & marine)	1	0	1	**2** (1 AGR Perth, 1 Field based AMOSC CG)	AGR Consultancy Services Pool / AMOSC	
Facilities & Ground Support	1	0	1	**1** (AGR Dampier)	AGR Staff / Consultants	

IMT Functional Role	Day shift need	Night shift need	Total Need	Pool size (location)	Source	Sufficient?
F&A Officer	1	0	1	**2** (2 AGR Perth)	AGR Staff / Consultants	
Administrative support (to sections above)	2	0	2	**4** (4 Admin support from AGR Perth)	AGR Staff / Consultants	
Western Gas Totals (start state – 2 x LO)	**19**	**4**	**23**	**43**		**Yes**
DOT IGN (full compliment)	11	n/a	11	From pool surplus and then AMOSC as required.		
Western Gas Total (Include full DOT compliment)	**30**	**4**	**34**	**43**	**Yes**	
AMOSC IMT						
AMOSC Lead	1	0	1	3 (2 virtual)	Yes	
Planning & Environment Function	1	0	1	1 (35 – CG Mgt, virtual)		
Operations Function	1	0	1	1 (5 – AMOSC Staff, virtual)		
Response Technical Specialist	1	0	1	1 (5 – AMOSC Staff, virtual)		
WWC Source Control IMT – as per WWC SCERP						

B.7 Western Gas DIMT Composition

As primary contractor to Western Gas, AGR Australia forms the bulk of the DIMT as follows:

AGR Australia:

- Incident Command (IC) - 3 x AMOSC equivalent IMO3 trained personnel;
- Planning Section – 3 x AMOSC equivalent IMO2 trained personnel;
- Logistics Section – 3 x AMOSC equivalent IMO2 trained personnel;
- Operations - 3 x AMOSC equivalent IMO2 trained personnel;
- Finance Admin - 2 x AMOSC equivalent IMO2 trained personnel.

Surge Finance and Administration support requirements will be met through AGR's Perth based staff (non-IMO trained).

AGR Aberdeen:

- Incident Command (IC) – 3 x OPRED[2] OPEP3; and
- Section Chief Roles – 5 x OPRED OPEP2.

AGR Aberdeen trained personnel can be provided by remote within 24 hours and in-country support can be expedited to occur within 14 days.

Western Gas Crisis Management Team (CMT)

The Western Gas CMT has an additional Incident Command (IC) trained person (AMOSC equivalent IMO3) who is the DIMT / CMT Liaison.

AGR Consultancy Services

AGR has an Australian Consultancy Services division that sources personnel for the Australian and Asia Pacific Oil and Gas (O&G) Industry. Consultancy Services maintains a personnel database of experience of O&G professionals including multiple options from the disciplines:

- Drilling Managers;
- Drilling Superintendents;
- Senior Drilling Engineers;
- Logistics Coordinators;
- HSE Personnel.

AMOSC have advised that surge / backup pools of human resources IMO II /IMO 3 equivalent just-in-time training can be delivered with the above pool as required prior to undertaking DIMT functions within the peak DIMT requirements timeframe (14 days). This may be delivered remotely, with competence validation (in person) prior to entering the DIMT. The number of additional surge personnel through this mode is a minimum of 6 x Incident Command

[2] Refer below to Section B.9 for infomation on OPRED OPEP Level standards

(IC)(AMOSC equivalent IMO3) and 12 x Section Chief Roles (AMOSC equivalent IMO2) or a total of 18 personnel.

B.8 WA DoT IMT Support

The WA DoT Industry Guidance Note (IGN) requires petroleum titleholders to provide 11 IMT personnel able to the State DoT IMT. This will be met initially with a Liaison Officer (LO) from AGR's Perth team or Xodus (Western Gas' contracted environmental advisor) with further requirements from the AMOSC Core Group / Xodus as determined by whether the spill reaches into State Waters.

Currently AMOSC Core Group has COVID-19 restrictions in place that allow remote support only, for both Core Group members and AMOSC staff. Therefore if the contributions to the DoT IMT come from AMOSC, this will be in remote form. Once COVID-19 restrictions are lifted in accordance with the National Plan, Western Gas will liaise with AMOSC on whether or not 'in-room' IMT support will be possible.

NB. Current OSTM predictions are that in worst case credible scenario, there are no shoreline impacts, surface oil, dissolved hydrocarbons in State Waters. The is a low probability (15%) of an instantaneous low level of entrained hydrocarbons (88 ppb) may reach State Waters in summer season.

B.9 DIMT Competency Requirements

Table B 4 Expanded DIMT Role Competency Requirements

DIMT Role	Project Specific OPEP Induction	Oil Spill Response Command and Control (IMO Level III / PMAOIR 418 / ICS 300 Equivalent / OPRED OPEP3)	Oil Spill Response Management (IMO Level II / PMAOIR 320/322 / ICS 200 Equivalent / OPREP OPEP2)	Emergency Response Exercise Training / Workshop
Incident Commander	✓	✓		✓
Deputy Incident Commander	✓	✓		✓
Safety Officer	✓			
Public Information Officer (CMT)	✓		✓	✓
Federal Liaison Officer	✓		✓	✓
State Liaison Officer	✓		✓	✓
HR (CMT)	✓			✓

DIMT Role	Project Specific OPEP Induction	Oil Spill Response Command and Control (IMO Level III / PMAOIR 418 / ICS 300 Equivalent / OPRED OPEP3)	Oil Spill Response Management (IMO Level II / PMAOIR 320/322 / ICS 200 Equivalent / OPREP OPEP2)	Emergency Response Exercise Training / Workshop
Legal (CMT)	✓			✓
Planning Section Chief	✓		✓	✓
Documentation	✓			✓
Situation Unit Lead	✓		✓	✓
Environment Unit Lead	✓		✓	✓
Trajectory Forecasting	✓			✓
Response Technical Specialist	✓		✓	✓
Operations Section Chief	✓		✓	✓
Air Operations Branch Manager	✓		✓	✓
Marine Operations Branch Manager	✓		✓	✓
Oiled Wildlife Response Commander	✓		✓	✓
SC Branch Director SC Deputy Director SCER Advisor	✓		✓	✓
Logistics Section Chief	✓		✓	✓
Source Control Logistics Lead	✓			✓
Supply Unit Lead	✓			✓
Facilities and Ground Support (Dampier)	✓			✓
Communications Unit (IT) Manager	✓			

DIMT Role	Project Specific OPEP Induction	Oil Spill Response Command and Control (IMO Level III / PMAOIR 418 / ICS 300 Equivalent / OPRED OPEP3)	Oil Spill Response Management (IMO Level II / PMAOIR 320/322 / ICS 200 Equivalent / OPREP OPEP2)	Emergency Response Exercise Training / Workshop
Medical Unit Lead (includes infection control – COVID-19)	✓			
Finance Section Chief	✓		✓	✓
Procurement Unit (marine & aviation asset contracting)	✓			
Compensation Unit	✓			
Administration & Records	✓			

AGR personnel working on the United Kingdom Continental Shelf (UKCS) work in accordance with Department for Business, Energy & Industrial Strategy (BEIS) and Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) requirements.

It requires each operator to maintain an Oil Pollution Emergency Plan (OPEP) and for the Duty Holder and/or Well Operator to a) provide training and b) to carry out annual emergency exercises against the Plan.

For the former, there are four levels of training:

- OPEP 1 - for on-scene responders at the offshore installation;
- OPEP 2 - for senior managers involved in the coordination of a spill response at an Incident Management Centre (IMC);
- OPEP 3 - for specialists involved detailed spill response considerations including the activation and deployment of additional resources from an IMC; and
- OPEP 4 - for on scene responders at onshore locations in the event of a landfall.

AGR trains its personnel up to and including Level 3 in the UK. Level 4 response is managed by a specialist 3rd party contractor, typically Oil Spill Response Limited (OSRL).

OPEP 2

This BEIS-accredited training standard is the minimum requirement for any person performing the role of:

- Operators Representative or Emergency Operations Manager within the SOSREP's Operations Control Unit (OCU);
- Duty Manager, Emergency Room Manager and/or Incident Commander (within the Incident Command System);
- Corporate decision-makers dealing with priority setting and significant external liaison during a spill response;
- Personnel involved in the decision-making processes in a UKCS response or in liaison with the relevant government agencies.

OPEP 3

The OPEP 3 training standard (3 days intensive) is a specialist course aimed at the understanding of the role of the Secretary of State's Representative (SOSREP) and the functions of the Operations Control Unit (OCU) and how they potentially interface with AGR's clients and other relevant government agencies.

The course provides the knowledge and understanding in the following areas:

- Assessing the situation and activating the Oil Pollution Emergency Plan (OPEP);
- Developing a spill response strategy;
- Establishment and organisation of a response structure;
- Activation of spill response operations;
- Management and control of an ongoing spill response;
- Assisting in the decisions to deactivate a response.

B.10 Western Gas CMT Composition and Competency Requirements

The WGC CMT is composed of members of the Senior WGC Management Team and supporting resources, with additional support roles filled by representatives from contracted service providers.

The Senior Management of WGC consists of seasoned industry professionals with a combination of complementary technical and commercial experience. The team structure is outlined in the Figure B-3 below:

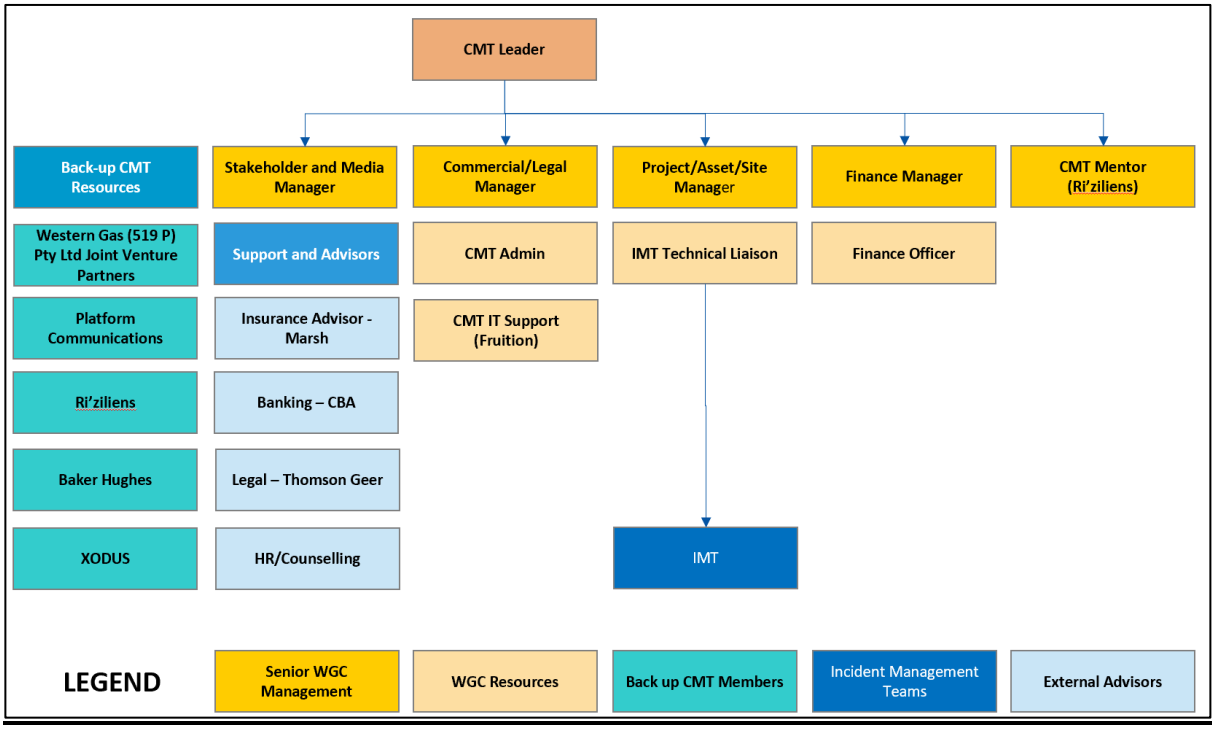


Figure B-3 Western Gas CMT Structure

Roles and responsibilities

WGC resources (employees and embedded contractors) have been identified for CMT roles with responsibilities defined below.

CMT Lead Roles

Crisis Management Team Leader

The CMT Leader role will be filled by either of the two Executive Directors of the company who are the senior-most managers and Directors in the business. The Executive Directors are best placed to define the potential impact to the business by an MAE and ensure the response is appropriate and timely. The Executive Directors have the delegated authority from the Board of Directors to make decisions (including financial commitments) required in response to emergency events.

The CMT Leader is responsible for:

- Directing the company's response to a crisis;

- Establishing and communicating strategic goals with other members of the CMT;
- Ensuring response actions are aligned to statutory, regulatory and legal requirements;
- Ensuring Company Executive and Board are briefed on the crisis response and related issues; and
- Ensuring the company maintains sufficient resources to manage incident response over extended periods.

Finance Manager

The Finance Manager will support the CMT Leader in managing the finances of the business in an emergency situation and ensure timely commitment of funds and engagement of services and support via the Financial Management System. The Finance Manager is responsible for:

- Activation of the financial resources and support functions required to support response plans;
- Tracking of expenditure during emergency responses and reporting status to the CMT;
- Ensuring requests for expenditure are actioned in a timely manner and tracked; and
- Completing post-incident expenditure analysis and reporting.

Commercial / Legal Manager

The Commercial / Legal Manager will provide access to the commercial and legal arrangements in place to implement emergency response. This will include implementation of insurance loss adjustment engagement via the incumbent insurance broker. The Commercial / Legal Manager is responsible for:

- Assuming the role of Primary Scribe to establish immediate record of events. This responsibility can be handed over to a support role once the CMT is established;
- Engaging legal and commercial support functions as required by the CMT;
- Reviewing outgoing correspondence from a commercial/legal perspective; and
- Advising the CMT Leader on commercial/legal considerations of draft response plans.

Stakeholder and Media Manager

The Stakeholder and Media Manager will support the CMT Leader in formulating and defining and managing the stakeholder engagement plan and supporting communications, including responses required to the Regulatory Authorities. The Stakeholder and Media Manager is responsible for:

- Review the Stakeholder Register and defining / prioritising the Stakeholders most likely to be contacted in relation to the incident event;
- Preparing draft stakeholder engagement briefing releases for review by the CMT;
- Engage additional resources to support communications throughout the incident; and
- Monitor external agencies and correspondence for information on the incident which may need to be considered in external communications.

Project Manager

The Project Manager for Sasanof-1 will support the CMT Leader providing technical details about the project or asset affected and supporting the response plans. The Project Manager will have intimate knowledge of the project, risk register and the mitigating controls and procedures established to support emergency situations. The Project Manager will be responsible for:

- Ensuring the timely availability of technical and operational information and documentation pertaining to the Asset and the equipment involved in the incident;
- Maintaining communications and situation awareness via the IMT Liaison;
- Assisting the CMT to generate and review response plans prepared by the IMT or CMT and considering options, costs and risks; and
- Engage technical support as required to assist with these responsibilities.

Technical Liaison

The Project Technical Liaison (IMT Liaison) is the independent technical advisor engaged for major projects or Petroleum Activities to provide technical assurance support throughout the project. The Technical Liaison will be the primary interface between the CMT and the IMT and can interchange positions with the Project Manager, if required, once sustainable manning levels are defined. The responsibility of the Technical Liaison is:

- To be the primary interface between the IMT and the CMT Project Manager;
- Provide regular situational awareness reports to the CMT;
- Assist Project Manager with interpretation of SITREPs for the CMT; and
- Work with CMT to generate and review response plans considering options, costs and risks.

CMT Mentor

In addition to the standard roles of the CMT, WGC has engaged an experienced crisis management and corporate support agency to provide real-time mentoring of the WGC CMT

to ensure planned responses are independently assured and appropriate to the situation. The CMT Mentor has the capacity to provide additional experienced CMT personnel to relieve or replace CMT Leads as required.

CMT Support Resources

The following supporting resources will be drawn from the WGC resources (employees and embedded contractors) to support the CMT.

Insurance Broker

WGC has confirmed that the incumbent Insurance Broker will attend the CMT in support of any incident where Insurance cover may need to be accessed. The Broker will support the CMT in:

- Engagement of Loss Adjustor;
- Preparation of Loss Report; and
- Engagement with Underwriter(s) to facilitate timely access to insurance cover.

CMT Administration Officer

The CMT Admin Officer is responsible for maintaining the readiness of the CMT Room, ensuring IT systems are functional and relevant documentation is available including CMT contact registers. For extended response situations the CMT Administration Officer will ensure that appropriate sustenance is provided for the CMT.

CMT IT Support

CMT IT support is provided by a third-party contractor who will assist the CMT Administration Officer in initial set-up of the CMT room, perform scheduled checks on the CMT room IT functionality, and provide 24/7 IT support to the CMT through the management of incidents.

Finance Officer

The Finance officer will support the Finance Manager with financial and procurement functions, preparing purchase orders, tracking expenditure in finance reporting systems and providing update reports to the Finance Manager.

Back-up Resources

WGC recognises that for major adverse events, particularly a source control event, immediate in-depth response is the first priority. Once the response plan has been established, agreed and communicated, the CMT can stabilise at the required levels of manning to support the IMT through the duration of the incident.

WGC has established a 'surge' capacity for Lead positions within the CMT drawing on the expertise of identified senior and experienced resources, including:

- Other Senior Managers within WGC;
- Joint Venture Partners involved in the Sasanof-1 well;
- Project Planning support companies; and
- Agencies with specific crisis management expertise (HR counselling and support, crisis management raining, stakeholder engagement and media management).

CMT Training and Verification of Competency

Under the Corporate HSE Framework, the WGC Competency and Training Procedure (WGC-HSE-PRO_Competency and Training) defines the experience and capabilities required for the Senior Management of the company, including the required emergency response and crisis management training for these senior positions to respond to a variety of emergency situations.

Independent training, certification and readiness assessment is provided for the CMT. Records are maintained for this training and included in the Competency and Training Register for the Senior Management.

For major activities conducted by WGC Operational Readiness Assurance procedures require that joint emergency response and crisis management exercise will be conducted by the relevant IMT and the CMT, at least 30 days prior to commencement of the activity. Such simulations are planned by independent agencies and generally included in commitment registers in support of the activity regulatory approvals.

Such simulations usually represent the worst-case outcome incident envisaged to have potential to occur during the execution of the activity.

Table B5 Oil Spill Response Readiness Checklist

Oil Spill Response Arrangement	Readiness Check	Schedule	Performance Standard	Measurement Criteria
Source Control				
Relief Well Drilling - Access to MODU	MODU Register review	One month prior to spud.	Suitable rigs that can be deployed in the event of a Source Control incident requiring a relief well.	Document the identified suitable rig by: • Name • Rig Type • Location • Contract Status • NOPSEMA-accepted MODU Safety Case • Technical specification to meet requirements of relief well.
Source Control Equipment & Services Capping stack BOP intervention.	Contract / Plan Review	Up to 30 days prior to well spud.	WWC availability of well control specialist to fill the roles of Source Control Branch Director and ER Specialist within 72	Confirmation (email) from WWC with names of personnel and status of equipment as detailed in SCERP.

Oil Spill Response Arrangement	Readiness Check	Schedule	Performance Standard	Measurement Criteria
Debris clearance equipment. Associated well control personnel and technical services.			hours of notification. Source Control Equipment Availability	
Capping Stack Installation	Vessel Register Review	One month prior to spud.	Suitable ISV that can be deployed in the event of a Source Control incident requiring a capping stack deployment.	Document the identified suitable ISV by: • Name • Rig Type • Location • Contract Status • NOPSEMA-accepted MODU Safety Case Technical specification to meet requirements of capping stack deployment.

Oil Spill Response Arrangement	Readiness Check	Schedule	Performance Standard	Measurement Criteria
Vessel MDO Spill Response	Contract / Plan Review	Prior to mobilisation or vessel arrival in field.	Approved SOPEP in place	Copy of SOPEP for each vessel on file.
Vessel Emergency communication link between shore base, rig, and support vessels	Notification / Comms Check	Prior to activity commencement.	Notifications / comms can be established between vessels and shore base or rig in the event of an emergency	Documented comms check showing date , time and elapsed response time.
Monitoring, Evaluation, Surveillance (MES)				
Vessel Surveillance	Contract / Plan Review	Prior to activity commencement.	Access to vessels for surveillance	Copy of Master Services Agreement (MSA) with multiple vessel providers to gain access to vessels

Oil Spill Response Arrangement	Readiness Check	Schedule	Performance Standard	Measurement Criteria
Aerial Surveillance	Contract / Plan Review	Prior to activity commencement.	Access to aircrafts for surveillance	Copy of Master Services Agreement (MSA) with helicopter provider for duration of Sasanof-1 Drilling Program.
Aerial Surveillance	Contract / Plan Review	Prior to activity commencement.	Access to trained aerial observers	AMOSC Member Contract in place. AMOSC Readiness Report prior to activity commencement
Tracking Buoys availability	Contract / Plan Review	Prior to activity commencement.	1 tracking buoy on each support vessel and on rig.	Vessel Master / On-board AGR HSE Coordinator confirmation that buoy is on board
Tracking Buoys functionality	Comms / Tracking software Test	Prior to activity commencement and weekly thereafter.	Signal confirmation from tracking software.	Tracking buoys pass functional test as per Operation Work Instruction.
Trajectory Modelling	Contract / Plan Review	Prior to activity commencement.	Access to oil spill trajectory modelling services	Contract with RPS APASA in place via AMOSC Member Contract.

Oil Spill Response Arrangement	Readiness Check	Schedule	Performance Standard	Measurement Criteria
Satellite Imagery	Contract / Plan Review	Prior to activity commencement.	Access to satellite imagery services	AMOSC Member Contract in place. AMOSC Readiness Report prior to activity commencement Review to confirm access to satellite imagery services
CMT / DIMT Readiness	Desktop Exercise	Prior to activity commencement.	CMT / DIMT meets the performance standards in OPEP and to ensure situational awareness for DIMT	Documented OPEP Response Exercise Report.
Oiled Wildlife Response				
OWR equipment	Contract / Plan Review	Prior to activity commencement.	Access to OWR equipment for duration of drilling program.	AMOSC Member Contract.

Oil Spill Response Arrangement	Readiness Check	Schedule	Performance Standard	Measurement Criteria
OWR personnel	Contract / Plan Review	Prior to activity commencement.	Access to OWR personnel for duration of drilling program.	AMOSC Member Contract.
Waste Management				
Waste management	Contract / Plan Review	Prior to activity commencement.	Access to waste management service provider for duration of drilling program.	Waste Management Contract in place.
Operational and Scientific Monitoring				
Monitoring equipment	Contract / Plan Review	Prior to activity commencement.	Access to OSM equipment for duration of drilling program.	Equipment confirmation report from Astron / BMT.
Monitoring personnel	Contract / Plan Review	Prior to activity commencement.	Access to OSM specialist	Duty Roster Report from Astron / BMT

Oil Spill Response Arrangement	Readiness Check	Schedule	Performance Standard	Measurement Criteria
			personnel equipment for duration of drilling program.	
Monitoring readiness	Desktop Exercise	Prior to activity commencement.	OSM personnel respond in accordance with OSMP Performance Standards	Documented OPEP Response Exercise Report.

Appendix C Source Control ALARP Methodology and Analysis

C.1 Sasanof-1 Source Control ALARP Evaluation Methodology

Western Gas has used the ALARP principle (EP Section 2.2.4) to assess control measures of the selected source control strategies from the preliminary NEBA in Table 7-1 of the EP. Each potential source control strategy was reviewed and included a review of potentially feasible options to improve the reliability and timeliness of the source control arrangements. An overview of the ALARP assessment methodology for each potential source control strategy is outlined in Table C-1, and a summary of the assessment is provided in Table C-2 including a rationale for the effectiveness rankings.

The OPGGS(S) Regulations refer to technical and 'other' controls where technical control measures involve hardware like shutdown valves and alarms. 'Other' control measures include administrative and procedural control measures that are underpinned by other elements such as organisational systems, competency requirements, training, response plans etc. Industry practice has further developed this concept of a range of different types of controls based on a POiSTED[3] framework (People, Organisation, Information, Support and facilities, Training, Equipment, Doctrine). This has been further refined to apply to the categorisation of source control measures for a LOWC response:

- People – personnel;
- Systems – organisation, information/communications, support facilities, training/ competency;
- Equipment – equipment; and
- Procedures – policies, plans and procedures (i.e. doctrine).

Western Gas' philosophy is to deploy a range of different types of controls to reduce impacts and risks through multiple and independent layers of protection. As LOWC event is a MAE or Major Environmental Event (MEE), the Performance Standard Criteria Safety Critical Control (SCC) approach for assessing the proposed control's effectiveness i.e., Availability, Functionality, Reliability, Survivability and Interdependency has been used.

[3] POSTED was the model originally utilized by the Australian Army to describe the inputs to capability. Noetic has added a lower case i to illustrate the inclusion of information in the Information and Communications technology context. The background materials on a Capability Framework came from a document prepared for the Victoria Country Fire Authority in Australia.

Table C-1 ALARP Evaluation Methodology for Source Control Response Strategies

<table>
<tr><th>Title</th><th colspan="3">Description</th></tr>
<tr><td>Control Measure</td><td colspan="3">Potential control measure under consideration</td></tr>
<tr><td>Control Measure Status</td><td colspan="3">• Existing - control measures are already in place.
• Alternative - control measures are evaluated as replacements for the control already in effect.
• Additional - control measures are evaluated in terms of their ability to reduce an impact or risk when added to the existing suite of control measures.
• Improved - control measures are evaluated for improvements they could bring to the effectiveness of adopted control measures.
Adapted from NOPSEMA Guideline Environment Plan Decision Making N-04750-GL1721 Revision 6 – November 2019.</td></tr>
<tr><td>Control Measure Category</td><td colspan="3">People, Systems, Equipment, Procedures.</td></tr>
<tr><td>Environmental Outcome</td><td colspan="3">Environmental benefit from proposed control measure.</td></tr>
<tr><td rowspan="5">Control Measures Effectiveness Assessment</td><td colspan="3">Effectiveness assessment of proposed control measure using SCC performance standard criteria - functionality, availability, reliability, survivability, interdependence.</td></tr>
<tr><td rowspan="2">Criteria</td><td colspan="2">Effectiveness Ranking</td></tr>
<tr><td>Low</td><td>High</td></tr>
<tr><td>Availability</td><td>Equipment / resources not readily available and no external arrangement or internal processes in place to expedite timely provision of equipment / resources.</td><td>Equipment / resources readily available or on standby, and / or contracts, arrangements, or MoUs in place for timely provision of equipment / resources.</td></tr>
<tr><td>Functionality</td><td>Control measure does not significantly reduce environmental impact or risk.</td><td>Control measure can significantly reduce environmental impact or risk.</td></tr>
<tr><td>Reliability</td><td>Control measure not tested in Australian waters and / or low assurance assigned to success rate.</td><td>Control measure tested in Australian waters and/or high assurance assigned to success rate.</td></tr>
<tr><td>Survivability</td><td>Control measure has low operational timeframe and needs to be replaced regularly to maintain effectiveness.</td><td>Control measure has a high operational timeframe and does
not need to be replaced regularly to main effectiveness.</td></tr>
</table>

Title	Description		
	Interdependence	Control measure reliant on other systems in order for it to be able to perform its intended function.	Control measure not reliant on other systems in order for it to be able to perform its intended function.
Estimated cost $ / effort	Cost or effort to implement proposed control measure in Activity timeframe.		
Implementation time	Estimated implementation time on notification of a LOWC.		
ALARP Evaluation / Decision	Accept or reject proposed control measure		

Table C-2 ALARP Evaluation of potential source control measures

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
Source Control Emergency BOP Intervention							
Mudline Control Device (MCD)	Additional	Equipment	Pre-deployed MCD below the existing subsea BOP stack isolates reservoir if BOP fails, controlling flow of hydrocarbons earlier reduces environmental impacts.	**Availability** *Low*. Requires significant long lead planning. **Functionality** *High*. Potential to shut-off hydrocarbon flow. **Reliability** *Low*. Deployed once in Russian Arctic where access for a relief well rig would not be possible, due to ice, during winter season. **Survivability** *High*. Similar survivability to subsea BOP. **Interdependency** *High.* Independent operation of the BOP.	~US$3.5M	Immediate	Reject – High costs disproportionate to environmental benefit versus accepted source control below through deployment of emergency BOP intervention from rig or vessel.
Emergency BOP Intervention on Rig	Existing	Procedure / Equipment	Pre-deployed ROV fitted with Subsea Emergency	**Availability** *High*. ROV already on rig.	~US$100K	Immediate	Accept – Control measure practicable and effective, minor

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
			Accumulator on rig to activate BOP closure locally at subsea BOP either mechanically or hydraulically via hot stab if surface closure not effective. Controlling flow of hydrocarbons as quickly as possible will reduce environmental impacts.	**Functionality** *High*. Potential to shut-off hydrocarbon flow. **Reliability** *High*. Experience in use in Australian and international drilling operations. **Survivability** *High*. BOP ROV Intervention skid does not need to be replaced within Sasanof-1 well timeframe. **Interdependency** *Low.* The rig based BOP ROV Intervention skid is dependent on the evacuation status of personnel which may occur if LOWC occurs.			cost not disproportionate to environmental benefit.
Emergency BOP Intervention (vessel based) with support vessel(s) and	Additional	Procedure / Equipment	Deploy vessel ROV to activate BOP closure locally at subsea BOP either mechanically or	**Availability** *High*. BOP ROV Intervention skids suitable available to be deployed with Sasanof-1 timeframe.	US$750K	< 7 days.	Accept – Control measure practicable and effective, moderate cost not disproportionate to

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
ROVs to be sourced via Mutual Aid MoU.			hydraulically via hot stab if surface closure not effective. Controlling flow of hydrocarbons as quickly as possible will reduce environmental impacts.	**Functionality** *High*. Potential to shut-off hydrocarbon flow. **Reliability** *Low*. Few examples of its use (Macondo). **Survivability** *High*. Multiple BOP ROV Intervention skid units available within Sasanof-1 well timeframe. **Interdependency** *Low.* The vessel based BOP ROV Intervention skid is dependent on the status of the BOP and debris around it.			environmental benefit.
Emergency BOP ROV Intervention using Vessels on Standby.	Improved	Equipment / Procedures	Deploy vessel ROV fitted to activate BOP closure locally at subsea BOP either mechanically or hydraulically via hot stab if surface	**Availability** *High*. BOP ROV Intervention skids and vessels suitable available to be deployed with Sasanof-1 timeframe. **Functionality** *High*. Potential to shut-off hydrocarbon flow.	~US$3-5M	<1 day	Reject – High costs disproportionate to environmental benefit from potential need to have debris cleared

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
			closure not effective. Controlling flow of hydrocarbons as quickly as possible will reduce environmental impacts.	**Reliability** *Low*. Few examples of its use (Macondo). **Survivability** *High*. Multiple BOP ROV Intervention skid units available within Sasanof-1 well timeframe. **Interdependency** *Low.* The vessel based BOP ROV Intervention skid is dependent on the status of the BOP and debris around it.			prior to capping stack arrival at site.
Source Control – Capping Stack (Primary Strategy)							
Capping Stack equipment maintained in 'ready deploy status' by WWC – air freight from Singapore to Dampier, then sea	Existing	Equipment / Procedures	Deploy WWC Capping Stack from Singapore by air to Dampier, transfer to ISV and sail to site. Controlling flow of hydrocarbons as quickly as possible will reduce	**Availability** *High*. Contract in place with WWC. **Functionality** *High*. Potential to completely stop LOWC. **Reliability**	~US$500,000	21 days	Accept – Control measure practicable and effective, minor cost not disproportionate to environmental benefit. Note that sea freight of capping stack

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
freight to well location.			environmental impacts.	*Low*. Few examples of actual deployment (Macondo) **Survivability** *High*. Capping stack stored in Singapore does not need to be replaced in Sasanof-1 timeframe. **Interdependency** *Low.* Dependent on safe operating conditions (metocean) over well head. Subsea plume analysis indicates vessel intervention with small vertical offset possible due to low surface LELs. May require deployment of debris clearance tool before deployment. Requires suitable deployment vessel with safety case.			directly to site slightly faster by ~ 24 hours. Both sea and air freight are acceptable options. Selection of transport option will be made in actual event of LOWC.
Capping Stack equipment maintained in 'ready deploy status' by WWC –	Existing	Equipment / Procedures	Deploy WWC Capping Stack from Singapore on ISV and sail to direct to Sasanof-1 location.	**Availability** *High*. Contract in place with WWC. **Functionality** *High*. Potential to completely stop LOWC.	~US$500,000	21 days	Accept – Control measure practicable and effective, minor cost not disproportionate to

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
sea freight from Singapore direct to well location.			Controlling flow of hydrocarbons as quickly as possible will reduce environmental impacts.	**Reliability** *Low*. Few examples of actual deployment (Macondo). **Survivability** *High*. Capping stack stored in Singapore does not need to be replaced in Sasanof-1 timeframe. **Interdependency** *Low.* Dependent on safe operating conditions (metocean) over well head. Subsea plume analysis indicates vessel intervention with small vertical offset possible due to low surface LELs. May require deployment of debris clearance tool before deployment. Requires suitable deployment vessel with safety case.			environmental benefit. Note that sea freight of capping stack directly to site slightly faster by ~ 24 hours. Both sea and air freight are acceptable options. Selection of transport option will be made in actual event of LOWC.
Pre hire of capping stack deployment vessel on standby in Singapore	Improved	Equipment / Procedures	Deploy WWC Capping Stack from Singapore on ISV and sail to direct to	**Availability** *High*. Contract in place with WWC. ISV potentially available.	~US$5-8M	Potentially reduce mobilisation time	**Reject** – High costs disproportionate to environmental benefit from

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
			Sasanof-1 location. Controlling flow of hydrocarbons as quickly as possible will reduce environmental impacts.	**Functionality** *High*. Potential to completely stop LOWC. **Reliability** *Low*. Few examples of actual deployment (Macondo). **Survivability** *High*. Capping stack stored in Singapore or ISV does not need to be replaced in Sasanof-1 timeframe. **Interdependency** *Low.* Dependent on safe operating conditions (metocean) over well head. Subsea plume analysis indicates vessel intervention with small vertical offset possible due to low surface LELs. May require deployment of debris clearance tool before deployment. Requires suitable deployment vessel with safety case.		from 21 to 15 days	potential to have debris cleared prior to capping stack arrival at site and need for safety case preparation prior to deployment.

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
Purchase and pre-position capping stack and equipment.	Improved	Equipment / Procedures / People	Capping stack available immediately. Controlling flow of hydrocarbons as quickly as possible will reduce environmental impacts.	**Availability** *Low*. Long lead time for manufacture of capping stack would defer drilling program by up to 18-24 months. **Functionality** *High*. Potential to completely stop LOWC. **Reliability** *Low*. Few examples of actual deployment (Macondo). **Survivability** *High*. Capping stack does not need to be replaced in Sasanof-1 timeframe. **Interdependency** *Low.* Dependent on safe operating conditions (metocean) over well head. Subsea plume analysis indicates vessel intervention with small vertical offset possible due to low surface LELs. May require deployment of debris	~US$10-20M	~2days	**Reject** – High costs disproportionate to environmental benefit from potential to have debris cleared prior to capping stack arrival at site, need for ISV with Safety Case and need to hire, train and deploy personnel in Australia with capping stack maintenance expertise. Lead time to buy capping stack 1-2 years.

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
				clearance tool before deployment. Requires suitable deployment vessel with safety case.			
Source Control – Debris Clearance (primary strategy)							
Debris Clearance Tools on shared standby for preparation of site (if needed) prior to installing capping stack.	Existing	Equipment / Procedures	Rapid mobilisation of equipment to prepare site prior to potential installation of capping stack allows earlier control of hydrocarbons flow thereby reducing environmental impacts.	**Availability** *High*. Contract in place with WWC. **Functionality** *High*. Wide range of capability and functionality to remove debris to allow capping stack or emergency BOP intervention. **Reliability** *Low*. Few examples of actual deployment (Macondo) **Survivability** *High*. Wide range of debris types / condition able to be removed by equipment. Debris removal tools do not need to be replaced in Sasanof-1 timeframe.	Included with capping stack standby cost.	21 days	**Accept** – Control measure practicable and effective, minor cost not disproportionate to environmental benefit.

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
				Interdependency *Low.* Dependent on safe operating conditions (metocean) over well head. Subsea plume analysis indicates vessel intervention with small vertical offset possible due to low surface LELs. Requires suitable deployment vessel with safety case.			
Pre hire of suitable debris clearance support vessel(s) on standby in Singapore	Improved	Equipment / Procedures	Rapid mobilisation of equipment to prepare site prior to potential installation of capping stack allows earlier control of hydrocarbons flow thereby reducing environmental impacts.	**Availability** *High*. ISVs potentially available. **Functionality** *High*. Wide range of vessel capabilities to deploy debris removal tools. **Reliability** *Low*. Few examples of actual deployment (Macondo). **Survivability**	~US$2-4M	15 days	**Reject** – High costs disproportionate to environmental benefit due to need to deploy debris clearance tool on ISV with Safety Case.

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
				High. ISV does not need to be replaced in Sasanof-1 timeframe. **Interdependency** *Low.* Dependent on safe operating conditions (metocean) over well head. Subsea plume analysis indicates vessel intervention with small vertical offset possible due to low surface LELs. Requires suitable deployment vessel with safety case.			
Source Control – Relief Well (Primary Strategy)							
Relief well operations managed in accordance with the DIMT Incident Action Plan (IAP), AGR SCERP and third-party requirements.	Existing	Equipment / Procedures	Rapidly initiate relief well planning and pre-identification of equipment requirements. Reduced duration of subsea blowout.	**Availability** *High*. Contract and plans in place with existing 3rd parties. **Functionality** *High*. Potential to permanently shut off hydrocarbon flow. **Reliability**	~US$500k	80 days	**Accept** – Control measure is effective and has minor cost implications.

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
				Low. Few examples of actual deployment (Montara and Macondo). **Survivability** *High*. Relief well plan will be updated in the event of actual LOWC **Interdependency** *Low*. Requires suitable MODU with safety case.			
NOPSEMA-accepted Well Operation Management Plan (WOMP) and Safety Case(s) specific to the relief well activity.	Existing	Procedures	Identifies key well barrier requirements and safety critical controls to avoid or mitigate a LOWC. Mitigates reduces risk of subsea blowout.	**Availability** *High*. Legislative requirement to be in place prior drilling relief well. **Functionality** *High*. Specifies barrier requirements and contingency arrangements for drilling of relief well. **Reliability** *High*. WOMPs and SCR common for Australian operations. **Survivability** *High*. Does not need to be revised over course of Sasanof-1 program.	N/A	Prior to spudding of relief well	**Accept** – Control measure is effective and has minor cost implications.

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
				Interdependency *High.* Not dependent on other measures.			
Prepare outline relief well safety case revision (MoU MODU).	Existing	Procedures People	Reduces NOPSEMA Safety Case acceptance time and well kill duration. Reduced duration of subsea blowout.	**Availability** *High*. AGR has in-house Safety Case expertise. Identified preferred rig and existing relationship with operator. **Functionality** *High*. Known requirements for relief well drilling safety issues. **Reliability** *Low.* Untested approach with NOPSEMA. **Survivability** *Low*. Potential for changes in SCR or rig operator SMS in the event preferred rig unavailable. **Interdependency** *Low.* Dependent on SMS of rig being used for relief well.	$50K	Implement post primary MODU safety case but prior to entering exploration drilling reservoir.	**Accept** – Control measure is effective and has minor cost implications.
Purchase wellhead and conductor for relief well.	Existing	Equipment	Reduces delays in equipment availability. Reduced duration of subsea blowout.	**Availability** *High*. Equipment available. **Functionality** *High*. Potential to kill well earlier. **Reliability** *High.* Commonly used equipment.	~US$400K	Immediate	**Accept** – Control measure is effective and has minor cost implications.

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
				Survivability *High*. Wellhead and conductor do not need to be replaced over course of Sasanof-1 program. **Interdependency** *High.* Not dependent on other measures.			
Purchase casing, casing accessories for relief well.	Improved	Equipment	Reduces delays in equipment availability. Reduced duration of subsea blowout.	**Availability** *High*. Equipment generally available. **Functionality** *High*. Potential to kill well earlier. **Reliability** *High.* Commonly used equipment. **Survivability** *High*. Casing and casing accessories do not need to be replaced over course of Sasanof-1 program. **Interdependency** *High.* Not dependent on other measures.	>$1M, Contracting and logistics effort	Implement prior to exploration well spud.	**Reject** – High costs, grossly disproportionate to environmental benefit. Necessary casing widely used by Australian Titleholders with stockpiles in Australia accessible via APPEA MoU provisions.

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
Casing, casing accessories for relief well accessible via APPEA Mutual Aid MoU provisions.	Existing	Procedures	Reduces delays in equipment availability. Reduced duration of subsea blowout.	**Availability** *High*. Equipment generally available. **Functionality** *High*. Potential to kill well earlier. **Reliability** *High.* Commonly used equipment. **Survivability** *High*. Casing and casing accessories do not need to be replaced over course of Sasanof-1 program. **Interdependency** *High.* Not dependent on other measures.	Procurement and Logistics effort	Implement prior to spud.	**Accept** – Control measure is effective and has minor cost implications. Necessary casing widely used by Australian Titleholders with stockpiles in Australia accessible via APPEA MoU provisions.
Pre-drill top hole of relief well.	Improved	Procedures / Equipment	Reduces well kill duration Reduced duration of subsea blowout.	**Availability** *Low.* Rig availability to drill top only is low. **Functionality** *High*. Would materially impact relief well drilling time. **Reliability** *Low*. Impacted by prevailing weather conditions. Potential for need to change for another location.	~$5-8M	Up to a year	**Reject –** High costs, second operation risk exposure, and plug and abandon liability grossly disproportionate to environmental benefit.

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
				Survivability *High*. Impacted by prevailing weather conditions. Risk of drilling top hole in a sub optimal location. **Interdependency** *Low.* Requires knowledge of plume, 3rd Safety Case and MODU and separate EP.			
APPEA Mutual Aid MoU in place with other operators to release MODU for relief well.	Existing	Procedures	Reduces delays in equipment availability. Reduced duration of subsea blowout.	**Availability** *High*. In place. **Functionality** *High*. Potential to materially impact relief well drilling time. **Reliability** Low. MoU has yet to be tested in Australia. **Survivability** *High*. MoU not required to be updated or changed over course of Sasanof-1 well. **Interdependency** *Low.* Relies on industry vessels and rigs able to be safely transferred to a relief well program.	Nil	Implement prior to spud of exploration well.	**Accept** – Control measure is effective and has minor cost implications.

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
MODU / Vessel contract tracking and forecasting including Vessel Brokerage monthly MODU / vessel updates.	Existing	Procedures People	Improves visibility of likely locations of relief well MODU and vessels during the Activity. Reduced duration of subsea blowout.	**Availability** *High*. AGR has existing contract in place for Clarksons and have previously used their database. **Functionality** *High*. Database specifies vessel / rig type, specifications, existing Safety Case, current location. **Reliability** *High*. Previously used in AGR drilling campaigns. **Survivability** *High*. Control measure does not require change over course of Sasanof-1 well **Interdependency** *High*. Not dependent on other control measures.	Nil	Ongoing	**Accept** – Control measure is effective and has minor cost implications.
Prepare mobilisation plan for MODU outside of Australia if no MoU MODU in Australia 3 months prior to	Existing	Procedures People	Reduces delays in preparation of safety case for relief well – in the case of requiring a MODU to be mobilised from Southeast Asia, NZ	**Availability** *High*. AGR has experience in rig negotiation, management, audit and mobilisation. **Functionality** *High*. Potential to maintain relief well target timeline.	$50K	Implement 3 months prior to spud.	**Accept** – Control measure is effective and has minor cost implications.

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
commencement of Activity.			or elsewhere. Reduced duration of subsea blowout.	**Reliability** *High*. AGR has experience in rig negotiation, management, audit and mobilisation. **Survivability** *High*. Inherent in adaptive mobilisation plan. **Interdependency** *High*. Not dependent on other control measures.			
Invasive Marine Species (IMS) clearance of a nominated Southeast Asia (SEA) MODU.	Improved	Procedures People	MODU cleared from IMS are able to mobilise directly to the wellsite in event of emergency. Reduced duration of subsea blowout. Reduced duration of subsea blowout.	**Availability** *High*. Contract in place to conduct / coordinate. **Functionality** *High*. Can materially impact rig mobilisation time. **Reliability** *Low*. Depends on location of rig and how long it stays in one place **Survivability** *Low*. Depends on location of rig and how long it stays in one place. **Interdependency** *Low.* Depends on cleared rig being the one used in drilling relief well.	$20K	Prior to mobilisation to relief well site	**Reject** – This control relies on knowledge of MODU required, no significant additional environmental benefit, versus obtaining clearance via adaptive management mobilisation plan control if Australian

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
							waters rig not available.
Invasive Marine Species (IMS) Risk Assessment (RA) of Potential South East Asia MODU.	Improved	Procedures	IMS RA based on past and prospective MODU movements informs choice of available MODU.	**Availability** *High*. Contract in place to conduct / coordinate. **Functionality** *High*. Can materially impact rig mobilisation time. **Reliability** *High*. Specific to actual rig being used for relief well drilling. **Survivability** *High*. Specific to actual rig being used for relief well drilling. **Interdependency** *High*. Specific to actual rig being used for relief well drilling.	~$10K	Implement if no MoU MODU in Australia 3 months prior to spud.	**Accept** – Control measure is effective and has minor cost implications.
MODU on standby in case relief well needed.	Improved	People Equipment Procedures	MODU immediately available to drill relief well. Reduced duration of subsea blowout.	**Availability** *Low*. Difficult to get rig on standby for well duration. **Functionality** *High*. Can materially impact relief well drilling time. **Reliability** *Low*. Unheard of in the industry.	~$30-50M	~7 days to mobilise standby MODU to drill relief well	**Reject** – High costs grossly disproportionate to environmental benefit versus capping stack deployment.

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
				Survivability *High*. Relief well MODU would not need to be changed during course of Sasanof-1 drilling program. **Interdependency** *High*. Safety Case already in place			
Pre-Mobilisation of Relief Well (Source Control) Personnel	Improved	People	Having Source Control Team in place at the start of the Activity leads to elimination of the mobilisation time for Source Control Team. Negligible – Source Control Team can work remotely during initial phase and then mobilise over time.	**Availability** *High.* Personnel available. **Functionality** *High*. Availability of source control expertise can impact on all source control activities. **Reliability** *Low.* Few examples of actual deployment (Montara and Macondo). **Survivability** *Low*. Potential to change out personnel if Sasanof-1 program delayed by rig availability. **Interdependency** *High*. Not dependent on other control measures.	~$500k	Prior to spud	**Reject** – High costs disproportionate to negligible environmental benefit from reduction in mobilisation times (Source Control Team able to operate remotely initially).

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
Relief Well (Source Control) personnel resourcing plan in place.	Existing	People	Mobilisation Plan for Source Control Team. Reduced duration of subsea blowout.	**Availability** *High.* Personnel available. **Functionality** *High*. Availability of source control expertise can impact on all source control activities. **Reliability** *Low.* Few examples of actual deployment (Montara and Macondo). **Survivability** *High.* Personnel sourced from a pool of trained resources which is not changed over course of drilling Sasanof-1. **Interdependency** *High*. Not dependent on other control measures.	~$250K	Prior to spud of exploration well	**Accept** – Control measure is effective and has minor cost implications.
Two alternative relief well site locations selected prior to spud.	Existing	Procedures	Provide assurance that primary and secondary relief well location(s) is/are suitable for use and provide information to complete mooring analysis. Reduced	**Availability** *High.* Vessels and personnel available. **Functionality** *High.* Confirms suitability of relief well site. **Reliability** *Low.* Few examples of actual deployment (Montara and Macondo).	$50K	Prior to spud of exploration well.	**Accept** – Control measure is effective and has minor cost implications.

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
			duration of subsea blowout.	**Survivability** *Low.* Potential for relief well location to change. **Interdependency** *High*. Not dependent on other control measures.			
Mooring analysis for relief well MODU(s).	Improved	Procedures	Provide assurance that any relief well MODU can be moored at the relief well location. Reduced duration of subsea blowout.	**Availability** *Low.* Motion characteristics specific to each rig. **Functionality** *Low*. Mooring analysis does not significantly impact timeline of commencing relief well drilling. **Reliability** *Low.* Motion characteristics specific to each rig. **Survivability** *Low.* Motion characteristics specific to each rig. **Interdependency** *High*. Not dependent on other control measures.	$10K	Prior to spud of exploration well.	**Reject** – Additional effort on mooring analysis not warranted versus 1st preference for DP Relief Well MODU.
Pre lay of relief well MODU moorings.	Improved	Equipment	Reduce time to moor relief well MODU on location. Reduced	**Availability** *Low.* Mooring specific to each rig. **Functionality** *High*. Reduces relief well MODU mooring time.	~$1.0M	Prior to spud of exploration well.	**Reject** – High costs grossly disproportionate to environmental

Control Measure	Control Measure Status	Control Measure Category	Environmental Outcome	Control Measure Effectiveness Assessment	Cost	Implementation time	ALARP Analysis
			duration of subsea blowout.	**Reliability** *Low.* Mooring specific to each rig. **Survivability** *Low.* Mooring specific to each rig. **Interdependency** *High*. Not dependent on other control measures.			benefit versus 1st preference for DP Relief Well MODU.