Esso Australia Resources Pty Ltd

EMERGENCY PREPAREDNESS AND RESPONSE

BASS STRAIT ENVIRONMENT PLAN

Volume 3

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Abbreviations

ADIOS	Automated Data Inquiry for Oil Spills
AHS	Australian Hydrographic Service
ALARP	As Low As Reasonably Practicable
AMOSC	Australian Marine Oil Spill Centre
AMSA	Australian Maritime Safety Authority
APPEA	Australian Petroleum Production and Exploration Association
BBMT	Barry Beach Marine Terminal
BOP	Blowout Preventer
CSV	Construction Support Vessel
C&R	Containment and Recovery
DAWR	Department of Agriculture and Water Resources
DELWP	Department of Environment, Land, Water and Planning Victoria
DNA	Deoxyribonucleic Acid
DPAW	Department of Parks and Wildlife
EMBSI	ExxonMobil Biomedical Sciences
EMPLAN	NSW State Emergency Management Plan
EP	Environment Plan
EPA	Environmental Protection Agency
EPBC	Environmental Protection and Biodiversity Conservation Act
EPO	Environmental Performance Objectives
EPS	Environmental Performance Standards
ERT	Emergency Response Team

ESD	Ecologically Sustainable Development
FWADC	Fixed Wing Aerial Dispersant Contract
GIS	Global Information System
IMO	International Maritime Organisation
IMT	Incident Management Team
IPECA	International Petroleum Industry Environmental Conservation Association
ITOPF	International Tanker Owners Pollution Fund
JRCC	Joint Rescue Coordination Centre
KSAT	Kongsberg Satellite Services
MARPOL	International Convention for the Prevention of Pollution from Ships
MoU	Memorandum of Understanding
MC	Measurement Criteria
NAF	Non Aqueous Fluid
NATA	National Association of Testing Authorities
NEBA	Net Environmental Benefit Analysis
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NRDA	Natural Resource Damage Assessment
NSW	New South Wales
OIMS	Operations Integrity Management System (OIMS) Objectives.
OPEP	Oil Pollution Emergency Plan
OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage Act 2006
OPGGS(E)R	Offshore Petroleum and Greenhouse Gas Storage Environment Regulations 2009
(OPGGS(S))	Offshore Petroleum and Greenhouse Gas Storage Regulations
OSMP	Operational and Scientific Monitoring Program
OSR	Oil Spill Response
OSRL	Oil Spill response Limited
OWR	Oiled Wildlife Response
PSZ	Petroleum Safety Zone
ROC	Oil Retained On Cuttings
ROV	Remotely Operated Vehicle
RPS	RPS Group PLC
SCAT	Shoreline Clean-up Assessment Technique
SFRT	Subsea First Response Toolkit
SOLAS	Safety of Life At Sea
SMEP	Victorian State Maritime Emergencies (non-search and rescue) Plan
SSDI	Subsea Dispersant Injection
Tas	Tasmania

TasPlan	Tasmanian Marine Oil Spill Contingency Plan
TasPorts	Tasmanian Ports Corporation
TRP	Tactical Response Plans
Vic	Victoria
VOC	Volatile Organic Compounds
WCDS	Worst Credible Discharge Scenario
WildPlan	Tasmanian Oiled Wildlife Response Plan

1. Introduction

This volume of the Environment Plan describes potential response options available for an oil spill occurring from any of Esso's activities within the Gippsland Basin as described in:

- Volume 2: Bass Strait Operations Environment Plan,
- Volume 2a: JUR Drilling Environment Plan,
- Volume 2b: Whiting Plug and Abandonment Environment Plan#
- Volume 2c: SHA / TWA Plug and Abandonment Environment Plan#
- Volume 2d: BTW Installation, Commissioning and Initial Operations Environment Plan

#Activities completed in 2020

This volume assesses and evaluates:

- Potential environmental impacts from implementing response options in accordance with Regulation 13(6); and
- Esso's capabilities for each response option in accordance with Regulation 14(8AA).

The Oil Pollution Emergency Plan (OPEP) details the initial and ongoing actions to take following a spill incident, the response framework and organisation structure, and step by step guides for key roles and responsibilities. The OPEP is an operational document which provides the response resources available for all levels of incidents, tools for spill response assessment, timeframes to initiate a response, notifications, and steps for response escalation, monitoring and stand down.

The Operational and Scientific Monitoring Plan (OSMP) outlines environmental monitoring that may be implemented in the event of an oil spill to the marine or coastal environment. Information from oil spill monitoring enables the Incident Management Team (IMT) to make informed decisions regarding response options. Oil spill monitoring provides the principle tools for determining the extent, severity and persistence of environmental impacts from a hydrocarbon spill and associated response and/or remediation activities.

2. Overview of Emergency Oil Spill Response Strategies

In an oil spill event, response options and tactics employed will vary depending on a number of factors related to the specific spill incident including: oil types, volumes, location of spill and whether it is a discrete spill or an ongoing flow.

The response options for the Bass Strait are listed below:

- Source Control;
- Surveillance and Monitoring;
- Application of Dispersant;
- Containment & Recovery (Offshore and Nearshore);
- Shoreline Protection and Clean-up; and
- Oiled Wildlife Response.

In-situ burning was considered however has not been included as a viable response strategy as:

- This response strategy is not approved as part of the national plan
- This response strategy has not been used previously in Australia
- Potential issues with local community and stakeholder engagement due to visual amenity

An effective response strategy may require a combination of different response options and may be scaled up or down depending on the oil spill event.

This Volume details the following information for each response option:

- Description of Response;
- Assessment of Environmental Impacts caused by Response Activities; and

- Assessment of required capability.

Environmental Performance Outcomes (EPOs), Standards (EPSs) and Measurement Criteria (MC) have been identified and put in place to ensure environmental impacts from response activities are acceptable and reduced to as low as reasonably practicable (ALARP).

In addition, EPOs, EPSs and MC have been identified to ensure resources remain current and available to respond to an oil spill event.

The EPOs, EPSs and MC are detailed in Volume 4 of the EP for emergency response capability and in Appendix C of the OPEP for oil spill response. These will be monitored and reported as per the implementation strategy.

2.1 Environmental Impact Assessment of Oil Spill Response

All oil spill response activities are implemented with the aim of reducing the overall environmental impact of the spill however, each activity in itself may also impact the environment, therefore it is important to understand impacts, assess the level and acceptability of impacts, and reduce impacts to ALARP.

This volume addresses assessment and evaluation of the consequence of mobilising the response strategies in the Bass Strait, which considers specific environmental aspects (Section 2.1.1) and receptors in the Bass Strait environment.

The environmental impact assessment of each response option has been undertaken in accordance with the following sections which can be found in Volume 2

- Environmental Impact Assessment (including assessment of consequence)
- Demonstration of ALARP
- Demonstration of Acceptability

The environmental receptors that may be impacted in a spill scenario have been described in the Description of Environment Volume 1 and summarised in the impact tables below.

2.1.1 Environmental Aspects

After identifying and describing the possible response options, an assessment was carried out to identify environmental receptors and potential interactions between the response activities and the receiving environment. The environmental receptors identified as occurring in the area are described in the Description of Environment Volume 1. The environmental aspects have been identified for each oil spill response option and are shown in Table 2-1.

Based upon an understanding of the environmental aspects, potential impacts were defined and ecological and social receptors identified enabling a systematic evaluation to be undertaken. Many aspects align with those already described in the activity specific Impacts and Risks Volume (i.e. Volume 2, 2a, 2b etc.) such as aspects associated with vessels, therefore this volume only evaluates aspects and impacts that are unique to oil spill response activities.

Table 2-1 Applicable Environmental Aspects

Environmental Aspect	Response Strategies	Environmental Impact Assessment
Vessel related aspects		
Emissions to Air (as a result of support operations)	• Source Control • Monitoring and Surveillance • Dispersant Application • Containment and Recovery • Shoreline Protection and Clean-up	Vessel and helicopter impacts are assessed within Volume 2.

Environmental Aspect	Response Strategies	Environmental Impact Assessment
	• Oiled Wildlife Response	
Physical Interaction - Other Marine Users	• Source Control • Monitoring and Surveillance • Containment and Recovery • Shoreline Protection and Clean-up • Dispersant Application	Vessel and helicopter impacts are assessed within Volume 2.
Planned Discharge – Treated Bilge	• Source Control • Monitoring and Surveillance • Dispersant Application • Containment and Recovery	Vessel impacts assessed in Volume 2.
Planned Discharge - Deck Drainage	• Source Control • Monitoring and Surveillance • Dispersant Application • Containment and Recovery	Vessel operations impact assessment in Volume 2
Planned Discharge - Food waste	• Source Control • Monitoring and Surveillance • Dispersant Application • Containment and Recovery	Vessel impacts assessed in Volume 2.
Planned Discharge - Sewage and Greywater	• Source Control • Monitoring and Surveillance • Dispersant Application • Containment and Recovery	Vessel impacts assessed in Volume 2.
Other Aspects		
Planned Discharge – Cement	• Source Control	Impact assessment for drilling a relief well within this volume.
Planned Discharge - Drilling Muds & Cuttings	• Source Control	Impact assessment for drilling a relief well within this volume.
Planned Discharge - Operational Fluids (surface and subsurface)	• Source Control	Impact assessment for drilling a relief well ~~/ capping stack installation~~ within this volume.
Physical Presence - Seabed Disturbance	• Source Control	Impact assessment for drilling a relief well ~~/ capping stack installation~~ within this volume.
Sound Emissions	• Source Control	Impact assessment for drilling a relief well within this volume

Environmental Aspect	Response Strategies	Environmental Impact Assessment
Planned Discharge of Dispersant (subsea and surface)	• Dispersant Application	Impact assessment within this volume.
Socioeconomic (fisheries, tourism, culture)	• Dispersant Application • Containment and Recovery • Shoreline Protection and Clean-up • Oiled Wildlife Response	Impact assessment within this volume.
Water quality – from decanting	• Containment and Recovery	Impact assessment within this volume.
Physical Presence - Interaction with Fauna and Flora	• Dispersant Application • Containment and Recovery • Shoreline Protection and Clean-up • Oiled Wildlife Response	Impact assessment within this volume.
Physical Presence - Sensitive and protected areas and parks	• Dispersant Application • Containment and Recovery • Shoreline Protection and Clean-up • Oiled Wildlife Response	Impact assessment within this volume.
Waste Management and Secondary Contamination	• Dispersant Application • Containment and Recovery • Shoreline Protection and Clean-up • Oiled Wildlife Response	Impact assessment within this volume.

2.2 Assessment of Oil Spill Response Strategies and Required Capabilities

Oil pollution preparedness and response arrangements should be commensurate with the identified risk and be fit for purpose, performance based, adaptable, scalable, sustainable, and clearly identify roles and responsibilities. All necessary arrangements to support timely response to foreseeable oil pollution emergencies must be in place prior to an activity commencing, and be maintained for the duration of the activity.

As per the IPIECA & OGP (2013) guidelines, the results from the spill modelling and impact assessment of the worst case discharge scenarios (see Volume 2) provide important input related to the likelihood of different spill scenarios, the ecological and socio-economic consequences of the scenarios, and the likelihood of exposure and oil volumes in geographical areas. Such information supports response planning analysis including NEBA, establishing response strategies and assessing resource needs across all response tiers.

Assessment of Oil Spill Response Strategies aims to identify:

- Viable strategies for delivering a response with the greatest net environment benefit

- Tactical measures required to implement the identified response strategies, considering technical, practical and safety factors
- Tiered resources required to mount the tactical measures and achieve an effective and realistic response

In order to address these items, Esso engaged AMOSC to conduct a detailed review of the selected worst case discharge scenarios in order to establish:

- Response strategies and required capability to respond to each worst case discharge scenario;
- Resource and personnel requirements for mobilisation and implementation of each response strategy;
- Consideration of resources and personnel for mobilisation and implementation of applicable Tactical Response Plans (TRPs); and
- Assessment of the availability of resources from Tier I, II, III equipment stockpiles.

The results from the AMOSC assessment have been used to generate a summary of resources required, resources available and expected timeframes to mobilise the personnel and equipment for each response option within this Volume.

The *APPEA Guidance Document: Incident Management Team- Knowledge requirements for responding to marine oil spills* has also been considered in assessing the capability and competency requirements of the IMT managing response activities. Designated members of the Esso IMT must complete all hazards training (PMAOMIR418/ PMAOMIR322) and oil spill response training to IMO II or IMO III equivalent. Training and competency requirements by position are detailed in the implementation strategy of the relevant EP.

Ability to scale up the IMT for a larger scale incident is managed via access to tiered response resources as detailed in Table 2-2 IMT Scaling

Table 2-2 IMT Scaling

Position	Initial Response	Secondary Resource	Tertiary Resource
Incident Controller	Esso		EM RRT
Liaison Officer	Esso		EM RRT
Safety Officer	Esso		EM RRT
Operations Section Chief	Esso		EM RRT
Marine Branch	Esso	AMOSC	EM RRT
Aviation Branch	Esso	AMOSC	EM RRT
Dispersant Branch	AMOSC	OSRL	OSRL
Shoreline Response Branch	Esso	AMOSC	EM RRT
OWR Branch	AMOSC	OSRL	EM RRT
Resource Protection	Esso	AMOSC	ÉM RRT
Planning Section Chief	Esso		EM RRT
Trajectory Forecast Function	AMOSC		EM RRT
Environment Unit Lead	Esso	AMOSC	EM RRT
Resources at Risk	Esso	AMOSC	EM RRT

Position	Initial Response	Secondary Resource	Tertiary Resource
*OSMP	OSMP contractor		EM RRT
*SCAT Coordinator	OSMP contractor	AMOSC	EM RRT
Shoreline Response Program	AMOSC	OSRL	EM RRT
Situation Unit Lead	Esso		EM RRT
GIS / COP	Esso		EM RRT
Resource Unit Lead	Esso		EM RRT
Logistics Section Chief	Esso		EM RRT

RRT and OSRO members will complete an induction/onboarding prior to integrating into the Esso Australia IMT
*Specialist training required to implement OSMP/SCAT as outlined in OSMP.

2.2.1 Response Strategies

For each worst case discharge scenario, a full range of response strategies were considered. Strategies which were not viable (e.g. due to oil type or proximity to sensitive receptors) were identified. The details of response strategies applicable to each worst case discharge scenario can be found in OPEP Appendix D – Quick Reference Information.

Note that these are the proposed response strategies based on the available spill response modelling information. Actual response strategies implemented will be decided using the process described in Section 2.3 and in consultation with relevant state agencies. Guidance will be sought from relevant state agencies as to external factors which may influence the implementation of planned response strategies (e.g. natural disasters, pandemics).

2.2.2 Resource Requirements and Timeframe

Resource requirements were determined for each response strategy applicable to each worst case discharge scenario. Resource and personnel requirements are determined based on modelling outputs which indicate the location and intensity of the impact. Both deterministic and stochastic modelling was referenced to understand the overall resource requirements and where these resources may need to be located.

Considerations for resource requirements for each response strategy are outlined in Table 2-3.

Table 2-3 Considerations of resource requirements for response strategies

Response Strategy	Considerations for resource requirements
Surveillance and monitoring	Time to shoreline impact Location and type of oil
Dispersant Application	Type of oil Location of spill in proximity to sensitive receptors Surface oil loading
Containment and recovery	Type of oil Location and loading to sensitive receptors Surface oil loading
Source control	Well and facility design

Response Strategy	Considerations for resource requirements
	Reservoir characteristics Release rates
Shoreline protection and clean-up	Time to shoreline impact Type of oil Shoreline loading Geographical distance of impact Location and loading to sensitive receptors Shoreline characteristics
Oiled wildlife response	Time to shoreline impact Type of oil Shoreline loading Potential for protected species to be located in the area

2.2.3 Assessment of required resource availability

An assessment of required resource availability has been completed based on the greatest requirements and the fastest required response time. For example, the MLA spill scenario has the greatest surface volume of oil and requires the largest volume of dispersant, therefore, resources for dispersant application have been determined based on this scenario. Details of which scenario is relevant to assessment of resource availability for each response strategy is outlined in Table 2-4. The assessments can be found in the relevant sections of this Volume 3.

Resource needs were assessed against resources available using a tiered response model, i.e. Tier 1 – Esso; Tier 2 – AMOSC; Tier 3 - National Plan / international resources to identify any gaps in capability. State owned equipment was not considered in this assessment and so provides additional capability.

A summary of the required capabilities is included in the relevant Quick Reference Guides (see OPEP Appendix D – Quick Reference Information).

Table 2-4 Applicable WCDS to Response Strategy resource requirements

Response Strategy	Relevant WCDS	
	Resources	Timeframe
Surveillance and monitoring	Applicable to all scenarios	
Dispersant Application	MLA	MLA
Containment and recovery	MLA / TNA	MLA
Source control	Specific to parameters of relevant scenario	
Shoreline protection and clean-up	SHA[1]	SHA
Oiled wildlife response	Applicable to all scenarios	

2.2.4 Demonstration of ALARP

An ALARP assessment has been completed to confirm that risks continue to be reduced to ALARP and all alternative options to meet resource requirements have been considered. Additional, alternative or improved controls considered but not adopted have also been included in the ALARP assessment.

[1] Note that the SHA well was abandoned in October 2020. However the modelling for this 'workover' discharge scenario was used to represent an oil spill close to shore

This ALARP assessment applies an 'Engineering Risk Assessment' in which a comparative assessment of risks, costs, and environmental benefit is conducted (OGUK, 2014). The cost–benefit analysis shows the balance between the environmental benefit and the cost of implementing the identified measure.

2.2.5 Ongoing monitoring and maintenance of capability

To ensure risks continue to be reduced to ALARP throughout the lifetime of the activity, performance standards and outcomes have been established to monitor response capability and ensure it is maintained.

For each response strategy, all activities have been provided a standard of performance and a performance outcome. These EPOs and EPSs will be monitored in accordance with the relevant measurement criteria (e.g. through tests and drills or validation of agreements). Refer to Volume 4 for further details.

If external factors are identified to have a potential to impact spill response capability (e.g. natural disasters, pandemics) a review of available capability against required capability will be completed to ensure risks continue to be reduced to ALARP. The management of change process will be used to make required changes or updates to capability, if required.

2.2.6 Selection of Protection Priorities

To inform prioritisation and implementation of response strategies in the event of an incident, resources at risk have been identified for each worst case scenario. These are listed in the relevant Quick Reference Guides. Protection priorities are selected based on:

- sensitivity and predicted consequence (as assessed in Volume 2)
- protected / actionable areas
- minimum time to exposure
- feedback from stakeholder engagement

In the event of an incident, the NEBA process (refer to Section 2.3) will be applied to the protection priorities defined in the Quick Reference Guides to assist in planning the response.

2.3 Net Environmental Benefit Analysis

A process known as Net Environmental Benefit Analysis (NEBA) considers the advantages and disadvantages of oil spill response options in terms of their respective impacts on the environment. NEBA recognises that oil spill response activities have the potential to cause environmental impacts but may be justifiable due to overriding benefits and/or the avoidance of further impacts. The NEBA process can be applied to offshore and nearshore spill response, and to shoreline cleanup. An effective Net Environmental Benefit Analysis is a three-step process (Table 2-5).

The Esso NEBA process has been developed using guidance documents *Response Strategy Development Using Net Environmental Benefit Analysis (NEBA)* (IPIECA, 2015) and *Guidelines on implementing spill impact mitigation assessment (SIMA)* (IPIECA, 2017).

Table 2-5 Steps of the NEBA process

Step	Activities
1	Identify and prioritise an area's ecological, socioeconomic, and cultural resources according to environmental sensitivity.
2	Evaluate feasible response options and compare them to each other in addition to the option of natural recovery in order to define environmental benefits and drawbacks for all options.
3	Select the response option or combination of options that result in the greatest environmental benefit and/or least adverse effects on key resources.

2.3.1 Identifying and categorising sensitivities

Esso has undertaken a 'preparedness NEBA' which is essentially a draft of Step 1 & 2 of the NEBA Process (Table 2-5). This tool has identified resources at risk in over 40 geographic areas in an oil spill event which are located within the Bass Strait Described Area (DA) (refer to Volume 1). The resources identified span Victoria, Tasmania, New South Wales and Queensland.

The protection priorities defined in the Quick Reference Guides and the preliminary preparedness NEBA can be referenced in the event of an incident and used as a template during the response. In the event of an incident, it will be necessary to confirm the priorities are current and supported by stakeholders, and check the response strategies are indeed feasible given the specifics of the situation.

Each resource at risk has been subdivided further into resource types e.g. sandy beach, shipwrecks, fisheries, estuaries, rocky shores etc. Each of these resource types has been allocated:

1. Intrinsic Protection Priority (IPP)
2. Spill Impact Ranking; and (SIR)
3. Protection Priority Ranking (PPR).

The Intrinsic Protection Priority is calculated through:

- Irreplaceability / Significance of a Resource (Navigatus 2011)
- Vulnerability of a resource to oiling (NOAA ESI)
- Influence (criticality to human beings, ecosystems or their components)

The Spill Impact Ranking is determined based on the following impacts:

- Time before exposure;
- Duration of exposure;
- Size/scale;
- Intensity;
- Surface thickness;
- Dissolves aromatics; and
- Entrained hydrocarbons.

The IPP and the SIR are combined to give an overall PPR.

In a spill incident, the preparedness NEBA will be updated to reflect overall incident specific PPR for each resource at risk. This is achieved by:

- Determining SIR using data from incident-specific trajectory modelling; and
- Review of the IPP with stakeholders who have current and local knowledge of the resource areas.

Once this has been completed, the NEBA can be updated to select response strategies to protect the highest priority resources at risk.

2.3.2 Evaluate feasible response options

A summary of the outcomes of potential response options for each hydrocarbon type i.e. diesel, light crude and condensate is provided in the OPEP. The preparedness NEBA details the pros and cons for each response strategy based on each resource type, taking into account the impact of the response itself on the resource. The potential effects of response options (both positive and negative) are assessed compared to the 'no intervention' option and identified as:

- Proposed;
- Viable;
- Not recommended;
- Not applicable; and
- Not viable.

The potential response options for a spill have been categorised as one of the above in the preparedness NEBA for each of the resource types within each resource area. This information is summarised in OPEP Appendix D – Quick Reference Information. In an actual incident, the spill responses should be reviewed and updated to consider fluid type, safety, feasibility, timing, current and local and knowledge of the resource areas.

2.3.3 Selecting the best or a combination of response options

This step requires a range of stakeholders to reach consensus on the relative priority of the environmentally-sensitive resources and to understand the trade-offs associated with available response technologies (IPIECA-IOGP, 2015).

Two trade-off aspects are balanced in this step (i.e., protection and response, and the benefits and drawbacks of selected response options). For the former, this priority may be influenced by the ease of protection and response, recovery times, and the importance for subsistence, economic value, and seasonal changes (IPIECA-IOGP, 2015).

Once the response options and priorities have been selected, this should be reviewed by relevant IMT members and considerations to logistics, safety and resources finalised. The NEBA is an ongoing process and should be updated on a regular basis for the duration of the spill to allow for "real-time" alignment with changing field conditions and address the health of response personnel, community health, and socioeconomic considerations (e.g. beach closures). Further, these tools should be used to gain stakeholder input on local or regional priorities, expand awareness, and gain trust in the decision-making process.

Net environmental benefit should always be a key factor when making decisions on the optimum spill response options to implement.

3. Source Control

3.1 Response Option Description

Source control activities are implemented to prevent or minimise the release of hydrocarbons into the marine environment. The release of hydrocarbons may occur from one of the following scenarios:

- Operational spills (overfills, transfers and process equipment and drains system);
- Storage tank or piping leak/rupture;
- Pipeline leak/rupture;
- Well blowout (surface and subsea).

The origin and nature of hydrocarbon spill will determine the type of source control activities required and the duration of the response. Source control activities may include:

- Isolation of tanks / pipes;
- Remote Operated Vehicle (ROV) intervention;
- Well capping;
- Relief well;
- Use of the Well Kill Equipment Skid;
- Use of resources from a third party response provider (e.g. Wild Well Control);
- Pipeline isolation, depressuring and repair.

The source of the spill will be assessed and evaluated by the Emergency Response Team (ERT) and Incident Management Team (IMT) on a case by case basis. The origin and nature of the spill (wells, pipeline or vessel) and metocean conditions will influence the source control response options selected based on technical feasibility.

An advantage of Source Control:

- Stops / minimises the flow of hydrocarbons into the environment.

Disadvantages of Source Control:

- Increase in environmental impacts from response activities e.g. planned discharges; and

- Presents safety risks.

Potential source control options are detailed below.

3.1.1 Isolation of Tanks / Pipes

Isolation provides a way for separating process systems and equipment from one another and may be used to prevent flow of hydrocarbons. Many types of isolations exist on subsea infrastructure, pipelines, wells and vessels. Isolation of a pipeline is the primary source control of containing a pipeline rupture/failure.

3.1.2 Remote Operated Vehicle (ROV) Intervention

ROVs can be used subsea to inspect the condition of wellheads, pipelines and subsea equipment and have arms which may be used to manipulate valves and manually isolate equipment. Specialist ROVs can be fitted with a range of equipment including: debris clearing tools, specialist tooling, subsea dispersant spraying capabilities, cameras and cutting tools.

Note that per NOPSEMA Guidance Note GN166, vessels remotely supporting a ROV that is being used in connection with inspection, the operation of a valve and/or the recovery of debris are not required to have a safety case. Per NOPSEMA Guidance Note GN166, if other activities are undertaken where a vessel is subject to the Australian Offshore Petroleum Safety Legislation, vessels will comply with duties of an operator and safety case.

3.1.3 Well Capping Stack

A “capping stack” is a piece of equipment that is placed over the blown-out well as a “cap.” Its purpose is to stop or redirect the flow of hydrocarbons, establishing a barrier to the marine environment. Once subsea, the capping stack is installed on the wellhead/subsea BOP to stop flow. The capping stack provides a safe barrier until the well can be permanently sealed. This option will require the use of a Construction Support Vessel (CSV) to install the capping stack.

As described in Volume 2, Section 6.7.6 of the Bass Strait EP, use of a capping stack is not generally technically feasible in shallow water depths.

OSRL’s offset capping stack system is limited due to minimum depth requirements (>75 m) and long mobilisation times.

For well activities in greater than 75m water depth, including drilling and plug and abandonment projects, a capping stack feasibility assessment will be undertaken to confirm its viability and will be detailed in the relevant EP.

3.1.4 Well Kill Equipment Skid

The Well Kill Equipment Skid can be used for bullhead killing or lubricating production wells in the event of a critical well failure. The dedicated Well Kill Equipment Skid is a standalone hydraulic / diesel drive unit which requires minimal platform facility support. The Well Kill Equipment Skid is stored at BBMT when it is not in use offshore.

Use of the platform based well kill equipment skid is accounted for in platform specific safety cases as part of the Well Kill Contingency Plan.

3.1.5 Third Party Well Control Equipment

In the event of a loss of well control in which flowrates are too great to be able to use the Well Kill Equipment Skid, but not great enough to warrant drilling a relief well, resources from a third party well control can be used to control a loss of containment from the well (e.g. Wild Well Control).

3.1.6 Relief Well

A relief well is constructed like a standard well, and is directionally drilled to intersect the original well to allow specialised fluids to be pumped into the well to overcome reservoir pressure and stop the flow of the original well.

3.1.7 Pipeline depressuring and watering out

Pipelines can be depressured and watered out to reduce the flow of hydrocarbons released from a pinhole. Watering out pipelines replaces hydrocarbons with produced water and reduces the volume of hydrocarbons released to sea.

Pipeline depressuring procedures are in place for each pipeline which provide guidance on how to safely depressure a pipeline at the relevant end and start platforms. Watering out procedures are also available.

3.1.8 Pipeline repair

Pipeline repair activities will be dependent on the type of initiating event and the feasible engineering solutions to repair the hole. Repairs to stem the flow of hydrocarbons would be completed using ROV from a vessel and may require the use of:

- Cap
- Plug
- Clamp
- Repair sleeve

Caps or plugs may be feasible for use to repair a pipeline after rupture however are less likely to be feasible given the difficulty in installation over a large area.

Once the hydrocarbon flow has been stemmed (or the pipeline pressure has reached equilibrium with the water if repair is not feasible), the pipeline will be repaired to reinstate production. For pinhole leaks and minor holes this could involve operation with the cap/plug/clamp/sleeve in place.

For a full rupture, a DSV with divers or a construction or pipe lay barge fitted with a dive spread will be required. This would need to mobilise from SE Asia or Europe and would likely need a number of regulatory documents prepared including a safety case, a dive safety management system and a dive project plan. Repair time is estimated to be a minimum of 3 months. Note that this is not considered a source control response option as repair of the pipeline to reinstate production will not reduce the volume of hydrocarbon released.

3.1.9 New Technologies under investigation

ExxonMobil continues to study new offshore drilling technologies including ways to mitigate the potential impacts of an uncontrolled flow of hydrocarbons to the environment for a well incident (LOWC). The following strategies are not proposed to be use as part of this Environment Plan but demonstrate ExxonMobil's commitment to continually improving knowledge and technology for source control.

- **Seawater Injection Method (SWIM**) (Jain, Nedwed, Kulkarni, Mitchell, & Meeks) utilises seawater pumped at a high rate into a failed and leaking blow out preventer (BOP) to generate enough back pressure to overcome reservoir pressure and stop the flow of oil and gas.
- **Rapid Crosslinking Polymer Injection** (Nedwed, et al., 2019) is a method that mixes monomers and a catalyst that causes a rapid polymerisation reaction, resulting in a stable solid. The reaction can occur under extreme temperatures and pressures and can withstand significant contamination from other fluids and solids.

3.2 Environmental Impact Assessment of Source Control Response

Many environmental aspects associated with implementing source control activities (e.g. aspects associated with vessels, ROV and subsea installation) apply to multiple activities and are assessed in Volume 2. Environmental aspects associated with drilling a relief well and capping stack are assessed below. These include:

- Physical Presence – Seabed disturbance;
- Planned Discharge – Cement;
- Planned Discharge – Drilling muds and cuttings; and
- Sound Emissions.

Further assessment of the acceptability of these impacts in an oil spill response context and controls identified for minimising the environmental impact of mobilising a source control response are described below.

Table 3-1 Environmental Impact Assessment of Source Control Options

Environmental Aspect:	Impact Assessment	Consequence Level
Relief well drilling		
Physical Presence – Seabed Disturbance	Smothering and alteration to benthic habitats can occur as a result of seabed disturbance. The type of damage that could be sustained due to smothering may include destruction of habitat. Benthic habitats and communities within the Bass Strait show natural small scale variation, however the area is mostly considered homogenous. Studies conducted by Esso (Cardno, 2019) demonstrate similarities in taxa but variation in composition between different sites. Seabed disturbance from relief well drilling activities will be limited to close proximity to existing infrastructure, and typically in areas which have previously been disturbed during installation of infrastructure. Benthic habitats and communities within the Operational Area show natural small scale variation, however, are mostly homogenous, with no particular areas of value or sensitivity. It is possible that activities will produce a slight alteration of the local habitat and community structure due to the small amount of changed substrate in an area of uniform soft sediments; however the naturally homogenous nature of the habitats and communities in the Operational Area will result in quick recovery, and no long-term changes to ecosystem are expected. Any impacts will be inconsequential or have no adverse effects. No additional controls identified.	IV
Planned Discharge – Cement	Impacts to ambient water quality from planned discharge of cement will be highly localised and temporary, with turbidity and chemical toxicity impacts quickly ceasing following discharge. Any impacts will be inconsequential or have no adverse effect, and impacts to pelagic organisms (such as plankton, fish, and marine fauna) are not expected. Once cement has hardened, the sediment quality will be permanently changed. Any impacts to ambient sediment quality will be inconsequential or have no adverse effect and impacts to benthic habitats and communities are not expected. No additional controls identified.	IV
Planned Discharge – Drilling muds and cuttings	Chemicals will be discharged to the marine environment resulting in a change in water quality. Due to the high energy marine environment, discharges will quickly dissipate. Impacts to ambient water quality will be localised and temporary, and any impacts will be inconsequential or have no adverse effect. Prior to discharge the chemicals will be assessed using the Esso Chemical Discharge Assessment Process (described as part of the Implementation Strategy in Volume 4) which uses the OCNS ranking in conjunction with	IV

Environmental Aspect:	Impact Assessment	Consequence Level
	toxicity, biodegradation and bioaccumulation data to determine potential impacts to the environment and acceptability of planned discharges. No additional controls identified.	
Sound Emissions	Gales (1982), cited in NCE (2007), reports that underwater sound measured from fixed drilling platforms did not exhibit markedly different characteristics from those engaged in production, and that none of the measured sound could be directly related to the mechanical action of the drill bits. It is therefore believed that most sound associated with drilling is created by the operation of the rig itself. No additional controls identified.	IV

Acceptability of Environmental Impact from Source Control

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity.	✓	All aspects related to source control activities, including EPO's, EPS's and controls have been detailed in Volume 2 or have been evaluated as having the potential to result in a Level IV consequence.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	All oil spill response activities are implemented with the aim of reducing the overall environmental impact from a spill incident. Source control activities are implemented to stop the flow of oil and minimise safety risks and environmental damage. Impacts associated with source control are offset by the broader positive effects of reducing the impact of a spill incident on coastal and marine sensitivities and socio-economic receptors (e.g. fishing, tourism).

Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	• The Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009 (OPGGS(S)) requirements for NOPSEMA approved facility Safety Case.
			  • Protection of the Sea (Prevention of Pollution from Ships) Act 1983.
			  • Navigation Act 2012.
			  • Marine Order 96 (Marine pollution prevention – sewage) 2013.
			  • Marine Order 95 (Marine pollution prevention - garbage) 2013.
			All well specific source control activities will have an approved WOMP and comply with:
			  • Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011.

Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed control measures are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist".

Factor	Demonstration Criteria	Criteria Met	Rationale
	Meets ExxonMobil Environmental Standards.	✓	Proposed controls meet the requirements of the ExxonMobil Drilling Emergency Preparedness and Response Manual.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives.	✓	Proposed control measures meet: • OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and • OIMS System 8-1 objective to clearly define and communicate OI requirements to contractors. • OIMS System 10-2 objective to ensure effective response to emergencies and business disruptions that threaten the safety, security and health of the public, contractors and employees, the environment, asset integrity, and critical business operations
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised.

Table 3-2 ALARP Demonstration of Environmental Impacts from Source Control

ALARP Decision Context and Justification	Decision Context A. Source control equipment and resources (ROVs, capping stacks, vessels and rigs for relief well drilling) are standard practices that have been accepted for use in the Australian and International Offshore Petroleum Industry in the event of a hydrocarbon spill. Impacts associated with source control activities are well understood and source control response activities have been initiated and managed by industry previously. Source control activities are aligned with company and partner values. Good Practice control(s) have been identified to ensure environmental impacts associated with implementing this response are reduced to ALARP, these controls will be implemented in a response scenario and have been included in the OPEP. Esso believes ALARP Decision Context A should apply.		
Good Practice	**Adopted**	**Control**	**Rationale**
Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class.	✓	Vessel Requirements.	The vast majority of commercial ships are built to and surveyed for compliance with the standards (i.e. Rules) laid down by classification societies. The role of vessel classification and classification societies has been recognised by the International Maritime Organisation (IMO) across many critical areas including the International Convention for the Safety of Life at Sea, (SOLAS), the 1988 Protocol to the International Convention on Load Lines and the International Convention for the Prevention of Pollution from Ships (MARPOL).
AMSA JRCC notified before operations commence to enable	✓	Pre-start Notification.	Under the Navigation Act 2012, the Australasian Hydrographic Society is responsible for maintaining and disseminating hydrographic and other nautical information.

AMSA to distribute an AUSCOAST warning.			Details for AUSCOAST warning will be provided to the JRCC (24<48 hours) prior to commencing operations.
All planned drilling discharges are evaluated in accordance with the Chemical Discharge Assessment Process.	✓	Chemical Discharge Assessment Process.	All cements, drill fluids, additives and/or their components planned for discharge are evaluated as acceptable.
Cuttings are treated to reduce Residual Oil on Cuttings (ROC).	✓	Solids Control Equipment.	It is industry standard practice to remove Non Aqueous Fluid (NAF) muds from cuttings using a combination of shale shakers and/or cuttings driers to minimise the residual oil on cuttings.

3.3 Capability Assessment of Source Control

A detailed capability assessment has been undertaken to ensure that Esso has access to sufficient resources to complete source control activities in a timely manner.

This section summarises outcomes of the capability assessment.

Table 3-3 Source Control Resource Availability

Activity	Resource Required	Resource Availability	Expected Timeframes
Specialist ROV	1 x ROV for subsea well pipelines intervention / SFRT and surveillance.	Resource Agreements in place with ROV specialists.	Estimated 5 days from call out request to arrival in Victoria.
Construction Support Vessel (CSV)	1 x CSV to assist in source control activities: Specialist ROV subsea well /pipelines interventions and surveillance Deployment of SFRT including debris clearance Deployment of capping stack	Resource A construction support vessel with a current Australian safety case sourced from the Australasian region.	Estimated 23 days from spill occurring to arrival in field.
Capping stack	1 x capping stack	Resource Capping stack held in Singapore and Norway with OSRL Capping stack held in Singapore and Aberdeen with Wild Well Control	Estimated 4 days lead time ready to load on CSV or air freight.
Relief Well	1 x rig per relief well.	Resource A rig will be mobilised from the Australasian region.	Estimated 98 days to drill the relief well.
Well Kill Skid	1 x well kill skid (including all relevant equipment as defined in the response plan)	Resource A well kill skid will be mobilized from BBMT or platform. Personnel Trained wellwork personnel available to operate wellwork skid	The well kill skid can be at the platform within 48 hours with appropriately trained personnel (24 hour pack up time and moved on the next available boat)

Activity	Resource Required	Resource Availability	Expected Timeframes
Third party well control equipment	Specialised well control equipment	Resource Agreement with Wild Well Control	Estimated time to contain well release incident is 14 days
Pipeline de-pressuring and watering out	1 x Competent operators on relevant platform	Personnel Trained personnel available to operate facilities	As soon as practicable once location of spill has been confirmed
Pipeline repair	Pipeline repair equipment Specialist ROV equipment (as above)	Resource Agreements in place with pipeline repair equipment specialists Agreements in place with ROV specialists	Available within 45 days

Table 3-4 Source Control Capabilities

Good Practice	Adopted	Control	Rationale
Established Incident Management Team.	✓	Esso Incident Management Team (IMT).	Esso's IMT includes trained personnel able fulfil Incident Commander, Operations Section Chief, Planning Section Chief, Logistics Section Chief, Safety Officer, Source Control Branch Director and Environmental Unit Lead roles.
Pre-arranged agreement with ROV provider.	✓	Agreements with ROV providers.	ExxonMobil's global agreements provides Esso with access to ROVs.
For Rig Activities and capping stack mobilisation : Identification of suitable support vessels and their location prior to the commencement of rig activities.	✓	Support vessel identification process.	Support vessel identification process enables understanding of the availability of suitable vessels which may reduce response time. In the event that a vessel safety case must be revised to complete the activities, Esso will work with vessel contractors to revise and resubmit the vessel safety case within one week of the incident occurring.
Pre-arranged access to Subsea First Response Toolkit (SFRT).	✓	Agreement with AMOSC for SFRT.	The agreements with AMOSC provide access to SFRT designed with the following capabilities: Survey and provide a detailed image of condition of subsea infrastructure Ability for subsea intervention
Ability to access drilling rigs in an emergency event.	✓	MoU with APPEA.	APPEA Memorandum of Understanding (MoU) states that signatories will make best endeavors to make drilling units available for transfer between operators when requested for emergency response.
Existing arrangements with source control contractors	✓	Agreement with Wild Well Control and OSRL	Agreements with Wild Well Control and OSRL provide access to specially trained personnel and equipment to assist in the event of a LOWC.
Existing contract for access to capping stack	✓	Agreement with Wild well control and OSRL	Agreement in place with Wild Well Control and ORSL for access to a capping stack

Table 3-5 Consideration of Additional/ Alternative/ Improved Capability for Source Control

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
Pre-drilling top holes	This option may result in a reduction of 1-2 days for drilling a relief well, however due to the uncertainly of the location and trajectory it is unknown if the top hole could get utilised in specific spill scenarios. This option may result in unnecessary environmental impacts, including: • Discharge drill cuttings; • Discharge of chemicals; • Discharge of muds; and • Benthic habitat disturbance.	The position of a relief well vary in location and trajectory according to the actual conditions at the time the loss of containment event occurs. Limited reduction in days (potentially 1-2), this equates to approximately 2% of the time it would take to drill a relief well.	Not adopted.
Standby rig during drilling activities	A rig on standby may reduce the time required to drill a relief well.	Significant costs are associated with having a standby rig. Given the high potential cost, implementing this control measure is considered grossly disproportionate, given that the source control event has an extremely low likelihood of occurrence.	Not adopted.
Purchase and have available pipeline repair equipment locally	Having pipeline repair equipment available locally may reduce the time taken to repair a pipeline and reduce the overall volume of oil released.	Pipeline repair equipment to be used is specific to the type of pipeline failure and must be determined at the time of incident. Significant cost associated with having access to a wide variety of pipeline repair equipment.	Partially adopted. Some pipeline repair equipment for higher likelihood scenarios (e.g. clamps for pinhole leaks) are available locally.

4. Surveillance and Monitoring

4.1 Response Option Description

Surveillance and monitoring activities are essential in an oil spill response strategy to characterise and quantify volumes and determine the movement of the slick. This information is fundamental to mobilising an effective oil spill response strategy and critical in determining the scale and nature of the oil spill incident.

To understand the scale and fate of the oil, the spill should be observed as soon as possible and monitored throughout the response until the decision has been made to stand down.

Advantages of Surveillance and Monitoring:

- Validate trajectory and weathering models;
- Determine effectiveness of response techniques; and
- Outputs will be used to guide decision making on the use of other monitoring or response options.

Disadvantages of Surveillance and Monitoring:

- Increase in environmental impacts from response activities e.g. vessels; and
- Increase in safety risks.

A variety of surveillance and monitoring techniques can be used to gather information required to support the ongoing response. These may include:

4.1.1 Aerial and/or vessel observation

Aerial and vessel observation provides the IMT with real time data of magnitude, direction of travel, and visual characteristics of surface oil. This information can be used in response planning and forming the incident specific NEBA.

4.1.2 Computer-based modelling software

Computer software can generate maps that show predictions for the path of the oil spill. It can also forecast the effects that currents, winds, and other physical processes have on the movement of oil in the ocean. This information can be used in response planning and the incident specific NEBA.

4.1.3 Utilisation of satellite tracking buoys

Satellite tracking buoys provide real time current data to use to predict forecasts of surface behaviour of the oil and direction of travel.

4.1.4 Remote sensing from aircraft and/or satellites

Airborne remote sensing equipment supplements visual observations by using sensors which detect radiation outside of the visible spectrum.

Satellite imagery can provide real time imagery over large areas and assist with determining the movement of the slick and determining response activities

4.1.5 Water quality and oil sampling

Water sampling will confirm the properties of oil. These details can be inputted into computer based modelling for increased accuracy and assist with determining response activities.

When oil enters the marine environment, a proportion of it will float and spread out on the sea surface where it will be influenced by the wind and ocean currents. In some situations, where natural dispersion and weathering processes are considered the most appropriate response, surveillance and monitoring may be the primary response strategy.

In this case, the response will monitor the oil as it undergoes the natural weathering processes of evaporation and dispersion, in which wind and wave action breaks the oil into small droplets in the water column increasing bioavailability and allowing the oil to be naturally degraded. Higher levels of surveillance such as vessel/aircraft surveillance, oil spill trajectory modelling and deployment of satellite tracking drifter buoys are options to be considered for Level 2/3 spills given the nature and scale of the spill risk.

4.2 Environmental Impact Assessment of Surveillance and Monitoring Response

Environmental aspects associated with surveillance and monitoring were identified and evaluated in Table 4-1. All associated environmental impacts have been described and assessed within Volume 2 and no additional environmental impacts have been identified as a result of surveillance and monitoring response activities.

Table 4-1 Acceptability of Environmental Impacts from Surveillance and Monitoring

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity.	✓	All aspects related to surveillance and monitoring activities are assessed in Volume 2 and have been evaluated as having the potential to result in a Level IV consequence.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	All oil spill response activities are implemented with the aim of reducing the overall environmental impact. Surveillance and monitoring response activities are critical in determining the scale and nature of the oil spill incident. This information is fundamental to mobilising an effective oil spill response strategy to minimise potential environmental damage from a spill incident.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The proposed control measures align with the requirements of: • OPGGS Act 2006; • Protection of the Sea (Prevention of Pollution from Ships) Act 1983; • Navigation Act 2012 – Chapter 4 (Prevention of Pollution); • Marine Order 96 (Marine pollution prevention – sewage) 2013; and • Marine Order 95 (Marine pollution prevention - garbage) 2013.
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed control measures are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist".
	Meets ExxonMobil Environmental Standards.	✓	There is no standard related to the Surveillance and Monitoring however the controls proposed meet the strategic objectives of the Upstream Environmental Standards.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives.	✓	Proposed control measures meet: • OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and • OIMS System 8-1 objective to clearly define and communicate OI requirements to contractors. • OIMS System 10-2 objective to ensure effective response to emergencies and business disruptions that threaten the safety, security and health of the public, contractors and employees, the environment, asset integrity, and critical business operations.

Factor	Demonstration Criteria	Criteria Met	Rationale
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised.

Table 4-2 ALARP Demonstration of Environmental Impacts from Surveillance and Monitoring

ALARP Decision Context and Justification	Decision Context A. The potential environmental aspects associated with mobilising a Surveillance and Monitoring response have been evaluated and no new impacts have been identified. Surveillance and monitoring response activities are standard practices that are routinely used in the Australian and International Offshore Petroleum Industry as well as many other industries. Impacts associated with surveillance and monitoring are well understood and well implemented by the industry. Good Practice control(s) have been identified to ensure environmental impacts associated with mobilising this response are reduced to ALARP, these controls will be implemented in a response scenario and have been included in the OPEP. Esso believes ALARP Decision Context A should apply.		
Good Practice	**Adopted**	**Control**	**Rationale**
Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class.	✓	Vessel Requirements	The vast majority of commercial ships are built to and surveyed for compliance with the standards (i.e. Rules) laid down by classification societies. The role of vessel classification and classification societies has been recognised by the International Maritime Organisation (IMO) across many critical areas including the International Convention for the Safety of Life at Sea, (SOLAS), the 1988 Protocol to the International Convention on Load Lines and the International Convention for the Prevention of Pollution from Ships (MARPOL).

Table 4-3 Engineering Risk Assessment

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
None Identified.			

4.3 Capability Assessment of Surveillance and Monitoring

A detailed capability assessment has been undertaken to ensure that Esso has access to sufficient resources to complete surveillance and monitoring activities in a timely manner. The assessment concluded sufficient resources are available within acceptable timeframes to conduct this response.

This section summarises outcomes of the capability assessment.

Table 4-4 Surveillance and Monitoring Resource Availability

Activity	Resource Required	Resource Availability	Expected Timeframe
Visual Observation - Aerial Surveillance	1x observer per aircraft. Aircraft to have 100nm range and 3 hour duration.	<u>Resource</u> Esso helicopters can assist in aerial surveillance. Agreement with third party to provide fixed wing aircraft. AMSA Search and Rescue Aircraft. <u>Personnel</u> 4x Trained spill observers provided by Esso. Supplemented by AMOSC staff, AMOSC core group and OSRL.	Initial overflight <4 hours service requested. Trained observer <12 hours of spill occurring. Twice daily aerial surveillance. *(Note: Assumes good visibility, daylight hours and suitable flying conditions).*
Visual Observation – Vessel or Asset	An observer to conduct 2 hour watch from staffed assets.	<u>Resource</u> Platform /Drilling Rig /Vessel <u>Personnel</u> 1x Observer and /or available crew.	<2 hours, from time of spill.
Manual Oil Spill Trajectory Modelling	1x trained person.	<u>Resource</u> Trajectory vectoring. Relevant set of marine charts for Bass Strait. GIS mapping. <u>Personnel</u> IMT member trained trajectory vectoring. Internal Esso GIS mapping specialists.	<4 hours of service requested.
Oil Spill Trajectory Modelling	1x contract with specialist.	<u>Resource</u> AMOSC - Access to RPS modelling services. OSRL – Access to modelling services. ExxonMobil EMBSI (USA) – Access to modelling (available 24/7).	<4 hours of service requested.
ADIOS - Weathering Modelling	1x trained person.	<u>Resource</u> Automated Data Inquiry for Oil Spills 2 (ADIOS2) installed on IMT computers. <u>Personnel</u> IMT personnel trained in ADIOS.	<4 hours of the service requested.
Satellite Tracking Drifter Buoys	1x buoy available.	<u>Resource</u> 2x tracking buoys within 12 hours. 2x Tracking buoy available 24-48 hours.	Deployed <12 hours of spill occurring (dependent on weather conditions) (Level 2 & 3 spill).
Remote Observation Using Satellite Imagery	1x contract with specialist.	<u>Resource</u> AMOSC agreement with KSAT.	Initiated <24 hours of Level 3 spill occurring.

Activity	Resource Required	Resource Availability	Expected Timeframe
		OSRL Agreement with Radiant Solutions. ExxonMobil Geospatial Emergency Response Service (available 24/7).	
Initial Oil in Water Sampling	1x vessel. 1x initial sampling kit. 1x contract with laboratory.	Resource Vessel and crew (Esso). Initial Sampling kits available at various Esso locations. Personnel Field Service technician. Laboratory services and experienced analyst provided by NATA accredited lab as per OSMP.	Samples obtained <24 hours of spill occurring. Analysis initiated <24 hours of receipt in laboratory. Results <5 days.
Ongoing Oil in Water Monitoring	1x vessel. 1x sampling services contract.	Resource Vessel contractor/ crew (Esso). Sampling services via environmental consultancy. Personnel Sampling services via environmental consultancy. Laboratory services and experienced analyst provided by NATA accredited lab as per OSMP.	Samples obtained 48 hours hrs. of spill occurring. Analysis initiated <24 hours of receipt in laboratory Results within 5 days.
ExxonMobil	Personnel Trained and capable Esso IMT Regional Response Team	Available to fulfil roles in accordance with requirements and timeframes in OPEP Table 3-2. Remote support <12 hours from notification. In-country support <72 hours from notification.	ExxonMobil

Table 4-5 Surveillance and Monitoring Capabilities

Good Practice	Adopted	Control	Rationale
• Pre-arranged access to helicopters for aerial surveillance.	✓	Esso helicopter fleet.	Esso owns and operates its own helicopter fleet that can be used for surveillance and monitoring.
• Pre-arranged access to fixed wing aircrafts for aerial surveillance.	✓	Arrangement with third party for provision of fixed wing aircraft.	Arrangement with third party enables provision of fixed wing aircraft.
• Pre-arranged access to vessels for Surveillance and Monitoring activities.	✓	Support vessel.	The support vessel that is used for ongoing Esso operations can be used for surveillance and monitoring.
	✓	Agreement with third party suppliers for provision of additional vessels.	Agreement with supplier of vessel services has provision for supply of additional vessels

Good Practice	Adopted	Control	Rationale
• Pre-arranged access to trajectory modelling capabilities.	✓	Agreement with AMOSC for trajectory modelling.	Agreement with AMOSC, and the associated service level statement, includes provision for trajectory modelling.
• Pre-arranged access to satellite tracking buoys.	✓	Esso owned tracking buoys.	Esso owns satellite tracking buoys to enable quick deployment.
• Pre-arranged access to satellite imagery	✓	Agreements in place to access satellite imagery.	Agreements in place with satellite imagery provider enables access to satellite imagery services.
• Pre-arranged access to water testing services.	✓	Agreement with service provider for monitoring and sampling.	Agreement with third party service provider enables access to monitoring and sampling services.
• Pre-arranged access to personnel to support Tier III response activities.	✓	ExxonMobil Regional Response Team	ExxonMobil have a global team available to assist response for Tier III activities.

Table 4-6 Consideration of Additional/ Alternative/ Improved Capability for Surveillance and Monitoring

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
Night-time monitoring - infrared.	Enable night time monitoring of the location of oil on the water's surface.	Infrared may be used to provide aerial monitoring at night time, however the benefit is minimal given trajectory monitoring (and infield monitoring during daylight hours) will give good operational awareness. Safety considerations may also restrict night time operations.	Not Adopted.
Initial sampling kits available on supply vessels and rigs.	Enable rapid sampling from supply vessels and rigs	• Sampling kits on-board vessels and rigs will enable rapid sampling of the oil. • The results from the testing will provide details of the oil properties and confirm the properties of oil, assist with source identification. • Results can be used in the modelling for increased accuracy and assist with determining response activities.	Adopted.

5. Dispersant Application

5.1 Response Option Description

Dispersants enhance the rate and extent of natural dispersion in an oil spill event. The surfactants in dispersants allow wave energy to rapidly break oil slicks into small oil droplets. These droplets are pushed into the upper water column by wave action and maintained there by turbulence. The dispersed oil droplets are much more available to naturally-occurring, hydrocarbon-degrading microorganisms.

The principal ecological benefit of dispersant use is to keep oil from entering near-shore bays and estuaries, or stranding on shorelines, thereby protecting sensitive coastal habitats and the species that inhabit them. In previous oil spill incidents elsewhere in the world, it is the species in the areas near or onshore that have been most affected by an oil spill event (National Academies of Science, Engineering and Medicine, NASEM, 2019).

The mixture of solvents and surfactants that comprise typical commercial dispersants (Place et al., 2010) contain compounds with different physicochemical properties and therefore potential fates in the environment. Once introduced to open ocean waters, dispersant mixtures will be quickly diluted and subjected to degradation processes including biodegradation and photodegredation (NASEM, 2019).

For maximum effectiveness, dispersants should be applied as close to the source and as soon as possible to avoid losing the “window of opportunity”. Dispersant can be applied either subsea at the source of a subsurface spill or directly to any surface slicks from aircraft or vessels.

Dispersants may be applied in a broad range of weather conditions including high winds and rough seas that may not be suitable for other strategies, e.g., mechanical containment and recovery. Dispersants are mainly amenable to certain oil types and are generally not considered to be suitable for Group I and lighter Group II oils, including diesel. The oil type and the metocean conditions (e.g. temperature, wave height, swell) will dictate the effectiveness of dispersant application.

The main objectives of dispersant application are:

- Reduce environmental impacts;
- Rapidly reduce oil toxicity through dilution;
- Enhance the natural dispersion processes;
- Enhance natural microbial biodegradation;
- Minimise impacts to shoreline habitats;
- Reduce the requirement for shoreline clean up; and
- Reduce concentrations of Volatile Organic Compounds (VOCs) at the sea surface.

The decision whether or not to use dispersants will be made after considering the potential effects of dispersed oil versus undispersed oil, i.e. after employing a Net Environmental Benefit Analysis (NEBA) process which provides a methodology for comparing the base case of no spill response to those where individual response tools (mechanical containment and recovery, subsea and surface dispersants) are considered (IPIECA, 2017). Dispersants will only be considered for use at specific locations/times where testing shows oil to be amenable and decision is supported by the spill specific conditions.

5.1.1 Surface Application

Dispersants can be applied to surface oil from vessels or aircraft. Aerial application allows wide coverage for treatment of large volumes of oil. Potential advantages include; minimal human resource, enhanced biodegradation, and ability to spray large areas in a timely manner through the use of aircraft. A potential constraint is the limited time-frame for dispersant application; there is a relatively short “window of opportunity” for treating the spilled oil before it weathers and may become too viscous, although this can vary depending on specific oil properties and environmental conditions. Aerial dispersant operations are limited to appropriate weather conditions (e.g., visibility, ceiling and winds), daylight hours, and sufficient turbulence (from waves) to mix the dispersant into the oil.

Aircrafts

Aerial application of dispersant requires aircrafts to be fitted with dispersant spraying equipment. For best effectiveness, aerial dispersant should be administered at steady airspeeds (150 kts) and low altitudes, generally 50 – 100 ft above the sea level. Aerial platforms include those available through the fixed wing aerial contract and additional aircrafts are available through OSRL.

Vessels

Vessels can be fitted with dispersant spraying equipment for surface application. For best effectiveness the dispersant should be applied to the thickest concentrations of oil, via spray arm systems or specialised dispersant spraying equipment.

5.1.2 Subsea Application

Subsea dispersant injection is the process of injecting dispersants directly into the stream of oil that is leaving the well, ideally before the oil leaves the wellhead. The process allows the dispersant to come into contact with a much greater proportion of the oil and uses the turbulent jet effect of the force of the exiting oil to mix the dispersant effectively. SSDI can be operated continuously by offshore vessels, which can locate themselves offset from the position of the well release or by using the Subsea First Response Toolkit (SFRT) located in Perth.

Subsea dispersant injection (SSDI) operations can take place continuously and are effective in ongoing spill scenarios e.g. well blow outs.

Advantages of SSDI include:

- Requires less manpower than other response options and may reduce the VOCs at the surface improving health and safety of responders;
- Delivery of the dispersant directly to the release;
- At depth, dispersed oil will be subject to greater loss of soluble components and increased dispersion than surface application;
- Subsea injection operations can take place continuously, while surface application is limited to daylight hours and favourable wind and sea state conditions.

Potential disadvantages of SSDI include the need for specialised equipment to deliver the dispersant and to monitor effectiveness, although this equipment is available from Tier 3 response organisations (NASEM, 2019).

Use of subsea dispersant is highly dependent on the specifics of the release. In the event of an incident, a number of factors will be considered to inform the use of subsea dispersant. These include:

- Release type (surface or subsea)
- Release rate
- Oil type
- Location to sensitive receptors
- Water depth
- Safety of personnel in proximity to the release location

The decision to mobilise the SFRT and to use subsea dispersant will be taken based on advice from the Source Control Branch in consultation with relevant technical, environmental and regulatory stakeholders.

ROVs

Vessels can be fitted with specialist ROVs that have SSDI capabilities for subsea dispersant application. SSDI treats oil released at the point of release which reduces the volume of dispersant required and can be applied continuously in all-weather scenarios.

5.2 Types of Dispersant Available to Esso in an Oil Spill Incident

Since the 2010 Deep Water Horizon (Macondo) spill response, the petroleum industry has invested significantly in the purchase of the most studied, modern products (Dasic Slickgone NS, Finasol® OSR 52, Corexit® EC9500A) and their placement in strategic global locations to facilitate rapid response in an event where dispersants represent a viable response option (NASEM, 2019). The Corexit products remain the most studied products available and there is a wealth of information regarding their effectiveness (high) and relative toxicity (low). As a result of this, industry continues to work toward maintaining/reinstating their status as products approved for possible use.

Several types of dispersant are available to Esso and are proposed for use during an oil spill incident. A summary of each is given in Table 5-1.

5.2.1 Dispersant Testing

Esso undertook dispersant efficacy testing on five Bass Strait crudes against two of the available dispersants (Dasic Slickgone NS and COREXIT 9500). Testing was also conducted on a third dispersant COREXIT 9527, although this is no longer available for use as it is not accepted by AMSA on the National Plan.

The testing was carried out on fresh crude, 12 hour weathered, 24 hour weathered and 48 hour weathered under Bass Strait summer and winter conditions. Each dispersant was tested at an application rate of 20:1 (oil: dispersant). A summary of the results is provided in OPEP Appendix E – Dispersant Testing Results. Key findings from the dispersant efficacy testing include:

- Testing shows that dispersant is highly effective on most types of fresh oil, but not all Esso crudes tested are amenable to dispersant;
- Non-spreading oils are considered to be non-dispersible;
- Effectiveness of dispersant decreases significantly on weathered oils;
- Once pour point of the oil is above temperature of the seawater, the dispersability rapidly drops off; and
- Dispersability of the oil generally increases at higher temperatures.

Table 5-1 Summary of dispersant stock available to Esso

Dispersant	Details	Stockpiled	AMSA OSCA Accepted	Dispersant tested on Esso Crude
Dasic Slickgone NS	Slickgone is widely used in the offshore industry worldwide and meets the requirements of the UK, French, Norwegian and Australian dispersant protocols. Extensive field trials in the UK indicate that an effective treatment rate for dispersants is approximately 1 part dispersant to 20-30 parts of oil and can be effective when applied from aircraft, vessels and directly on shorelines.	AMOSC, AMSA, OSRL	✓	✓** ✓***
Dasic Slickgone EW	Slickgone EW is the latest addition to the Dasic International product range and is exceptionally efficient on a broad spectrum of oils. It is also effective on water-in-oil emulsions (mousses) and will even delay the formation of such emulsions if applied early enough. It is highly effective at emulsifying crude oils, fuel oils and water-in-oil emulsions even at low temperatures, producing oil droplets minute enough to be retained beneath the sea surface where they are rapidly diluted by subsurface mixing and are eventually biodegraded by micro-organisms.	AMSA	✓	
Total Finasol OSR52	Finasol OSR52 provides a rapid and effective breakdown of hydrocarbons. It was the first product on the market to comply with all three major international regulations; EPA, MMO and CEDRE. It can be applied either neatly or at 10% by aircraft, boats or by hand held sprayers with backpack spray units.	OSRL	✓	
Nalco Corexit 9500A	COREXIT EC9500A contains an improved oleophilic solvent delivery system than that used in earlier formulations of Corexit. Aircraft provide the most rapid method of applying dispersants to an oil spill for aerial spraying. Corexit is a solvent-based "concentrate" dispersants, which may either be applied undiluted (neat) or sprayed in a stream of seawater. COREXIT 9500 can be used during early stages of a response and may be ~~is~~ more effective on viscous, emulsified, and weathered spills than alternative options.	Esso, BHP, AMOSC OSRL	✓	✓**

**2019 Crudes tested: Snapper, Moonfish, Flounder, West Kingfish and Halibut
*** 2012 Crudes tested: Tuna, Halibut and West Kingfish

5.2.2 Acceptance of Dispersant Application

AMSA

An oil spill clean-up agent (OSCA) is defined as a chemical, or any other substance, used for removing, dispersing, or otherwise cleaning up oil or any residual products. The Australian Maritime Safety Authority (AMSA) have products on the OSCA register which are considered to have met the requirements of acceptable practice for the National Plan.

All existing stocks of previously accepted Oil Spill Control Agents held within the National Plan (AMSA and AMOSC) inventories, as of 1 January 2012, remain acceptable for National Plan use until used or disposed of. They are listed in the OSCA Register as 'transitional OSCAs' and almost exclusively comprise the AMSA, AMOSC and Esso's pre-2012 stockpiles of dispersants

NOPSEMA

The EP submission process provides the mechanism for Esso to gain 'acceptance' for the use of location, activity or OPEP specific oil spill dispersant products and deployment strategies (e.g. surface and/or subsea application) prior to any incidents.

Any dispersant use in response to a pollution incident from an offshore petroleum activity must be carried out in accordance with an accepted EP and no additional 'approvals' are required to implement response arrangements.

State Waters

Any dispersant application within state waters (<3 nm) must be approved by the state control agency prior to use.

5.3 Environmental Impact Assessment of Dispersant Application

5.3.1 Dispersant Toxicity

Modern dispersant products (e.g., Dasic Slickgone NS, Finasol® OSR 52, Corexit® EC9500A) are a mixture of solvents and surface active agents (surfactants) with different physicochemical properties and therefore potential fates in the environment. Once released into the aquatic environment, dispersants are subject to rapid dilution, dissolution, biodegradation, and photodegradation processes (NASEM, 2019). Consequently, there is a brief time window in which marine organisms will be subject to the full toxicity of the dispersant and dispersed oil.

When a dispersant is introduced at depth by subsea injection, dispersant components will differentially dilute and dissolve, with some being retained at depth. In this situation, biota could be exposed to dilute concentrations of the more persistent and water-soluble dispersant components, such as the anionic surfactant di (2-ethyhexyl) sodium sulfosuccinate (DOSS). The US EPA benchmark for the protection of aquatic life is 40 µg/L. A study conducted by the Operational Science Advisory Team (OSAT) following the Macondo spill investigated the footprint of Corexit at sea by measuring the concentrations of DOSS. It was found that DOSS was more persistent at depth however no dispersant water quality exceedances were measured in the OSAT program (OSAT, 2010) and only one sample was found that exceeded the US EPA guideline for aquatic organisms (Gray et al., 2014). Both DOSS and the solvent used in Corexit (dipropylene glycol butyl ether) are expected to rapidly degrade following application at the cool, shallow Gippsland waters, as they are known to rapidly degrade in light (Gray et al., 2014; Glover et al., 2014), and Corexit has been shown to be microbially degraded at 5 and 20 degrees (Campo et al., 2013).

The current protocols for registering an Oil Spill Control Agent for use in Australia (described in detail by AMSA (2011)) use NATA-accredited standardised toxicity tests on a variety of taxa. These tests include lethal and sub-lethal endpoints and to be registered in Australia, the LC50 values must be greater than 10 mg/L for the tested fish larvae and crustaceans. This is considered is considered "slightly toxic" by the US EPA (Hemmer et al., 2011).

Dispersants currently used in the industry are less toxic than oil (EMSA, 2010) and recent studies have found that Corexit 9500 is not more acutely toxic in standardized tests than common household cleaning products (Word et al., 2014). All dispersants proposed to be used by Esso in the event of an incident are accepted on to the National Plan OSCA Register meaning they meet toxicology requirements for use.

CSIRO (2015) also noted that modern dispersants are much less toxic than spilled oil. However, their use can increase localised oil toxicity, but this is very short-lived due to the dilution effects and will result in much lower exposure and dosage than without dispersant use.

In laboratory experiments, dispersant components (including the solvents and surfactants) degrade rapidly, within hours to days. In field conditions, the few studies on the effects of dilution on dispersant fate and transport have shown that concentrations of dispersants reach a maximum of 5-13 ppm after surface applications and generally decrease to less than 1 ppm within minutes to hours (NASEM, 2019).

Products available today are low in toxicity and do not increase the toxicity of the dispersed oil because they are present in the water column at very low concentrations (Lessard, 2000). The toxicities of dispersants are usually lower than those of the soluble fractions of oils and this, together with the lower concentrations of dispersant in the dispersed oil, indicates that the toxicity of dispersed oil is predominantly due to the toxic components of the oil, and not the dispersant (NRC, 1989).

5.3.2 Increase in Dispersed Oil in the Water Column

The application of dispersants will increase the amount of oil that is entrained and dissolved in the water column, reducing exposure of coastal ecosystems to floating weathered oil, as well as reducing the risk of exposure of seabird and marine mammal populations to the floating oil (Bock et al. 2018; French-McCay et al. 2018; NRC 2005, 2013). It also has the potential to reduce contamination of sensitive intertidal habitats such as mangroves, coral reefs, salt marshes and sandy shores (recreational and tourist areas) through the reduction in shoreline impacts. However, in open ocean environments, the processes involved in dispersion will rapidly dilute the oil droplets and the soluble components of the oil (NRC, 2005). In fact, in deep waters, dispersants are thought to have minimal ecotoxicological effects because of dilution (NRC, 2005).

The application of surface dispersants may result in a greater risk that water column and subtidal habitats could be exposed to elevated concentrations of dispersed hydrocarbons. Surface dispersant application is usually restricted to greater than 3 nm from shorelines and in water depths greater than 10 meters. Maximum dispersed oil concentrations could reach 100-200 ppm in the top 10 meters initially, but it is expected to decrease to 1 ppm or less within 5-10 hours (Lessard, 2000).

A negative effect of subsurface dispersant injection is that the surfactants increase the bioavailability of oil components in the water column and more oil may remain at depth, potentially increasing the toxicity risk to deep-water fauna although dilution will reduce concentrations below toxicity thresholds rapidly (French-McCay et al. 2018).

Similarly, there is a potential for exposure of planktonic, pelagic, demersal and benthic organisms to increased levels of dispersed or dissolved oil components, although dilution is expected to be a significant factor (Hook & Lee, 2015).

5.3.3 Subsea Dispersant Injection (SSDI)

A variety of studies in the aftermath of the Macondo spill response in the Gulf of Mexico have shown that the dispersants that were developed for use on surface spills are also effective when applied during a subsea well response via Sub-Sea Dispersant Injection (SSDI). Research funded by the American Petroleum Institute (API) through a Joint Industry Task Force (JITF) and IPIECA/International Maritime Organization (IMO) through a Joint Industry Program (JIP) demonstrated that Dasic Slickgone NS, Finasol® OSR 52, Corexit® EC9500A are all effective at significantly reducing oil droplet size, a key measure of successful dispersant application. The work was performed at a number of independent research facilities in Europe (CEDRE, Sintef) and the US (Southwest Research Institute) and in conjunction with a number of universities including MIT and the University of Hawaii.

As a result of a reduction of oil droplet size, the surface expression of released oil is expected to be significantly reduced (NASEM, 2019), especially directly above the point of subsea release. This can help protect birds and aquatic mammals since less oil will be present in their habitats. Less surface oil will also be beneficial to response workers since there is an expectation of reduced volatile organic compounds (VOC) in the area in which they work, especially in the early stages of a response (French-McKay *et al*., 2019).

The reduction of oil droplet sizes in the water column will lead to dispersion at depth where concentrations are expected to decrease to levels well below aquatic toxicity thresholds and microbial biodegradation will be significant, even over extended periods of SSDI. A number of studies support these findings (including reports by T. Hays; R. Prince; K. Lee; D. French-McKay; NASEM 2019).

5.3.4 Impact Assessment

The application of dispersant in the event of a loss of well control and major spill will result in an increase in the proportion of spilled hydrocarbons in the water column as either dissolved or entrained oil. This has the effect of decreasing surface and shoreline loading, but increasing exposure to pelagic biota in offshore waters and possibly localised sedimentation of hydrocarbons to the seabed in the deep offshore waters.

An impact assessment has been completed to assess the impacts to receptors following the use of dispersant to mitigate a spill. The impact assessment considers the effects of increased exposure to hydrocarbons in the water column due to dispersant use and addresses any additional or reduced potential impacts from the use of dispersants, as compared to the unmitigated scenario described in Volume 2, Section 6.7.2.

This assessment has been completed based on the proposed response scenario described in Table 5-6 for dispersant application in response to the LOWC in the Northern region, as represented by the Marlin scenario (from the TRA A10 well) as described in Volume 2, Section 6.7.

This scenario has been selected as it results in the largest volume of oil spilled to surface and therefore, requires the largest volume of dispersant in response. Consistent with the assessment of dispersant toxicity described in Section 5.3.1, the impact assessment provided in Table 5-2 has been prepared based on the response scenario which results in the most oil being dispersed into the water column. Given the use of surface dispersants, this aligns with the scenario which uses the most dispersant. This being the surface and SSDI scenario described in Table 5-6.

Note that application via SSDI results in a greater volume of oil being dispersed into the water column. However, following the abandonment of SHA, TWA and BKA subsea facilities, there are no subsea oil wells producing in the Gippsland region. All producing oil wells are located on platforms and therefore, any spills from a loss of well control are assumed to occur at surface.

Remaining subsea facilities (KPA and BTW) produce gas and condensate (See Volume 2, Table 6-21). Discharge of gas with condensate is highly volatile and natural weathering processes will disperse oil and dispersant application is not considered a recommended response option. Therefore, SSDI is not considered to be a primary response option.

Through the use of surface dispersants, in-water hydrocarbon levels are likely to increase above high levels in areas predicted to be impacted by in water oil (see Volume 2, Table 6-7 and 6-8 for likelihood of impacts from LOWC) however, shoreline impacts are expected to be reduced.

Surface application of dispersant will be directed to the thickest part of the slick and to fresh oil which will be found close to the release location in water with sufficient depth to allow dilution of hydrocarbons and dispersant throughout the water column. Dispersants will only be used in Commonwealth waters, in waters of >10m depth and outside of Australian Marine Parks. Use of dispersants in State waters would only be with the approval of the State control agency.

Table 5-2 Aspect: Planned Discharge of Dispersant

Affected Receptor	Unmitigated LOWC Consequence (per Volume 2, Table 6-9)	Consequence of LOWC mitigated through use of dispersant	Consequence Level
Plankton	The impact to plankton is predicted to be **Level III** with potential effects on the food web recognised.	Plankton, specifically zooplankton, are vulnerable to hydrocarbons (Hook et al., 2016). Water column organisms that come into contact with oil and chemicals risk exposure through ingestion, inhalation and dermal contact (NRDA, 2012), which can cause immediate mortality or declines in egg production and hatching rates along with a decline in swimming speeds (Hook et al., 2016). Plankton are at their highest concentrations below surface waters (e.g. 60 m water depth for phytoplankton during the day) and undertake a vertical migration which would likely reduce their potential for (and duration of) exposure to dissolved hydrocarbons in the surface layer of the water column. Plankton are typically abundant in the upper layers of the water column and decline with depth. Once background water quality is re-established, plankton takes weeks to months to recover (ITOPF, 2011). Following use of dispersant, plankton are likely to be exposed to in-water hydrocarbons above the high exposure threshold along the Gippsland coastline. However, once background water quality is re-established, plankton takes only weeks to months to recover (ITOPF, 2011). Further, plankton found in open waters of the exposure zone is expected to be widely represented within waters of the wider Bass Strait region and generally across all waters in the south eastern offshore region, which aids in the re-establishment of communities. Exposure to greater concentrations of dissolved and entrained hydrocarbons due to the use of dispersants is predicted to result in short-term impacts to local plankton populations.	The impact to plankton is predicted to be consistent with the assessed LOWC scenario described in Volume 2, Table 6-9 being **Level III**.
Benthic Habitats and Communities - – Bare Substrate, Coral,	The consequence of a LOWC on benthic habitats is assessed as **Level II.**	Species residing in offshore locations are more likely to be exposed to increased ~~significant~~ levels of in-water hydrocarbons with the application of surface dispersant application depending on their water depth and location with	The consequence of a LOWC mitigated through use of dispersant application on benthic habitats is assessed as **Level II.**

Affected Receptor	Unmitigated LOWC Consequence (per Volume 2, Table 6-9)	Consequence of LOWC mitigated through use of dispersant	Consequence Level
Seagrass, Macroalgae, Subtidal Rocky Reef		respect to the spill. Impacts to deep water benthic sediments are not expected as a result of surface dispersant application. Known areas of seagrass which may be exposed to increased concentrations of dispersed oil include Corner Inlet, Lakes Entrance, Bemm River Estuary and Tamboon Inlet. There is the potential that exposure could result in sub-lethal impacts however seagrass in this region isn't considered a significant food source for marine fauna. Suitable hard substrate for macroalgal around Gabo Island and within the Bemm River Estuary may be impacted by increased concentrations of dispersed oil however are suggested to be some of the least sensitive marine species to oil exposure. Benthic invertebrate species closer to shore may be affected by increased in-water oil concentrations. Invertebrates of value (i.e. target species for fisheries) have been identified to include squid, crustaceans (rock lobster, crabs) and molluscs (scallops, abalone). While exposure can lead to impacts including mortality, recovery of benthic invertebrates exposed to in-water hydrocarbons would be expected to return to background water quality conditions within weeks to months of contact. Several studies have indicated that rapid recovery rates may occur even in cases of heavy oiling (Burns et al., 1993; Dean et al., 1998). Acute or chronic exposure, through both surface contact, and/or ingestion can result in toxicological risks. However, the presence of an exoskeleton (e.g., crustaceans) will reduce the impact of hydrocarbon absorption through the surface membrane. Other invertebrates with no exoskeleton and larval forms may be more prone to impacts from pelagic hydrocarbons. Complex assemblages (e.g. sponge habitat) or deep-water slow-growing sessile invertebrates are likely to recover much more slowly. Exposure to in-water hydrocarbons poses the greatest threat to sensitive macroalgal assemblages, specifically the Giant Kelp Forests TEC. These grow on rocky reefs from the sea floor 8 metres below sea level and deeper growing towards the sea surface. Benthic invertebrates are potentially at risk of toxic impacts of exposure to in-water hydrocarbons. While exposure can lead to impacts including mortality, recovery of benthic	

Affected Receptor	Unmitigated LOWC Consequence (per Volume 2, Table 6-9)	Consequence of LOWC mitigated through use of dispersant	Consequence Level
		invertebrates exposed to entrained hydrocarbons would be expected to return to background water quality conditions within weeks to months of contact. Several studies have indicated that rapid recovery rates may occur even in cases of heavy oiling (Burns et al., 1993; Dean et al., 1998). It is possible that injury or mortality associated with acute or chronic exposure could result in a slight alteration of the local habitat and community structure, however no long-term changes to ecosystem are expected. Offshore benthic habitats are more likely to be exposed to increased ~~significant~~ levels of in-water hydrocarbons although this is expected to be limited to very shallow waters (e.g., 10 to 50m) due to the nature of surface application. These areas of highly mobile sediment, where diversity and abundance are relatively low, will likely recover quickly.	
Fish	The consequences to fish and sharks are assessed as **Level II**, taking into consideration the potential impacts to threatened species such as the White and Grey nurse sharks.	Exposure to dissolved / entrained hydrocarbons and chemicals in the water column can be toxic to fishes. Studies have shown a range of impacts including changes in abundance, decreased size, inhibited swimming ability, changes to oxygen consumption and respiration, changes to reproduction, immune system responses, DNA damage, visible skin and organ lesions, and increased parasitism. However, many fish species can metabolise hydrocarbons, which reduces the risk of bioaccumulation (NRDA, 2012). Shallow inshore fish species including various syngnathids (seahorses, pipefish, pipehorses and seadragons) are less likely to be able to move away from in-water oils and therefore may be exposed to elevated levels or for longer periods. Their habitats are typically widespread however any impacts are expected to be local on individual organism levels. Fish are most vulnerable to hydrocarbon discharges during their embryonic, larval and juvenile life stages. Oil and chemical exposure may result in decreased spawning success and abnormal larval development. Impacts on eggs and larvae entrained in the upper water column are expected to be short term given the temporary period of water quality impairment, and the limited areal extent of the spill. As egg/larvae is widely distributed in the upper layers of the water column it is expected that current induced drift will rapidly replace any affected populations.	Consequences to fish and sharks are assessed as **Level II**, taking into consideration the potential impacts to threatened species such as the White and Grey nurse sharks.

Affected Receptor	Unmitigated LOWC Consequence (per Volume 2, Table 6-9)	Consequence of LOWC mitigated through use of dispersant	Consequence Level
		Pelagic free-swimming fish and sharks are unlikely to suffer long-term damage from exposure because dissolved/entrained hydrocarbons in water are not expected to be sufficient to cause harm (ITOPF, 2010). Pelagic free-swimming fish and sharks are also generally highly mobile and as such are not likely to suffer extended exposure (e.g. >96 hours) at concentrations that would lead to chronic effects due to their patterns of movement. Demersal fish are more likely to be exposed to significant levels of in-water hydrocarbons associated with the application of ~~subsea~~ dispersant application. Predicted zones of moderate exposure to dissolved hydrocarbons contacting the White shark distribution and breeding BIAs and Grey nurse shark foraging and migration BIAs may increase to high exposure levels following use of dispersant. These species are widely distributed and areas of increased impact due to dispersed oil are not considered significant compared to overall species distribution.	
Marine Reptiles - Turtles	Although the effects of hydrocarbons on marine reptiles, specifically turtles can be severe, the low density of turtles expected in the region (due to lack of BIA or aggregations) suggests that a LOWC would affect individuals rather than population level. Consequently, the potential impacts to marine reptiles are considered to be Consequence **Level II.**	Effects to marine turtles have been assessed to be most significant for surface oil and shoreline oil (See Volume 2, Table 6-9). Marine turtles are vulnerable to the effects of oil at all life stages; eggs, hatchlings, juveniles, and adults. Marine turtles can be exposed to oil externally (e.g. swimming through oil slicks) or internally (e.g. swallowing the oil, consuming oil affected prey, or inhaling of volatile oil related compounds). Effects of oil on turtles include increased egg mortality and developmental defects; direct mortality due to oiling in hatchlings, juveniles, and adults; and negative impacts to the skin, blood, digestive and immune systems, and salt glands. French-McCay 2018 performed a comparative risk assessment for a large blowout in the Gulf of Mexico and found that turtles are the marine species that undergo the most benefit from dispersing oil because of their vulnerability to surface slicks and their long lives and slower reproduction. While marine turtles, including threatened species, are known to occur in the area potentially exposed to in-water dispersed oils they are not noted to reside or aggregate in significant numbers, and there are no recognized BIAs in the region.	Although the effects of hydrocarbons on turtles is driven by surface and shoreline oils, the low density of turtles expected in the region (due to lack of BIA or aggregations) suggests that additional in-water oil would affect individuals rather than population level. Consequently, the potential impacts to marine reptiles are considered to be **Consequence Level II.**

Affected Receptor	Unmitigated LOWC Consequence (per Volume 2, Table 6-9)	Consequence of LOWC mitigated through use of dispersant	Consequence Level
		It should be noted that the threat and relative impacts of an oil / pollution on some marine reptile species are considered less damaging than other stressors. Report cards produced on protected marine reptiles in Australia generally ranked oil pollution as either 'not of concern' or 'of less concern' depending on the marine region (DSEWPAC 2012). Impacts from increased concentrations of in-water dispersed oil are expected to be largely consistent with that of the assessed LOWC scenario described in Volume 2, Table 6	
Birds	The potential consequence of risks to seabirds and shorebirds from a LOWC are considered to be **Level II.**	Birds foraging at sea have the potential to directly interact with oil on the sea surface some considerable distance from breeding sites in the course of normal foraging activities. Seabird species most at risk include those that readily rest on the sea surface (e.g. shearwaters) and surface plunging species (e.g. terns, boobies). As seabirds are a top order predator, any impact on other marine life (e.g. pelagic fish) may impact food supply both for the maintenance of adults and the provisioning of young. However, it is likely that the use of dispersant will be offset by the decrease in surface oil and reduction in the consequences for smothering of birds feeding at the surface. For the unmitigated scenario (see Volume 2, Section 6.7.2) oil concentrations at the moderate to high threshold are predicted to accumulate on the shorelines of Gabo Island, which supports the world's largest Little penguin colony, The Skerries and Tasmanian Bass Strait islands such as Curtis Island potentially impacting local populations. Under certain metocean conditions the zone of moderate surface exposure is predicted to overlap with the Little penguin breeding BIA. Impacts to these colonies are expected to be reduced following use of dispersant due to reduced shoreline loading. There are many listed threatened and migratory shorebird species likely to occur in the area overlapping the extent of exposed shoreline. However, in the event of a LOWC, these birds are potentially at risk of shoreline exposure and are not likely to be significantly affected by in-water concentrations of hydrocarbons due to their limited exposure time in the water column. Reduction in shoreline oil as a result of dispersant application is expected to reduce impacts to shorebird species.	Given the potential impacts to birds from oil spills are largely driven by shoreline and surface impacts, the potential impacts to birds due to a LOWC mitigated through use of dispersant application is assessed to be a **Consequence Level III**

Affected Receptor	Unmitigated LOWC Consequence (per Volume 2, Table 6-9)	Consequence of LOWC mitigated through use of dispersant	Consequence Level
Marine Mammals (Pinnipeds)	The consequence of a LOWC on pinnipeds is assessed as Level II.	There may be physical impacts from ingestion of in-water and surface oil. However, as mammals are highly mobile species, it is very unlikely that these animals will be continuously exposed to elevated concentrations of dispersed hydrocarbons for extended durations (e.g. >96 hours) that could lead to chronic effects. Both the New Zealand fur-seal (*Arctocephalus forsteri*) and the Australian fur-seal (*Arctocephalus pusillus doriferus*) are listed marine species with habitat and breeding sites known to occur in areas potentially exposed to surface, in-water and shoreline oil above the moderate threshold. Both the Australian and New Zealand fur seals are at risk to surface oil while at sea and shoreline accumulated oil at haul out sites or rookeries. While some individuals may be affected, population level effects on these other transient species are considered unlikely. It is likely that the use of dispersant will be offset by the decrease in surface oil and reduction in the consequences for whales feeding at the surface. French-McCay 2018 found that marine mammals in the Gulf of Mexico also were protected by use of dispersants for the same reason as turtles. As described in Volume 2, Table 6-9, the potential impacts to pinnipeds from oil spills are largely driven by surface and shoreline impacts.	Given the potential impacts to pinnipeds from oil spills are largely driven by shoreline and surface impacts, the potential impacts to pinnipeds due to a LOWC mitigated through use of dispersant application is assessed to be a **Consequence Level III**
Marine Mammals (Cetaceans)	The consequence of a LOWC on cetaceans is assessed as **Level II**.	There may be physical impacts from ingestion of in-water and surface oil. However, as mammals are highly mobile species, it is very unlikely that these animals will be continuously exposed to elevated concentrations of dispersed hydrocarbons for extended durations (e.g. >96 hours) that could lead to chronic effects. While some individuals may be affected, population level effects on these other transient species are considered unlikely. It is likely that the use of dispersant will be offset by the decrease in surface oil and reduction in the consequences for whales feeding at the surface. Impacts from increased concentrations of in-water dispersed oil are expected to be largely consistent with that of the assessed LOWC scenario described in Volume 2, Table 6-9.	The potential impacts to cetaceans are considered to be Consequence **Level II**.
Coastal Habitats and Communities– Sandy	The impact of LOWC is assessed conservatively as a **Consequence Level II**	There are different types of shorelines found along the Gippsland and southern NSW coast and offshore islands	Given the potential impacts to coastal habitats from oil spills are largely driven by shoreline oil loading, the

Affected Receptor	Unmitigated LOWC Consequence (per Volume 2, Table 6-9)	Consequence of LOWC mitigated through use of dispersant	Consequence Level
Shoreline, Rocky Shoreline, Mangroves and Saltmarsh		(including Tasmanian islands), however this coastline is dominated by wide sandy beaches with intermittent rocky shores, and salt marshes and isolated mangroves within tidal estuaries, coastal lakes and bays. The impacts to these coastal habitats (as described in Volume 2, Table 6-9) are influenced by the volume of hydrocarbon that could be stranded ashore and its thickness before the shoreline saturation point occurs (ITOPF, 2014). Use of dispersant is expected to reduce the volume of oil that reaches the shoreline and therefore reduce impacts to coastal habitats and communities, compared to impacts assessed in Volume 2, Table 6-9.	potential impacts to coastal habitats due to a LOWC mitigated through use of dispersant application is assessed to be a **Consequence Level III**
Wetlands	The consequence of LOWC is assessed as **Level III.**	As described in Volume 2, Table 6-9, wetlands of international importance which may be impacted (e.g., Corner Inlet Ramsar Site) have minimal risk of receiving oil following a LOWC because they have no, or very narrow and/or seasonal, connections to the sea. Under certain conditions shoreline oil is predicted to accumulate at high – moderate thresholds along the shoreline of Corner Inlet, however, following use of dispersant, it would be expected that surface oil will be significantly reduced.	The consequence is assessed as **Level III.**
National Parks and Reserves	The consequence is assessed as **Level II** taking into consideration the length of shoreline potentially impacted and the extent of oil accumulation predicted.	Spill modelling predicted that no AMPs would experience exposure to surface oil at or above the moderate threshold. However, modelling indicated that six AMPs (East Gippsland, Beagle, Flinders, Jervis, Freycinet and Central Eastern), could be exposed to moderate thresholds of dissolved oil. Impacts to National Parks and Reserves along the area of shoreline exposure (as identified in Volume 2, Table 6-7 and Table 6-8) are expected to be reduced following the use of dispersant due to decreased shoreline loading. This decrease in impact to Marine Parks is consistent with the conservation management aims of the South East Marine Reserves Network Management Plan. The East Gippsland and Beagle Marine Parks are ranked as Category VI protected areas meaning they should be	The consequence is assessed as **Level III** taking into consideration the reduction in shoreline impacts due to dispersant use.

Affected Receptor	**Unmitigated LOWC Consequence** (per Volume 2, Table 6-9)	**Consequence of LOWC mitigated through use of dispersant**	**Consequence Level**
		managed mainly for ecosystem protection and passive recreation. The Flinders and Freycinet Marine Parks are ranked as Category II protected areas meaning they should be managed mainly for the ecologically sustainable use of natural ecosystems. The application of surface dispersant aims to protect and minimise the impacts to ecosystems from hydrocarbon spill releases thereby allowing future sustainable use of the ecosystems in the region.	
AMPs	The consequence is assessed as **Level III.**	Although initial spill modelling indicated that no AMPs would be exposed to moderate thresholds of in water (dissolved) oil, it may be expected that in water exposure to hydrocarbons is increased to high levels following the use of dispersant. Surface and in-water (dissolved) oil entering these AMPs will degrade water quality until the oil is broken down and or currents shift the weathering oil outside the boundaries of the AMPs. Thus, water quality effects are predicted to persist only over the short to medium term in the AMPs.	The overall consequence is assessed as **Level III.**
KEFs	The consequence is assessed as **Level III**.	While a spill would not affect the KEF Upwelling East of Eden itself, if the spill occurs at the time of an upwelling event, it may result in krill being exposed to in-water phase hydrocarbons. Pygmy blue whales feeding at this time may suffer from reduced availability of prey however, even with increased in-water hydrocarbon concentrations due to dispersant use, these impacts are expected to be localised and temporary.	The consequence is assessed as **Level III**
Cultural –Indigenous and Historic	The consequence level is considered **Level III** based on public impact consequence considerations	Use of dispersant is expected to reduce shoreline impacts to the visual or cultural (including activities such as camping, rituals and ceremonies) amenity of cultural heritage sites such as historic (e.g. shipwreck) or indigenous protected areas It is expected that use of dispersant will reduce the duration of impacts from degraded aesthetics of sites as a result of reduced shoreline loadings. Parts of the Gippsland coast over which the Gunai-Kurnai people hold native title would be exposed to lesser impacts	The consequence level is considered **Level III** taking into consideration the reduction in shoreline impacts due to dispersant use

Affected Receptor	**Unmitigated LOWC Consequence** (per Volume 2, Table 6-9)	**Consequence of LOWC mitigated through use of dispersant**	**Consequence Level**
		than compared to the unmitigated spill described in Volume 2, Table 6-9.	
Commercial Fisheries	The potential economic impacts to commercial fisheries from LOWC are considered to be Public Impact Consequence **Level I** based on public impact consequence considerations	Several commercial fisheries may operate within the area potentially exposed in the event of a LOWC. For the unmitigated scenario (see Volume 2, Section 6.7.2), floating oil is predicted to extend 10's of kilometers outside the subsea facility PSZ (from which fishing vessels are already excluded) making it likely that in these situations an exclusion zone (or fisheries closure) would be established. Fishing areas may be closed for fishing for shorter or longer periods because of the risks of the catch being tainted by oil. Increased oil in water concentrations could result in increased fish taint and prolonged fishing restrictions. As described in Volume 2, Table 6-9, a temporary fisheries closure and the flow on losses from the lack of income derived from these fisheries based on reduced market confidence and the potential for extended media coverage (potentially greater than 3 months) has the possibility of exceeding medium community disruption (> 100 – 1000 people) such as reduced employment (in fisheries service industries and the seafood supply chain).	The potential economic impacts to commercial fisheries from LOWC are considered to be Public Impact **Consequence Level I** based on public impact consequence considerations (media coverage, the scope of the disruption (personal, commerce, transportation or socio-economic) and the size of the population affected) as per ExxonMobil Risk Matrix Application Guide, 2018 (Refer Section 3.5, Table 3 5).
Tourism and Recreation	The potential economic impacts to tourism and recreation from LOWC are considered to be Public Impact Consequence **Level I** based on public impact consequence considerations.	Impacts to tourism and recreation are driven by visual oil leading to reduced amenity of areas used by coastal tourists and recreational visitors, temporary health implications and possible closures. Use of dispersant is expected to reduce volume of shoreline oil meaning impacts to tourism and recreation are expected to be reduced. Modelling in Volume 2, Section 6.7 predicts visible oil extending into nearshore Victorian waters (including waters of Ninety Mile Beach, Point Hicks and Cape Howe Marine National Parks and Beware Reef Marine Sanctuary) and a number of National Parks and Reserves including the very popular Wilsons Promontory and (Gippsland) Lakes National Parks. It is expected that use of dispersant will reduce the duration of impacts from degraded aesthetics of sites as a result of reduced shoreline loadings.	Despite taking into consideration the reduction in shoreline impacts due to dispersant use, the consequence level is considered **Level I**. This is based on public impact consequence considerations (media coverage, the scope of the disruption (personal, commerce, transportation or socio-economic) and the size of the population affected) as per ExxonMobil Risk Matrix Application Guide, 2018 (Refer Section 3.5, Table 3 5).

Affected Receptor	**Unmitigated LOWC Consequence** (per Volume 2, Table 6-9)	**Consequence of LOWC mitigated through use of dispersant**	**Consequence Level**
		As described in Volume 2, Table 6-9, the extent of potential impacts to tourism and recreation depends on when the spill occurs, size and where it comes ashore.	

Table 5-3 Acceptability of Environmental Impacts from Dispersant Application

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity.	✓	The activities were evaluated as having the potential to result in a Level III to IV consequence.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	The application of dispersants will decrease the volume of oil on the surface which may reduce exposure to coastal sensitives and seabird and marine mammal populations to floating oil. Dispersant application will only be a selected following an incident NEBA, which must demonstrate potential environment impacts from dispersant outweigh the potential for shoreline, fauna and marine sensitivity impacts.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The proposed control measures align with the requirements of the: • OPGGS Act 2006 • Protection of the Sea (Prevention of Pollution from Ships) Act 1983. • Navigation Act 2012 – Chapter 4 (Prevention of Pollution). • Marine Order 96 (Marine pollution prevention – sewage) 2013 • Marine Order 95 (Marine pollution prevention - garbage) 2013.
Internal Context	Consistent with Esso's Environment Policy	✓	Proposed control measures are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist".
	Meets ExxonMobil Environmental Standards.	✓	Proposed controls meet the requirements of the ExxonMobil Dispersant Guidelines 2008.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives.	✓	Proposed control measures meet: • OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and • OIMS System 8-1 objective to clearly define and communicate OI requirements to contractors. • OIMS System 10-2 objective to ensure effective response to emergencies and business disruptions that threaten the safety, security and health of the public, contractors and employees, the environment, asset integrity, and critical business operations
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised.

Table 5-4 ALARP Demonstration of Environmental Impacts from Dispersant Application

ALARP Decision Context and Justification	Decision Context B Dispersant application is a standard response strategy that has been accepted for use in the Australian and International Offshore Petroleum Industry. Impacts associated with dispersant application are well understood and have been implemented by industry. The application of dispersants must be supported by an incident NEBA in commonwealth waters or have approval from state control agency within state waters. Dispersant application activities are aligned with company and partner values. Good Practice control(s) have been identified to ensure environmental impacts associated with mobilising this response are reduced to ALARP, these controls will be implemented in a response scenario and have been included in the OPEP. Esso believes ALARP Decision Context B should apply.		
Good Practice	**Adopted**	**Control**	**Rationale**
Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class.	✓	Vessel Requirements.	The vast majority of commercial ships are built to and surveyed for compliance with the standards (i.e. Rules) laid down by classification societies. The role of vessel classification and classification societies has been recognised by the International Maritime Organisation (IMO) across many critical areas including the International Convention for the Safety of Life at Sea, (SOLAS), the 1988 Protocol to the International Convention on Load Lines and the International Convention for the Prevention of Pollution from Ships (MARPOL).
NEBA completed prior to conducting dispersant application operations.	✓	Incident specific NEBA.	The NEBA takes into account the circumstances of spill, fate of the oil, potential environmental and social impacts and relative oil spill response options. NEBA will take into account IUCN Ranking of relevant Marine Parks.
Halting dispersant use if operational monitoring detects protected or migratory species at the water surface in the path or vicinity of spraying operations.	✓	Halt dispersant application if wildlife are identified in the area	If EPBC Act listed migratory species (e.g. whales) are observed in the immediate vicinity of dispersant operations, aerial dispersant operations will cease until the animal has not been sighted for 30 minutes or unless otherwise advised by the relevant state authority.
Dispersant pre-selection and assessment.	✓	Dispersant pre-selection and assessment.	Only dispersants listed in Section 5.2 will be utilized in the event of an incident, unless otherwise endorsed by a Statutory Authority
Pre-incident dispersant effectiveness testing	✓	Laboratory dispersant effectiveness testing.	Laboratory testing of five Gippsland crude oils against three types of dispersant has been completed under summer and winter conditions. Testing shows that dispersant is highly effective on most types of fresh oil. Effectiveness

			of dispersant decreases significantly on weathered oils.
Effectiveness of dispersant confirmed prior to application.	✓	Basic field dispersant effectiveness test.	Testing effectiveness of the dispersant on the oil spill will inform the response option strategy and assist IMT determining response activities.
Dispersant application is only accepted for: • Commonwealth waters • >10 m water depth • Outside Australian marine parks	✓	Exclusion zones	Defined area of where the application of dispersant is acceptable to reduce potential environmental impacts to marine fauna and flora.
Continuous monitoring of dispersed oil plume and visual monitoring of effectiveness.	✓	Monitoring of dispersant effectiveness	The OSMP implementation modules detail the requirement to monitor an oil slick for the effectiveness of the dispersants.
Monitoring of dispersant concentrations in water	✓	Monitoring of dispersant in water	Operational module O2 provides for monitoring of dispersant concentrations in water.
A record of the volumes of dispersant used in both subsea and surface application will be kept throughout the response.	✓	Records of dispersant volumes	The OPEP instructs IMT to record daily dispersant operations (types, volume and locations).
Dispersants will be targeted at areas of thickest oil and considerations of oil type, amenability and volume will be assessed prior to any dispersant application.	✓	Targeted dispersant application	The Exxon Mobil Oil Spill Response Field Manual details techniques for aerial and vessel ~~and to a lesser extent, subsea~~ dispersant application.
Surface dispersants only applied in daylight hours	✓	Surface dispersant only applied within daylight hours	Spraying surface oil slicks in daylight hours ensures that dispersants are targeted in areas where the oil is the thickest and helps prevent overdosing or application of dispersants in areas that will not be effective. Response during daylight hours also has significant benefits in reducing safety risks (e.g. night time flying) to personnel.
Verify effectiveness of dispersant application	✓	Additional monitoring will be implemented to verify dispersant use is effective and implemented as expected	Water monitoring (as in OSMP Module O2) will be used to monitor concentrations of hydrocarbons and dispersant in the water column.

Table 5-5 Engineering Risk Assessment

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
Lab based efficacy testing for surface application on all Esso crudes against all of the dispersants detailed in table.	Provide a better understanding of the amenability of each Esso crude in relation to each dispersant stock.	The rationale for the selected 5 crudes for laboratory testing was that they represent a cross-section of the types of	Not Adopted

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
		crudes produced in the Bass Strait. Results of testing can be found in OPEP Appendix E. Laboratory experiments and modeling are often limited by their inability to capture the complexity or scale found in the field. In the event of a spill, verification of incident specific dispersant effectiveness will be done before ongoing dispersant use occurs.	
Lab based efficacy testing for subsea dispersant injection using Esso Gippsland crudes. As part of a joint industry project, SINTEF and Cedre developed lab scale tests for measuring dispersed oil droplet distributions. Test results have shown that droplet size distributions are affected by crude type, different dispersant products and dispersant concentrations. The overall outcome was that increased SSDI effectiveness was indicated by the formation of smaller droplets. The tests have not been broadly employed.	Provide a better understanding of the effectiveness of SSDI for specific crudes and dispersant to oil (DOR) ratios	Dispersant efficacy testing has not been undertaken for subsea conditions, but industry experience estimates a subsea amenability to dispersant of approximately 50-70% effectiveness. Laboratory experiments for SSDI effectiveness testing is not as mature and available as those used for surface dispersant effectiveness measurement. The use of modeling to estimate effectiveness is often limited by an inability to capture the complexity or scale found in the field.	Not Adopted
Dispersants are selected from the Oil Spill Control Agents (OSCA) Register, including grandfathered stocks, unless otherwise endorsed by the Statutory Authority.	Dispersants which have been pre-approved for use in Australia by AMSA are placed on the Oil Spill Control Agent (OSCA) Register. The AMSA Efficacy Test Protocol for the Register (AMSA 2012) lists the toxicity testing requirements that ensure products meet the requirements of acceptable practice for the National Plan, and products with a high acute toxicity (LC50 < 10 ppm, 96 hrs.) or containing prohibited substances are not permitted.	All dispersants proposed for use meet the OSCA requirements and are listed on the National Plan Register. Capability assessments have been completed based on the use of approved dispersants and have confirmed enough dispersant is available for the proposed response.	Adopted

5.4 Capability Assessment of Dispersant Application

A detailed capability assessment has been undertaken to ensure that Esso has access to sufficient resources to complete dispersant application activities in a timely manner. Calculations of needs are conservative and could be overstating requirements by 25-50%. The reason for this is that capability needs have been calculated based on treating all surface oil, and do not take into account that oil will quickly disperse and spread below the ideal thickness required for spraying. Using a combination of surface (aerial or vessel application) and subsea dispersant injection significantly reduces the overall volume of dispersants required as summarised in Table 5-6. The assessment concluded sufficient resources are available within acceptable timeframes to conduct this response. This section summarises outcomes of the capability assessment.

Dispersants will be sourced from Esso's own stock in addition those available from AMOSC, AMSA National Plan Stock and OSRL. There is potential to obtain additional stock from mutual aid, and dispersant manufacturers would be requested to increase dispersant production.

Based on the capability assessment for the scenario with the highest dispersant requirement (45 m^3/day), continuity of supply can be maintained drawing on stocks as follows in Table 5-7.

Table 5-6 Dispersant source

	Surface Application only	
	Surface (Day 1-98)	**Total (98 day)**
# Aircraft	4	-
Sorties	15 / day	1455
Aerial dispersant (m^3)	42 / day	4080
Vessel dispersants (m^3)	3 / day	294
SSDI (m^3)	N/A	N/A
Total volume (m^3)	45 / day	4371
Planning assumptions:	Day 1 - 1 x air tractor available on Day 1 with 2 additional aircraft available from Day 2. Fourth aircraft from Day 3. Day 1-98. Aerial dispersant needs based on treating 100% release volume @ 20:1 application rate. No allowance made for natural weathering. Day 1-98. Vessel dispersant volume based on treating 10% of release volume @ 20:1 application rate Capability requirements based on MLA workover WCDS scenario (Refer Volume 2, Section 6.7.2) which results in the largest spill volume.	

Table 5-7 Dispersant source

Source	**Location**	**Day**
Esso	Victoria	1 to 2
AMOSC (surface)	Australia - various	3 to 7
AMOSC SFRT (50%)	Western Australia	8 to 13
AMSA	Australia – various	14 to 20
Mutual Aid	Australia – various	21
OSRL	Singapore	22 to 42
OSRL	Southampton	43 to 83
GRN	Worldwide	84+

Figure 5-1: Dispersant Supply chain

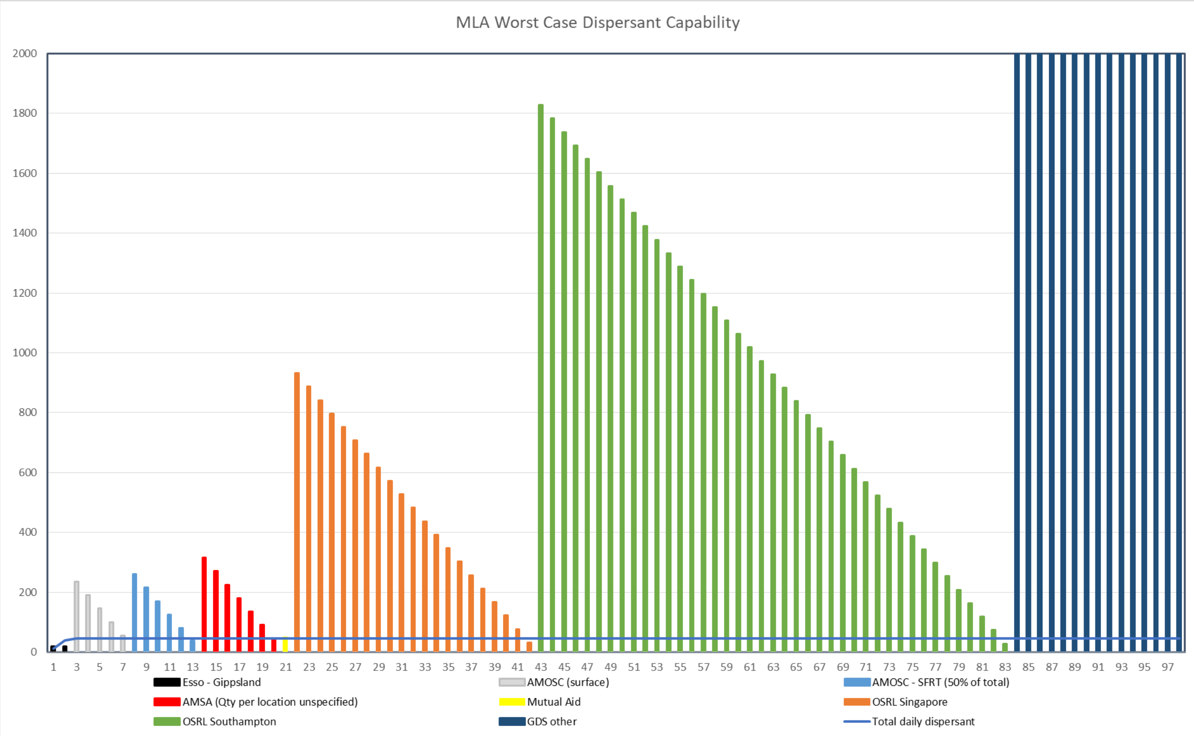


Table 5-8 Dispersant Application Resource Availability

Activity	Resource Required	Resource Availability	Expected Timeframe
Dispersant Stocks Available	4371 m^3 of dispersant based on the MLA WCDS using surface application only.	Dispersant stockpiles available in Australia between Esso, AMOSC, mutual aid and AMSA. Additional dispersant available from OSRL Global Dispersant Stockpile (GDS). GDS required after 21 days.	Victoria stockpiles <24 hours. National stockpiles <48 hours.
Dispersant Application from Aircraft*1	Ability to spray 42 m^3 of dispersant per day.	AMOSC (AMSA Fixed Wing Aerial Dispersant Contract (FWADC)) NatPlan. Air Attack Supervisor to be sourced under NatPlan arrangements to direct overhead spraying operations. Additional dispersant aircraft via OSRL.	Mobilisation of FWAD aircraft <4 hours of request for service. Dispersant application ability <24 hours. (*Note: Assumes good visibility, daylight hours and suitable flying conditions).*
Dispersant Application from Vessels	Ability to spray 4-6 m^3 of dispersant per day per strike team.	Esso Production support vessels loaded with dispersant and spraying equipment from BBMT. Agreements third party vessel operators. Vessels of opportunity are available at Barry Beach Marine Terminal, Lakes Entrance, Port Albert, Port Welshpool, Port Franklin and Mallacoota and Hobart.	1st team dispersant application ability <48 hours of request for service. 2nd team dispersant application ability <72 hours of request for service.

Activity	Resource Required	Resource Availability	Expected Timeframe
Testing Dispersant	Dispersant effectiveness test kit.	Access to 3 x test kits.	Available locally and within less than 48 hours of request.
ExxonMobil	Personnel Trained and capable Esso IMT Regional Response Team	Available to fulfil roles in accordance with requirements and timeframes in OPEP Table 3-2. Remote support <12 hours from notification. In-country support <72 hours from notification.	ExxonMobil

Table 5-9 Dispersant Application Capabilities

Good Practice	Adopted	Control	Rationale
Access to dispersant and dispersant application equipment for initial response.	✓	Esso owned dispersant stocks.	Esso owns stock of dispersant volume (estimated 12m^3) is available to mobilise for the first 24 hours of a response.
		Esso owned dispersant application equipment.	Esso have dispersant application equipment in Victoria and available to mobilise when required.
Pre-arranged access to additional dispersant stockpiles and equipment for applying dispersant.	✓	Agreement with AMOSC for dispersant capabilities.	Response capabilities maintained per service level statement including access to mutual aid and the National Plan (which provides dispersant stockpiles).
		Agreement with OSRL for dispersant capabilities.	Response capabilities maintained and available per OSRL service level statement.
Pre-arranged access to vessels for dispersant application.	✓	Support vessel.	The support vessel that is used for ongoing Esso operations can be used for dispersant application.
	✓	Agreement with third party suppliers for provision of additional vessels.	Agreement with supplier of vessel services has provision for supply of additional vessels
Pre-arranged access to personnel to support Tier III response activities.	✓	ExxonMobil Regional Response Team	ExxonMobil have a global team available to assist response for Tier III activities.

Table 5-10 Consideration of Additional/ Alternative/ Improved Capability for Dispersant Application

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
Quarterly AMOSC equipment availability review.	Provides status update on available equipment.	No cost associated with this control.	Adopted.
Dispersant and application equipment stored on vessel.	Reduce time to apply dispersant.	No cost associated with control.	Adopted.

6. Containment & Recovery

6.1 Response Option Description

Containment and recovery involves controlled collection and recovery of oil from the water's surface. The response typically involves the deployment of booms and oil skimmers from suitable vessels, as well as the collection, transfer and disposal of oil and oily water recovered during the response. Floating barriers or booms are used to enclose the spilled oil on the sea surface into a suitable surface thickness, to allow its mechanical removal using a recovery device such as a skimmer, which pumps the oil from the water surface into temporary storage. The oil and water mix are stored temporarily in vessel tanks on the deck or in internal tanks. Recovered sea water may need to be decanted and returned to the sea to free up storage capacity and enable greater volumes of oil to be recovered without making the potentially long voyage back to port, increasing the effectiveness of the Containment and Recovery. The decanted water will contain traces of hydrocarbons and cannot be discharged unless approval has been provided by AMSA.

Effective containment and recovery can reduce the potential risks and impacts associated with:

- Marine fauna;
- Sensitive shoreline environments;
- Shoreline response; and
- Waste generation.

Containment and recovery is often considered the primary or preferred response option due to the minor impact of its operation on the environment, however, the overall effectiveness of containment and recovery can be limited by a combination of operational constraints and the fate of the oil on the surface (e.g. thickness and patchiness) which may include but not limited to:

- Weather: suitable weather and sea state conditions, which is estimated at <50% of the time in the Bass Strait
- Logistics: availability of suitably equipped vessels, aerial surveillance support and adequate facilities for the storage and disposal of oil and water;
- Personnel: availability of competent responders;
- Location: accessibility and transit time;
- Health and Safety: health effects from exposure to the oil and ability to safety deploy and use equipment; and
- Environment: increased environmental risks and impacts from increased vessels/ aircraft use and treatment/disposal of oily waste.

Experience has shown that the efficiency of at-sea containment and recovery operations can vary widely depending on the above constraints, and recovery is usually limited to between 5% and 20% of the initial spilled volume (IPECA /IOGP – At Sea Recovery - Good Practice Guidance). Esso propose to use containment and recovery as a targeted strategy to mitigate impacts of oil contact with sensitive receptors where other strategies have been ineffective (e.g. dispersants) or may not be viable (e.g. shoreline clean up where there are access issues).

Estimated recovery rates have been calculated based on the encounter rate of strike teams utilising 400 metre of boom with a 120 m swath width travelling at 0.5 knots. Upper and lower recovery rates were calculated based on Bonn appearance code thickness of 50 to 200 micron.

Advantages of containment and recovery:

- Containment and recovery removes hydrocarbon from the environment
- Reduces exposure to surface wildlife e.g. cetaceans, birds

Disadvantages of containment and recovery:

- Labour intensive
- Presents safety risks
- Generation of large volumes of contaminated water
  Increase in environmental impacts from response activities e.g. vessels

6.2 Environmental Impact Assessment of Containment and Recovery

Resources for offshore containment and recovery activities will include offshore vessels that will be mobilised from established ports. Nearshore containment and recovery activities are likely to be undertaken from smaller crafts that may be launched from a number of different locations along the coastline. Access to the crafts, equipment and transit to the affected areas may disturb local port operations, recreational activities, fauna and sensitive habitats.

The collection, handling and disposal of hydrocarbons introduces potential environmental impacts from the oily waste generated. The oily waste must be handled and disposed of correctly to prevent secondary contamination from contaminated equipment and decanting activities.

Environmental aspects associated with implementing containment and recovery were identified and evaluated in Table 6-1 and Table 6-2. Implementing this response option introduces new environmental aspects which are not assessed within Volume 2:

- Physical Presence - Nearshore and Shoreline Users (Socioeconomic)
- Physical Presence - Interaction with Fauna and Flora
- Waste generation and Secondary Contamination

6.2.1 Impact Assessment

An impact assessment for each environmental aspect has been undertaken and additional controls have been identified to minimise the environmental impacts associated with containment and recovery which are detailed within the ALARP assessment. Further assessment of the acceptability of these impacts in an oil spill response context and controls identified for minimising the environmental impact of containment and recovery activities are described below.

Change to the function, interests or activities of other users could occur through disruption to recreational and commercial activities from vessel operations and site access is assessed in Table 6-1.

Table 6-1 Environmental Aspect: Physical Presence - Nearshore and Shoreline Users

Affected Receptor	Impact Assessment	Consequence Level
Socioeconomic (fisheries, tourism, culture)	Recreational fishing is generally concentrated inside the Gippsland Lakes or along the Ninety Mile Beach coastline. Additional vessels and personnel in the area may cause disruption to fishing activities. The movement of personnel, vehicles and equipment may disturb or damage cultural heritage artefacts or sites. The mobilisation of equipment and personnel for containment and recovery operations will be localised. The Oil Spill Tactical Response Plans (TRPs) detail socioeconomic sensitives for each location. The response activities will be in accordance with state response agency directions and Esso will provide the incident specific NEBA, TRPs and Shoreline Protections Plan and support where requested. The additional presence of vessels and personnel will only be short-term and in localised area for the response period. Once the response has been stood down nearshore socioeconomic activities can resume without disruptions, therefore the consequence of the impacts of the response activity is considered to be Level III.	III

The environmental impacts associated with containment and recovery operations include:

- Water Quality – Decanting
- Physical Presence - Interaction with Fauna and Flora
- Physical Presence – Sensitive and protected areas and parks
- Waste generation and Secondary Contamination

Table 6-2 Environmental Aspect: Physical Presence - Interaction with Fauna and Flora

Affected Receptor	Impact Assessment	Consequence Level
Water Quality	Containment and recovery operations will generate large volumes of oily water. Within Australia, the recovered water may be decanted and returned to the sea with approval from AMSA. This frees up valuable storage capacity in the temporary storage device which would otherwise have to be emptied before response operations can continue. The discharge of the oil and water mix may lead to localised, short-term impacts. The consequence to the marine environment is considered inconsequential as the decanted water will have removed much larger volumes of the oil in the marine environment than was present from the spill incident.	III
Physical Presence - Interaction with Fauna and Flora	The sandy beaches, mangroves and salt marshes in the Bass Strait provide potential foraging and breeding habitat for numerous bird species and benthic communities. The flora and fauna within these habitats have the potential to be trampled due to increased numbers of personnel accessing sites. However, containment and recovery response activities primarily occur in the ocean with exception of haul outs and waste and equipment storage. Response activities should avoid sensitive areas unless they have been selected specifically for clean-up or OWR activities. Exclusion zones can be set up to protect these areas and minimise environmental impacts. Haul out sites will use existing road and paths for access to reduce environmental impacts associated with increased foot and vehicle traffic. Shoreline impacts are expected to be inconsequential and have no adverse effects.	IV
	Containment and recovery operations utilise booms which sit on the water's surface, therefore fauna capable of diving, such as cetaceans and pinnipeds can avoid contact. Pinnipeds are likely to be present in the largest number. Impacts to species that inhabit the water column such as sharks and fish are not expected. The noise of the vessel motors may have a positive effect on scaring marine fauna from the immediate area. The additional presence of vessels, equipment and personnel will only be short-term and in localised area for the response period, therefore, the consequence of the impacts of the response activity is considered to be Level III.	III
Physical Presence - Sensitive and protected areas and parks	Potential impacts to sensitive and protected areas may be impacted from containment and recovery activities. Human presence in sensitive areas may adversely affect important natural behaviors of biota, e.g. nesting of shorebirds and seabirds, or pinnipeds. Haul out sites for containment and recovery activities will use existing road and paths for access, therefore, the impacts to sensitive and protected areas and parks are expected to be inconsequential and have no adverse effects.	IV
Waste Management and Secondary Contamination	The Esso Bass Strait Oil Spill Response Waste Management Plan, details requirement for selecting waste management options, and equipment and storage to be utilised to prevent secondary contamination. The Tactical Response Plan - Shoreline Protection & Clean-Up and site specific Tactical Response Plans include information on staging areas and access points. The location of waste will be within the specified exclusion zone. The generation of waste will be short-term and is localised to the response area, for the duration of the response. Therefore, the	III

Affected Receptor	Impact Assessment	Consequence Level
	consequence of the impacts of the response activity is considered to be Level III.	

Table 6-3 Acceptability of Environmental Impacts from Containment and Recovery

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity	✓	All the aspects related to containment and recovery have been evaluated as having the potential to result in a maximum Level III consequence.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	All oil spill response activities are implemented with the aim of reducing the overall environmental impact. Containment and recovery activities may limit the volume of oil that could impact the shoreline and marine sensitivities.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	Activities will comply: • OPGGS Act 2006. • Protection of the Sea (Prevention of Pollution from Ships) Act 1983. • Marine Order 96 (Marine pollution prevention – sewage) 2013. • Marine Order 95 (Marine pollution prevention - garbage) 2013.
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed control measures are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist".
	Meets ExxonMobil Environmental Standards.	✓	There is no standard related to the containment and recovery however the controls proposed meet the strategic objectives of the Upstream Environmental Standards.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives.	✓	Proposed control measures meet: • OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and • OIMS System 8-1 objective to clearly define and communicate OI requirements to contractors. • OIMS System 10-2 objective to ensure effective response to emergencies and business disruptions that threaten the safety, security and health of the public, contractors and employees, the environment, asset integrity, and critical business operations
External Context	Stakeholder concerns have been considered /	✓	No specific stakeholder concerns have been raised.

	addressed through the consultation process.		

Table 6-4 ALARP Demonstration of Environmental Impacts from Containment and Recovery

ALARP Decision Context and Justification	Decision Context A. Containment and recovery activities are standard practice for hydrocarbon spills to reduce hydrocarbons in the marine environment and minimise impacts to shorelines and marine sensitivities. There is a good understanding of potential impacts from containment and recovery. This response option would be supported by an incident specific NEBA. All activities undertaken in state waters will be led by the state control agency. Good Practice controls have been identified to ensure environmental impacts associated with mobilising this response are reduced to ALARP, these controls will be implemented in a response scenario and have been included in the OPEP. Esso believes ALARP Decision Context A should apply.		
Good Practice	**Adopted**	**Control**	**Rationale**
Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class.	✓	Vessel Requirement.	The vast majority of commercial ships are built to and surveyed for compliance with the standards (i.e. Rules) laid down by classification societies. The role of vessel classification and classification societies has been recognised by the International Maritime Organisation (IMO) across many critical areas including the International Convention for the Safety of Life at Sea, (SOLAS), the 1988 Protocol to the International Convention on Load Lines and the International Convention for the Prevention of Pollution from Ships (MARPOL).
NEBA completed prior to conducting containment and recovery activities.	✓	Incident specific NEBA.	The NEBA takes into account the circumstances of spill, fate of the oil, potential environmental and social impacts and relative oil spill response options.
Containment and recovery operations only undertaken within daylight hours	✓	Containment and recovery operations only undertaken within daylight hours	Containment and recovery activities will only be undertaken in daylight hours to monitor the boom to ensure trapped fauna are released as soon as possible. Response during daylight hours also has significant benefits in reducing safety risks (e.g. injury) to personnel.
Ensure daily Containment and Recovery operations are recorded (location, estimated amount of oil recovered, estimated amount of water recovered)	✓	Daily records of oil recovered	Daily logs and records of containment and recovery operations demonstrate that CAR equipment was deployed safely, effectively and following consideration of environmental conditions.
Exclusion zones established	✓	Exclusion zones	The OPEP requires that exclusion zones are put in place which consider health and safety and environment risks. These exclusion zones are determined in consultation with the state control agency.
Discharge of de-oiled water (decanting) must meet MARPOL requirements.	✓	Decanting performed in commonwealth waters in accordance with MARPOL requirements.	MARPOL sets out requirements for discharge of de-oiled water (decanting) to avoid undue environmental impact. Decanting performed in commonwealth waters in accordance

			Prevention of Pollution from Ships) Act 1983, Section 9, subsection (2) (e)
Incident specific Waste Management Plan.	✓	Bass Strait Oil Spill Response Waste Management Plan	The Esso Emergency Response Waste Management Plan will assist in the development of an incident specific Waste Management Plan.

6.3 Capability Assessment of Containment and Recovery

A detailed capability assessment has been undertaken to ensure that Esso has access to sufficient resources to complete containment and recovery activities in a timely manner. The assessment concluded sufficient resources are available within acceptable timeframes to conduct this response.

This section summarises outcomes of the capability assessment.

Table 6-5 Containment and Recovery Resource Availability

Task	Resource Required	Resource Availability	Expected Timeframe
Containment & Recovery - Vessels	8 x vessels available for 4 x strike teams based on the MLA crude WCDS	Esso Support vessel. Agreement with third party vessel operators to supply additional vessels. Vessels of opportunity are available at Barry Beach Marine Terminal, Lakes Entrance, Port Albert, Port Welshpool, Port Franklin and Mallacoota and Hobart.	1x Vessel C&R strike team will be on site <48 hours of service request. 2x Vessel C&R strike teams will be on site <72 hours of service request.
Containment & Recovery Equipment	Equipment for 4 x vessel strike teams.	<u>AMOSC</u> Geelong stockpile 3x C&R systems. Fremantle stockpile 3 x C&R strike systems. <u>OSRL</u> Additional equipment available through OSRL. <u>AMSA</u> Additional equipment available through AMSA.	Load out from Geelong <4 hours service request. 7 C&R systems available in Victoria Additional 3 C&R systems available in Australia that can be mobilised to Gippsland within 72 hours.
Containment & Recovery Personnel	2 x trained and 4 x personnel per strike team.	<u>Esso</u> Core Group (10) <u>AMOSC</u> Staff (6) Core Group (50) <u>OSRL</u> Response Technicians (18)	<u>Esso</u> <24 hours from request <u>AMOSC</u> <24 hours from request of service
Waste Management	Onshore waste management arrangements.	Esso have a contract with a third party waste management service to provide transport and disposal of solid and liquid wastes. Refer Section 9.3.	<24 hours of service request.

Task	Resource Required	Resource Availability	Expected Timeframe
ExxonMobil	Personnel Trained and capable Esso IMT Regional Response Team	Available to fulfil roles in accordance with requirements and timeframes in OPEP Table 3-2. Remote support <12 hours from notification. In-country support <72 hours from notification.	ExxonMobil

Table 6-6 Containment and Recovery Resource Availability

Good Practice	Adopted	Control	Rationale
Pre-arranged access to vessels for containment and recovery activities.	✓	Support vessel.	The support vessel that is used for ongoing Esso operations can be used for containment and recovery.
	✓	Agreement with third party suppliers for provision of additional vessels.	Agreement with supplier of vessel services has provision for the supply of additional vessels.
Pre-arranged access to additional equipment for containment and recovery.	✓	AMOSC agreement.	Agreement with AMOSC provides access to additional containment and recovery equipment.
Pre-arranged access to additional labour.	✓	Personnel trained for containment and recovery activities	Agreement with AMOSC provides access to additional containment and recovery personnel.
Pre-arranged Waste facilities.	✓	Agreement with waste management contractor.	Waste arrangements for removal of waste to approved disposal or treatment facilities in accordance with EPA requirements.
Pre-arranged access to personnel to support Tier III response activities.	✓	ExxonMobil Regional Response Team	ExxonMobil have a global team available to assist response for Tier III activities.

Table 6-7 Consideration of Additional/ Alternative/ Improved Capability for Source Control for Containment and Recovery

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
Standby dedicated emergency response vessel.	A dedicated standby emergency response vessel may reduce time required to implement containment and recovery activities and increase recovery capacity.	Significant costs are associated with leasing a suitable vessel. Given the high potential costs to the program, implementing this control measure is considered grossly disproportionate, given that the event has an extremely low likelihood of occurrence.	Not adopted.

7. Shoreline Protection and Clean-up

7.1 Response Option Description

Shoreline protection and clean-up consists of different techniques to prevent or reduce exposure of shoreline sensitives.

This shoreline response strategy is based on:

- Protection and deflection; and
- Shoreline response operations.

Advantages of Shoreline protection and clean-up:

- Deflection prevents oiling of sensitivities areas
- Clean-up removes hydrocarbon from the environment
- Reduces hydrocarbon exposure to wildlife e.g. cetaceans, birds

Disadvantages of Shoreline protection and clean-up:

- Presents safety risks
- Labour intensive response
- Increase in environmental impacts from response activities e.g. vessels
- May generate large volumes of waste

7.1.1 Protection and Deflection

Protection - Booms may be used to exclude slicks from targeted sensitive shorelines and/or amenities where it is safe and conditions permit access and effective deployment.

Deflection - Booms may be deployed at an angle to a drifting slick to divert oil away from targeted sensitive areas or to a collection point where it is safe to contain and recover.

Containment and Recovery – Near shore containment and recovery (refer to Section 6) may be deployed when there is little or no current and the sea-state permits.

This response is restricted by specific weather and metocean conditions and site accessibility. In strong winds, currents and/or waves this option may not be effective. In the event of an incident, the preparedness NEBA shall be updated with incident specific information to identify the priority sites for protection. Shoreline protection and clean-up will only be used as directed by state agencies.

7.1.2 Shoreline Clean-up

If a spill has reached or is predicted to reach the shoreline, an assessment of the area will be undertaken using the Shoreline Clean-up Assessment Technique (SCAT). This consists of a series of consistent and repeatable shoreline assessments that prioritise clean-up response based upon shoreline type. The assigned team will identify the appropriate shoreline clean-up technique, report the potential for, or any incidents of, oiled wildlife and undertake routine assessments throughout the response in terms of rehabilitation progress.

Shoreline clean-up consists of different manual and mechanical recovery techniques to remove oil and contaminated debris from the shoreline to reduce ongoing environmental contamination and impact.

Esso Australia and Cooper Energy have developed a Shoreline Protection and Clean-Up Plan and site specific Tactical Response Plans for Gippsland Basin oil and gas activities.

The plans outline the strategies that may be adopted and actions required to undertake safe and effective shoreline protection and clean-up response. The area assessed ranges from Port of Eden to Wilsons Promontory to Flinders Island in the Bass Strait (Figure 7-1).

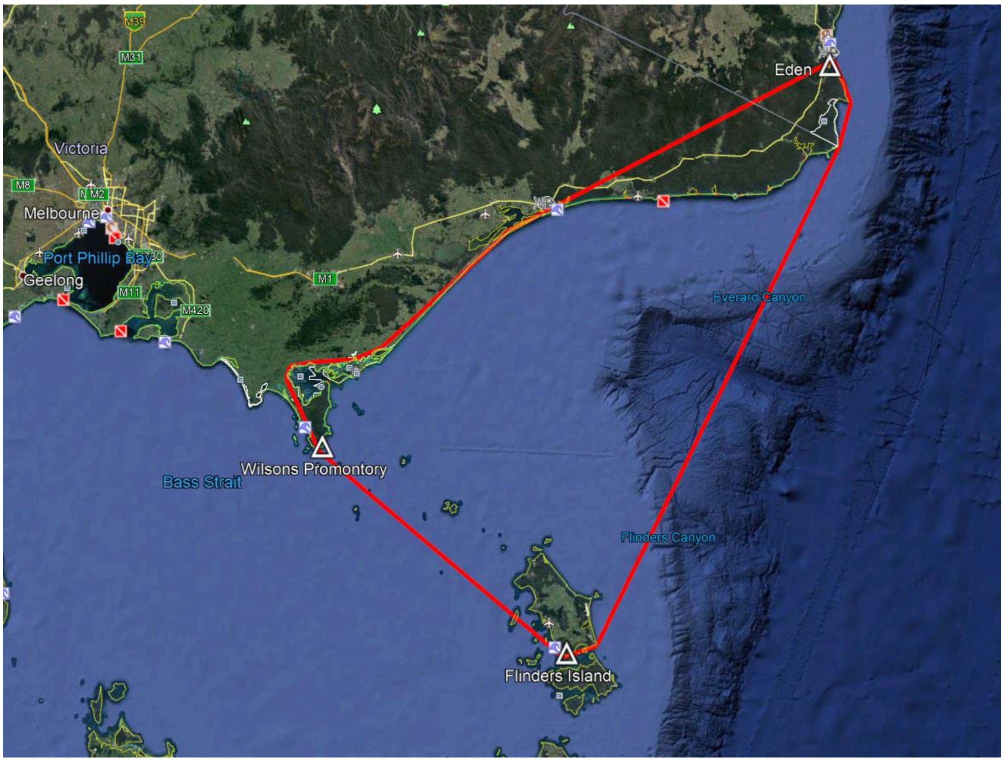


Figure 7-1 Overview of Gippsland Basin field locations

Tactical Response Plans (TRPs) are available for primary, secondary and tertiary sites that have been assessed and chosen based on appropriate access for shoreline response, shoreline type and key sensitive receptors. The application of Global Information Systems (GIS), cross referenced with the Oil Spill Response Atlas sensitivity mapping was carried out prior to site visits to validate both the identification of specific sites as 'high priority', and the strategies proposed for shoreline response.

The TRPs are designed to be used by both the Incident Management Team and field responders. The TRPs include the following information:

- Site description;
- Site access;
- Site constraints;
- Main sensitivities;
- Facilities / services i.e. food / accommodation / medical facilities / vessel and equipment hire;
- Key local contacts i.e. land manager, local emergency services, port authority; and
- Images / diagrams marked with staging areas, access points and tactics to be implemented.

TRPs set out a series of tasks to be executed by responders and a breakdown of resources (personnel and equipment) required to implement each task.

The locations shown in Table 7-1 have pre-drafted TRPs which should be used to guide response planning. Development of additional incident specific response plans may be required for locations without a pre-determined plan.

The collection, handling and disposal of hydrocarbons introduces potential environmental impacts from the oily waste generated. The oily waste must be handled and disposed of correctly to prevent secondary contamination from contaminated equipment and decanting activities.

Table 7-1 Tactical Response Plan sites

SITE NAME	Site Type	Latitude	Longitude
Primary Sites			
VICTORIA			
Corner Inlet	Inlet	38°47'49.23"S	146°30'3.86"E
Lakes Entrance	Inlet	37°53'26.16"S	147°58'23.12"E
Snowy River (Marlo)	River mouth	37°48'12.25"S	148°32'56.62"E
Wingan Inlet	Inlet	37°44'56.97"S	149°30'48.22"E
Betka River	River mouth	37°35'6.32"S	149°44'21.58"E
Mallacoota	Inlet	37°33'47.59"S	149°45'53.47"E
NEW SOUTH WALES			
Wonboyn River	River/Lake	37°14'57.55"S	149°57'59.54"E
Bittangabee Bay	Inlet	37°12'54.16"S	150° 0'57.51"E
Towamba River	River mouth	37° 6'44.56"S	149°54'45.62"E
Nullica River	River mouth	37° 5'26.91"S	149°52'20.21"E
FLINDERS ISLAND			
North East River	River mouth	39°43'51.81"S	147°57'38.73"E
Samphire River	river mouth	40°13'10.56"S	148°11'47.93"E
Secondary Sites			
VICTORIA			
Merriman Creek (Seaspray)	River mouth	38°22'56.18"S	147°11'4.26"E
Lake Bunga	Inlet	37°56'50.00"S	147°48'18.98"E
Lake Tyers	Inlet	37°51'33.78"S	148° 5'18.55"E
Yeerung River	River mouth	37°47'28.02"S	148°46'26.67"E
Sydenham Inlet (Bemm River)	River mouth	37°46'49.61"S	149° 1'11.26"E
Tamboon Inlet (Cann River)	Inlet	37°46'39.31"S	149° 9'11.11"E
Thurra River	River mouth	37°46'56.67"S	149°18'45.94"E
Mueller River	River mouth	37°46'44.51"S	149°19'41.29"E
Shipwreck Creek	River mouth	37°38'51.45"S	149°41'58.05"E
Davis Creek	River mouth	37°34'43.46"S	149°44'59.14"E
NEW SOUTH WALES			
Saltwater & Woodburn Creek	Woodburn Creek	37°10'15.46"S	150° 0'17.18"E
	Saltwater Creek	37°10'8.25"S	150° 0'9.11"E
Fisheries Creek	Creek	37° 6'38.72"S	149°55'47.31"E
Boydtown Creek	River mouth	37° 6'9.86"S	149°52'51.59"E
FLINDERS ISLAND			
Foochow Inlet	Inlet	39°53'53.77"S	148° 7'20.71"E
Melrose Road Inlet	Inlet	39°55'34.85"S	148° 9'18.30"E
Patriarch Inlet	Inlet	39°56'45.22"S	148°11'0.45"E
Cameron Inlet	Inlet	40° 4'14.54"S	148°17'10.36"E
Reddins Creek	Creek mouth	40°15'44.19"S	148° 9'5.00"E
Cronleys Creek	Creek mouth	40°14'54.22"S	148° 3'32.09"E

SITE NAME	Site Type	Latitude	Longitude
Fotheringate Creek	Creek mouth	40°12'51.95"S	148° 2'15.05"E
Nalinga Creek	Creek mouth	40° 8'10.47"S	148° 1'1.70"E
Pats River	River mouth	40° 5'51.62"S	147°59'40.77"E
Arthur Bay Conservation Area	Bay	40° 5'12.38"S	147°58'1.53"E
Lughrata Salt Marsh	Marsh entrance	39°54'31.82"S	147°52'30.33"E
Mines Creek	Creek mouth	39°54'13.00"S	147°51'59.85"E
Boat Harbour Creek	Creek mouth	39°51'3.29"S	147°47'22.15"E
Killiecrankie Creek	Creek mouth	39°50'9.47"S	147°50'23.83"E
Edens Creek	Creek mouth	39°45'40.28"S	147°53'3.65"E
Tertiary Sites			
Gabo Island	Island	37°33'44.75"S	149°54'39.07"E

7.1.3 State Government Agencies

In response to a spill, a shoreline protection and clean-up response will be led by the respective state response agency.

The National Plan also provides guidance on shoreline clean-up techniques as outlined in National Plan Guidance Response, assessment and termination of cleaning for oil contaminated foreshores (AMSA 2015).

The State Governments of Victoria, Tasmania and New South Wales will ultimately decide, through their control agencies, how oil spill response operations will occur on these shorelines, however, Esso will make the Shoreline Protection Plan and Tactical Response Plans, incident specific NEBA and resources to support the response available. Liaison Officers will be exchanged between IMTs to manage a coordinated response.

7.2 Environmental Impact Assessment of Shoreline Protection and Clean-up

Nearshore shoreline protection activities are likely to be undertaken from smaller crafts that may be launched from a number of different locations along the coastline. Access to the crafts, equipment and transit to the affected areas may disturb local fauna, sensitive habitats, and cultural heritage areas and disrupt local recreational activities.

Shore clean-up activities may disturb a number of nearshore habitats as identified in the prepared Shoreline Protection Plans. The collection, handling and disposal of hydrocarbons introduces potential environmental impacts from the oily waste generated.

7.2.1 Impact Assessment

An impact assessment for each environmental aspect has been undertaken and additional controls have been identified to minimise the environmental impacts associated with shoreline protection and clean-up which are detailed within the ALARP assessment. Further assessment of the acceptability of these impacts in an oil spill response context and controls identified for minimising the environmental impact of shoreline protection and clean-up activities are described below.

Change to the function, interests or activities of other users could occur through disruption to recreational and commercial activities from vessel operations and site access, Table 7-2.

Table 7-2 Environmental Aspect: Physical Presence - Nearshore and Shoreline Users

Affected Receptor	Impact Assessment	Consequence Level

Socioeconomic (fisheries, tourism, culture)	Recreational fishing is generally concentrated inside the Gippsland Lakes or along the Ninety Mile Beach coastline. Additional vessels and personnel in the area may cause disruption to fishing activities. The movement of personnel, vehicles and equipment may disturb or damage aboriginal and non-aboriginal cultural heritage artefacts or sites). The presence of stranded oil and clean-up operations may require temporary beach closures. The mobilisation of equipment and personnel for shoreline protection and clean-up activities will be localised. The Oil Spill Tactical Response Plans (TRPs) detail socioeconomic sensitives for each location. The response activities will be are in accordance with state response agency directions and Esso will provide the incident specific NEBA, TRPs and Shoreline Protections Plan and support where requested. The additional presence of vessels and personnel will only be short-term and in localised area for the response period. Once the response has been stood down nearshore socioeconomic activities can resume without disruptions, therefore the consequence of the impacts of the response activity is considered to be to be Level III.	III

The environmental impacts associated with containment and recovery operations include:

- Physical Presence - Interaction with Fauna and Flora
- Physical Presence – Sensitive and protected areas and parks
- Waste generation and Secondary Contamination

Table 7-3 Environmental Aspect: Physical Presence - Interaction with Fauna and Flora

Affected Receptor	Impact Assessment	Consequence Level
Physical Presence - Interaction with Fauna and Flora	Shoreline clean-up activities could lead to damage to shoreline habitats from high-pressure washing, trampling of shoreline sediments, flora and fauna from vehicles and mechanical recovery techniques, and disturbance of shoreline biota by human responders and vehicles. The sandy beaches, lakes, mangroves and salt marshes in the Bass Strait provide potential foraging and breeding habitat for numerous bird species and benthic communities. Environmental impacts to intertidal shoreline habitats and communities may have indirect effects on the food chains, affecting the macro fauna communities which they support. In addition, the removal of habitat (such as sand from beaches) may also make them more vulnerable to ongoing erosion. The Tactical Response Plans (TRPs) detail environmental sensitives for each location and the OPEP states the requirement for setting up exclusion zones in conjunction with the state control agency. Response activities should avoid these exclusion zones, unless they have been selected specifically for clean-up or OWR activities. Shoreline clean-up activities may adversely affect important natural behaviors of biota, e.g. nesting of shorebirds and seabirds, or pinnipeds. Human presence may also cause ground disturbance due to manual raking and turnover of sandy beaches or intertidal flats to remove accumulations of weathered oil, which could affect sediment infauna, cultural heritage sites. The consequences will be localised and short term, it will recover quickly once activities cease.	III

Affected Receptor	Impact Assessment	Consequence Level
	Protection and Deflection activities utilise booms which sit on the water's surface, therefore fauna capable of diving, such as cetaceans and pinnipeds can avoid contact. Pinnipeds are likely to be present in the largest number. Impacts to species that inhabit the water column such as sharks and fish are not expected. The noise of the vessel motors may have a positive effect on scaring marine fauna from the immediate area. Protection and Deflection response activities primarily occur in the ocean with exception of haul outs sites. The mobilisation of equipment and personnel for shoreline protection and clean-up activities will be localised. The Oil Spill Tactical Response Plans (TRPs) detail environmental sensitives for each location and the OPEP states the requirement for setting up exclusion zones in conjunction with the state control agency. Haul out sites will use existing road and paths for access, therefore, the shoreline impacts are expected to be inconsequential and have no adverse effects. The additional presence of vessels, equipment and personnel will only be short-term and in localised area for the response period, therefore, the consequence of the impacts of the response activity is considered to be Level III.	III
Physical Presence - Sensitive and Protected Areas and Parks	Potential impacts to sensitive and protected areas may be impacted from Shoreline protection and clean-up activities. Human activity in sensitive areas may adversely affect important natural behaviors of biota, e.g. nesting of shorebirds and seabirds, or pinnipeds. Human presence may also cause ground disturbance due to manual raking and turnover of sandy beaches or intertidal flats to remove accumulations of weathered oil, which could affect sediment infauna, cultural heritage sites, temporary exclusion of residents and tourists from amenity beaches. Haul out sites for protection and deflection activities will use existing road and paths for access, therefore, the impacts to sensitive and protected areas and parks are expected to be inconsequential and have no adverse effects. The Oil Spill Tactical Response Plans (TRPs) detail environmental sensitives for each location and the OPEP states the requirement for setting up exclusion zones in conjunction with the state control agency. The consequence to sensitive areas is assessed as localised and short term, it will recover quickly once activities cease.	III
Waste Management and Secondary Contamination	Accidental loss of waste during recovery, transport and disposal activities may result in secondary contamination. The Esso Bass Strait Oil Spill Response Waste Management Plan, details requirement for selecting waste management options and equipment and storage to be utilised to prevent secondary contamination. The Shoreline Protection and Clean-Up Plan and site specific Tactical Response Plans include information on staging areas and access points. The generation of waste will be short-term and is localised for the response period, therefore, the consequence of the impacts of the response activity is considered to be to be Level III.	III

Table 7-4 Acceptability of Environmental Impacts from Shoreline Protection and Clean-up

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity	✓	All aspects related to shoreline protection and clean-up activities have been evaluated as having the potential to result in a maximum Level III consequence.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	All oil spill response activities are implemented with the aim of reducing the overall environmental impact. The purpose of shoreline protection and clean-up activities is to minimise the environmental impacts resulting from an oil spill.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The proposed control measures align with the requirements of: • OPGGS Act 2006. • Emergency Management Act 2013 (Vic). • Emergency Management Act 1989 (NSW). • Emergency Management Act 2006 (Tas). • Wildlife Act 1975 (Vic). • EPBC Act. • Wildlife Act 1975 (Vic). • Nature Conservation Act 2002 (Tas). • National Parks and Wildlife Act 1974 (NSW).
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed control measures are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist".
	Meets ExxonMobil Environmental Standards.	✓	There is no standard related to the shoreline protection and clean-up however the controls proposed meet the strategic objectives of the Upstream Environmental Standards.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives.	✓	Proposed control measures meet: • OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and • OIMS System 8-1 objective to clearly define and communicate OI requirements to contractors. • OIMS System 10-2 objective to ensure effective response to emergencies and business disruptions that threaten the safety, security and health of the public, contractors and employees, the environment, asset integrity, and critical business operations
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised.

Table 7-5 ALARP Demonstration of Environmental Impacts from Shoreline Protection and Clean-up Activities

ALARP Decision Context and Justification	Decision Context A Shoreline protection and clean-up activities are standard practice for hydrocarbon spills to reduce hydrocarbons in the marine environment and minimise impacts to shoreline sensitivities. There is a good understanding of potential impacts from shoreline protection and clean-up activities. This response option would be supported by an incident specific NEBA. All activities undertaken in state waters will be led by the State Control Agency. Good Practice controls have been identified to ensure environmental impacts associated with mobilising this response are reduced to ALARP. These controls will be implemented by the state led control agency in a response scenario and have been included in the OPEP. Note that the response must be led by State Control Agencies, with Esso providing support and resources when requested. Esso believes ALARP Decision Context A should apply.		
Good Practice	**Adopted**	**Control**	**Rationale**
NEBA completed prior to conducting shoreline protection and clean-up activities application operations.	✓	Incident specific NEBA.	The NEBA takes into account the circumstances of spill, fate of the oil, potential environmental and social impacts and relative oil spill response options.
Environmental consideration of Gippsland basin local shorelines.	✓	Primary & Secondary Shoreline Tactical Response Plans (TRPs).	Shoreline Protection Plan & Tactical Response Plans (TRPs) describe the shoreline types and have categorised primary and secondary sites which have been assessed and chosen based on appropriate shoreline response options, shoreline type and key sensitive receptors. These plans will be made available to the control agency.
Incident specific Waste Management Plan.	✓	Bass Strait Oil Spill Response Waste Management Plan	The Esso Emergency Response Waste Management Plan will assist in the development of an incident specific Waste Management Plan.
Ensure daily Containment and Recovery operations are recorded (location, estimated amount of oil recovered, estimated amount of water recovered)	✓	Daily records of oil recovered	Daily logs and records of containment and recovery operations demonstrate that CAR equipment was deployed safely, effectively and following consideration of environmental conditions.
Exclusion zones established	✓	Exclusion zones	The OPEP requires that exclusion zones are put in place which consider health and safety and environment risks. These exclusion zones are determined in consultation with the state control agency.

Table 7-6 Engineering Risk Assessment

Additional, Alternative, Improved Controls	**Benefit**	**Cost / Feasibility**	**Adopted**
Shoreline protection and clean up only undertaken within daylight hours	Undertaking shoreline protection and clean up during daylight hours to ensure personnel can see sensitive environmental receptors and minimize impacts cause by unplanned interactions with flora and fauna.	Response duration will be extended.	Yes

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
	Response during daylight hours also has significant benefits in reducing safety risks (e.g. injury) to personnel.		

7.3 Capability Assessment of Shoreline Protection and Clean-up

A detailed capability assessment has been undertaken to ensure that Esso has access to sufficient resources to support the State Control Agency with an effective response in a timely manner. The assessment concluded sufficient resources are available within acceptable timeframes to conduct a response should it be required. The shoreline protection and clean-up capability assessment has been completed for planning and preparedness purposes. The State Control Agency will ultimately decide what strategies are to be implemented and the quantity and source of resources to be used during an incident.

7.3.1 Shoreline protection

Tactical response plans are used to assist in determining capability requirements, taking into account the specifics of the receiving environment.

Spill modelling is used to determine required resources to undertake shoreline protection and clean up. The ExxonMobil Oil Spill Response Field Manual [2014 edition], Section 12, Tables 12-1 to 12-23 is used to calculate resources for shoreline protection and clean-up including:

- Primary equipment required
- Size/type/description of equipment
- Numbers required
- Likely treatment rates and capacities

The above information is then aligned with shoreline protection planning based on location specific tactical response plans (TRPs) that have been developed for pre-identified priority locations (see Table 7-1). There exists the potential requirement to implement multiple TRPs during a single incident. EAPL considers the numbers and response timing requirements are conservative given that:

a. Modelling of the worst case minimum time to shoreline contact has been used, and;
b. Stochastic modelling results have been used to identify the potential TRP's that may need to be implemented concurrently, and;
c. Secondary TRP locations will not necessarily require a response, should the incident occur when the estuaries are closed.

The sum of resources required to implement the identified TRPs is summarised in the activity specific Quick Reference Guides. EAPL has also considered the concurrent implementation of the worst case scenario shoreline protection requirements which include the bulk of the TRPs, totalling 22 sites with the highest resource requirements, which are summarised in Table 7-10. While these calculations consider overall requirements, modelling demonstrates that oil will accumulate on different sections of the coast over time requiring a phased approach to resource deployment and implementation of TRP's. The below table provides an example of progressive personnel requirements using the phase of response concept as detailed in the OPEP. This approach has also been used to assess phased equipment needs and availability.

Table 7-7 Progressive Personnel Required - Shoreline Impact and TRP Activation

Assessment based on Seahorse Crude WCDS Modelling as a representative example of near shore loss of well control. Seahorse has now been plugged and abandoned.

Shoreline Receptor	hrs. to impact (>100 g/m^2)	Phase of Response	TRP Activated		Trained personnel based on TRPs			
					Trained	General	Special	Total
Ninety Mile Beach	36	Initial Response 24hr						
Wellington	42							
Seaspray	42		2	Merriman Creek (Seaspray)	16	48	44	108
Ocean Grange	43		-					
Lakes Entrance (West)	45		-					
Woodside Beach	45		-					
Lakes Entrance	47	48hr	3	Lakes Entrance	15	48	40	103
Lake Tyers Beach	50	Planned Phase – Decision Making Stage	4 5	Lake Bunga, Lake Tyers	34	102	73	209
Marlo	53		6	Snowy River (Marlo)	25	76	60	161
Cape Conran	54		7	Yeerung River	36	108	76	220
Golden Beach	55		-					
McLoughlins Beach	59		-					
Point Hicks	72		10 11	Mueller River Thurra River	38	112	82	232
Corringle	87		-					
Cape Howe	89		-					
Cape Howe / Mallacoota	89		16	Mallacoota	78	230	178	486
Gabo Island	90	96hr						
Sydenham Inlet	99	Planned Phase – Project Implementation						
Croajingolong (West)	101		12	Wingan Inlet	45	130	98	273
Croajingolong (East)	114		13 14 15	Shipwreck Creek Bekta River Davis Creek	84	245	189	518
East Gippsland	171							
Bega Valley	235		17 18 19 20 21 22 23	Wonboyn River Bittangabee Bay Woodburn & Saltwater Creeks Fisheries Creek Towamba River Boydtown Creek Nullica River	74	218	167	459
Clonmel Island	276		-					
Snake Island	296							
Corner Inlet	299		1	Corner Inlet	86	251	202	539
Wilsons Promontory (NE)	323		-					
Eurobodalla	338		-					

Shoreline Receptor	hrs. to impact (>100 g/m²)	Phase of Response	TRP Activated	Trained personnel based on TRPs			
				Trained	General	Special	Total
Montague Island	340		-				
Wilsons Promontory (East)	341		-				
Shoal Haven	734		-				

7.3.2 Shoreline protection

Strategies and resource needs for shoreline clean up have been assessed based on the shoreline type within each sector of the coastline with >100 gm/m^3 predicted shoreline loading based on stochastic modelling outputs. An indication of the level of resources required is provided using spill resource calculations. The spill resource calculations provide an indication of the levels of resources required to respond based on a number of estimates and assumptions, taking into account best practice and utilising detailed data on the shorelines involved. A detailed explanation of the resource calculations is provided in Section 7.3.3. The figures provided represent a target resource estimate and can be applied across a variety of scenarios. The resource numbers indicated are for response on a continuous basis and do not reflect a rapid initial demand for resources with slow taper off over the duration of the response. Initial resource requirements can be scaled up as required to achieve quicker results on a smaller scale response, while a larger scale response may continue to escalate.

As well as the numbers provided through resource calculations, a capability assessment for shoreline clean up was conducted based on stochastic modelling using the maximum predicted shoreline loading for each sector. This method provides an understanding of the potential resource needs for all sectors of coastline that maybe impacted, however, significantly over estimates the resources likely to be required for an individual incident.

The modelling provides an indication of the outer limits of a response however additional resources may be required for locations beyond the identified Sub-LGAs. These resources have not been considered within the scope of the capability assessment and TRP's have not been prepared for locations with low probability of moderate shoreline impact (<10%) or where shoreline impact is predicted in a minimum contact time of >7 days. Operational monitoring will be used to inform the need for incident specific response plans for these locations.

7.3.3 Shoreline clean up capability methodology

Oil spill trajectory modelling based on worst case discharge scenarios has been used to calculate shoreline response capability requirements. The modelling outputs included a summary of potential shoreline impacts, probability of impact, maximum load on the shoreline, length of shoreline affected at > 10 gm/m^2, and the length of shoreline affected at > 100 gm/m^2.

A resource ccalculator was designed using the resultant shoreline impacts, lengths of shoreline affected, degree of oiling, and best practice spill response tactics and resourcing estimates to undertake those tactics. Calculations have been based on no other interventions, such as containment & recovery or chemical dispersants, being utilised and so represent resource needs significantly greater than would be likely in an actual response where a range of strategies would be utilised in combination.

The ExxonMobil Oil Spill Response Field Manual provides industry best practice guidelines and information which was utilised as the basis for typical resources required for particular strategies and recognised shoreline types.

The resource calculator spreadsheet uses the shoreline type to determine the response strategies, then calculates the recommended number of personnel and equipment to enact the strategy. Each shoreline type may require a combination of response strategies, so each strategy per shoreline type was assigned a likelihood percentage that it would be applied. The below table shows the shoreline type, along with the strategies and percentages used in the calculations.

Table 7-8 Shoreline Clean-up – Shoreline type and methodology used for clean-up

Shoreline Type	***Clean-up method to be used***	***% of oiled shoreline type for clean-up method***
1. Manmade structures	flooding HP, ambient-water flushing hot water flushing natural recovery	10% 60% 10% 20%
2. Rocky Shores (sheltered)	natural recovery	100%
3. Rocky platform / cliff face (exposed)	natural recovery	100%
4. Sandy beach (mixed sand/shell)	manual removal - light oil manual removal - heavy oil flooding mechanical removal natural recovery	20% 30% 20% 10% 20%
5. Tidal flats (mud/sand) and vegetative salt/brackish marsh	LP, ambient-water flushing natural recovery	30% 70%
6. Shallow seagrass	natural recovery	100%
7. Reef	natural recovery	100%
8. Mangroves	LP, ambient-water flushing natural recovery	20% 80%

The Resource Calculator provides for calculating resources for an entire stretch of affected coastline to be cleaned in a single day. Corresponding numbers for the resources required were very large and do not take into account:

(1) External factors that act as constraints on the effective deployment or control of these resources, or secondary damage that they could cause, or

(2) The fact that these resources take time to ‘ramp-up.’

Given that a response will commence with a first strike plan and escalate from lower initial numbers to those required to manage the clean-up in the longer term, having 100% of resources from an early stage is an inaccurate representation of resources required.

In a large-scale response it has been demonstrated that 100% of the resources are unable to be applied within 7 to 10 days as the sheer numbers and the scale of the operation would be unmanageable.

Based on examples of incidents, estimates, and physical comparison of the numbers that would be both manageable and reasonably required to clean up known sections of beach within the boundaries of the modeling output, a conservative figure of 10% was applied to the calculator to best represent a target resource estimate across the variety of scenarios.

The outputs from the calculator, while indicating the level of possible resources, are not an upper limit and the reduction factor can be adjusted. Scaling up a response quickly to affect a faster resolution for a smaller scale spill can be managed through multiplication of the original resource requirements. A more accurate, detailed analysis of the resources required during an escalating response could be produced by the Logistics Section.

The table below shows estimates from the ExxonMobil Oil Spill Field Manual versus output of the Resource Calculator and indicates a reasonable correlation between the two:

Table 7-9 Comparison between ExxonMobil Oil Spill Field Manual resource recommendations and Resource Calculator output requirements for SHA shoreline cleanup

<table>
<tr><th colspan="6">ExxonMobil Oil Spill Response Field Manual</th></tr>
<tr><td></td><td></td><td colspan="2">lightly oiled shoreline</td><td colspan="2">heavily oiled shoreline</td></tr>
<tr><td rowspan="3">No timeframe</td><td>Resources Required</td><td>2 km</td><td>100 km</td><td>2 km</td><td>100 km</td></tr>
<tr><td>Workers</td><td>10 - 20</td><td>100 – 200</td><td>50 - 100</td><td>500 – 1,000</td></tr>
<tr><td>Foremen</td><td>1 - 2</td><td>10 - 20</td><td>5 - 10</td><td>50 - 100</td></tr>
<tr><th colspan="6">Resource Calculator</th></tr>
<tr><td></td><td>Resources Required</td><td colspan="2">2 km shoreline</td><td colspan="2">100 km shoreline</td></tr>
<tr><td rowspan="4">10% capacity per day for duration of spill</td><td>Foreman</td><td colspan="2">2</td><td colspan="2">44</td></tr>
<tr><td>Worker</td><td colspan="2">10</td><td colspan="2">420</td></tr>
<tr><td>Specialised Operators</td><td colspan="2">2</td><td colspan="2">26</td></tr>
<tr><td>Total People</td><td colspan="2">14</td><td colspan="2">490</td></tr>
<tr><td></td><td colspan="5"></td></tr>
<tr><td rowspan="4">100% capacity per day for duration of spill</td><td>Foreman</td><td colspan="2">10</td><td colspan="2">440</td></tr>
<tr><td>Worker</td><td colspan="2">84</td><td colspan="2">4200</td></tr>
<tr><td>Specialised Operators</td><td colspan="2">6</td><td colspan="2">260</td></tr>
<tr><td>Total People</td><td colspan="2">100</td><td colspan="2">4900</td></tr>
</table>

If relative short section of shoreline is affected, then a valid response would be the allocation of 100% of the resources available to clean it up in a day. Conversely, if hundreds of kilometres of shoreline is affected, the allocation of 100% of the required resources immediately would present a number of practical problems that could not be overcome including:

- Exceeding span of control through the divisions, branches, and clean up teams at one or more Forward Operating Bases and staging areas,
- Overloading the carrying capacity of the regional community support resources (Accommodation, messing, ablutions, etc.),
- Overloading the response location environment (Crowded carparks, traffic on beaches, etc.), and

- Under COVID-19 conditions, exceeding the ability to maintain social distancing or accommodation/isolation arrangements.
- Managing the safety and security of personnel.

Contained within the Resource Calculator is an interface which requires the input of length affected and % of shoreline type for the affected area. From these it then produces a resource list, as per below table.

Total Oiled Shoreline (km)	21
% of shoreline cleaned in 1 day.	10
Shoreline Type	**%**
Manmade Structures	0
Rocky Shorelines (Sheltered)	0
Rocky Platform / Cliff Face (Exposed)	40
Sandy Beach (mixed sand/shell)	60
Tidal Flats (Mud/Sand) and Vegetative salt/Brackish Marsh	0
Shallow Seagrass	0
Reef	0
Mangroves	0
Shoreline Total	100.00%

	Resources Needed				
Personnel	**14 days**	**28 days**	**56 days**	**84 days**	**112 days**
Foreman	3	6	6	6	6
Worker	27	54	54	54	54
Specialised Operators	2	4	4	4	4
Total People	**32**	**64**	**64**	**64**	**64**
Vehicles/Vessels					
ATV	3	3	3	3	3
Truck/Vehicle	3	3	3	3	3
Vac Truck	0	0	0	0	0
Tank Truck	0	0	0	0	0
Front End Loader/Dozer	1	1	1	1	1
Scraper/Grader	1	1	1	1	1
Dump Truck	1	1	1	1	1
Landing Craft/Barge	1	1	1	1	1
Oil Spill Equipment					
Pump	1	1	1	1	1
Skimmer w/pump	1	1	1	1	1
Inshore Boom (m)	46	46	46	46	46
Sorbent Boom/snares (m)	46	46	46	46	46
Washing Unit (Low Pressure)	0	0	0	0	0
Pressure Washer	0	0	0	0	0
Steam Cleaner	0	0	0	0	0
Shoreline flushing pipe length (m)	8	8	8	8	8
Manual Equipment					
Shovels	43	86	172	258	344
Rakes	43	86	172	258	344
Picks	43	86	172	258	344
Plastic Bags	2142	4284	8568	12852	17136
Wheel Barrows	9	18	36	54	72

Figure 7-2 Oil Spill Response Calculator extract

Analysis of the modelling allowed determination of shoreline areas that would be impacted. Potential impact zones with a probability of impact <10% were eliminated, leaving a comprehensive list of sites with 10% or greater probability of being impacted at or above the 10 g/m^2.

Comprehensive shoreline surveys using Google Earth imagery and cross referenced with a VIC DOT layer of shoreline types was used to categorise the shoreline makeup in each Sector. Shoreline types specified were then utilised in the calculations to determine strategies and resourcing requirements.

The combined total for the sectors affected in each scenario provides total resources required for that scenario.

In addition to personnel, the Resource Calculator estimates other required resources and is based on a number of assumptions. Taken from the ExxonMobil Oil Spill Response Field Manual for each of the recommended response strategies, the following have been applied relating to the personnel columns:

- Based on 14 day shifts of workers
- Based on oil stranding daily/Continuously
- Based on 1 primary crew and a replacement crew in rotation.
- Based on heavily oiled shorelines and resources required per km.
- Based on average of shoreline strategies for each shoreline type (described previously)

For the vehicles & vessels section, all totals were based on the resources required for a stretch of shoreline affected based on the strategy used as described above in the master calculations spreadsheet.

For the Manual equipment section:

- Shovels based on 1 per worker per week

- Rakes based on 1 per worker per week
- Pick based on 1 per worker per week
- Plastic bags based on 50 per worker per day (50*20 kg each = 1000 kg/day)
- Wheel Barrows based on 1 per team (5 persons) per week then replaced

Adjustment of the percentage of shoreline cleaned per day, or the percentage of shoreline strategy applied to a given shoreline type, the resultant resources required will change, however it must be pointed out that where a range has been presented, we have erred to the worst-case scenario to produce conservative figures.

Table 7-10 Shoreline Protection and Clean-up Resource Availability

Task	Resource requirement	Resource Availability	Expected Timeframe
O3: Shoreline Assessment Personnel	SCAT teams will comprise of: • 2 shoreline assessment trained (SAT) personnel (for primary TRPs) or 1 shoreline assessment trained person (for secondary TRPs) • State representatives • Operations and safety officers as needed Trained shoreline assessment personnel needed: • 3 in first 48 hrs • 9 in hours 48 – 96 • Up to 18 post 96 hrs Based on simultaneous implementation of all TRPs described in Table 7-7.	OSMP consultant has the following trained personnel available to respond. • 12 SAT personnel available within 24 hrs. of activation. • An additional 12 SAT staff are available within 14 days of activation. SAT personnel completing SCAT assessments in the first 48hrs will be made available to complete more assessments once initial SCAT assessments are complete.	12 field personnel to be mobilised within 24 hours of activation. Additional 12 field personnel to be mobilised within 14 days of activation.
Vessels for Shoreline Protection	12 x vessels* based on SHA crude WCDS.	Gippsland Ports have suitable vessels for nearshore response activities. Agreements with third party vessel operators to supply additional vessels. Vessels of opportunity are available at Barry Beach Marine Terminal, Lakes Entrance, Port Albert, Port Welshpool, Port Franklin and Mallacoota and Hobart.	6x vessels required within 24 hours
Shoreline Protection Response Equipment	3,250 m x Shoreboom 2,025 m x Near shore boom 1 x Offshore skimming system Anchor kits + accessories Based on simultaneous implementation of all TRP's from Merriman Creek (Vic) through to Nullica River (NSW)	<u>Esso/AMOSC (Geelong)</u> Shoreboom: 2,025m Near Shore boom: 6500m Anchor kits + accessories: 47 Offshore skimming system: 8 Temporary waste storage: 12 <u>AMOSC/AMSA/Mutual Aid</u>: Shoreboom: 5750 m	Esso/AMOSC (Geelong) <48 hours of request for service. Additional equipment <5 days of request of service

Task	Resource requirement	Resource Availability	Expected Timeframe
		Near Shore boom: 10975 m Anchor kits + accessories: 112 Offshore skimming system: 30 Temporary waste storage: 65	Refer to Quick Reference Guides for scenario specific requirements
Shoreline Protection Response Personnel	Up to 518 personnel based on the SHA crude WCDS.	State Response Team >200 trained personnel. AMOSC Core group <120 trained personnel (inc Esso). Esso Esso responders Agreements in place with labour hire companies.	State Response Team Notify <2 hours of incident. Initiate request to call out core group <3 hours.
Shoreline Clean-up Personnel	Up to 1926 personnel based on the SHA crude WCDS	Esso Esso responders Agreements in place with labour hire companies. AMOSC Core group >140 trained personnel (including Esso). State Response Team >200 trained personnel.	<48 hours of request for service. Refer to Quick Reference Guides for scenario specific requirements
Waste Management	Onshore waste management arrangements.	Esso have a contract with a third party waste management service to provide transport and disposal of solid and liquid wastes.	<48 hours of service request.
ExxonMobil	Personnel Trained and capable Esso IMT Regional Response Team	Available to fulfil roles in accordance with requirements and timeframes in OPEP Table 3-2. Remote support <12 hours from notification. In-country support <72 hours from notification.	

Table 7-11 Shoreline Protection and Clean-up Capabilities

Good Practice	Adopted	Control	Rationale
Pre-arranged access to personnel for O3 Shoreline Assessment	✓	Agreement with Third Party OSMP Consultant for personnel and resources required for implementation of OSMP.	Esso has an agreement in place with a Third Party OSMP Consultant who can provide access to personnel with the required training/experience for SCAT under OSMP module O3.
Pre-arranged access to vessels for shoreline protection.	✓	Agreement with third party suppliers for provision of additional vessels.	Agreement with supplier of vessel services has provision for the supply of additional vessels.

Good Practice	Adopted	Control	Rationale
Shoreline protection and deflection equipment available.	✓	Esso owned shoreline protection and deflection equipment.	Esso owns its own equipment that can be utilised for shoreline protection and clean up
Pre-arranged access to additional equipment for shoreline protection and deflection.	✓	AMOSC agreement.	Agreement with AMOSC provides access to additional equipment for shoreline protection and clean up equipment
Pre-arranged access to additional labour.	✓	Personnel hiring agreements.	Esso has personnel hiring agreements in place which can be utilised to provide personnel for shoreline protection and clean up activities.
Pre-arranged Waste facilities.	✓	Agreement with waste management contractor.	Waste arrangements for removal of waste to approved disposal or treatment facilities in accordance with EPA requirements.
Pre-arranged Heavy Plant Equipment	✓	Agreement with contractor for heavy lift equipment	Agreement with third party provides access to heavy plant equipment for shoreline protection and clean up.
Pre-arranged access to personnel to support Tier III response activities.	✓	ExxonMobil Regional Response Team	ExxonMobil have a global team available to assist response for Tier III activities.

Table 7-12 Consideration of Additional/ Alternative/ Improved Capability for Shoreline Protection and Clean-up

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
Reconfigure and relocate equipment	Reduce mobilisation times.	Relocation of equipment will be costly. The current equipment location allows for rapid mobilisation to the priority shorelines which are most likely to be impacted based on modelling. Relocation of shoreline protection and clean up equipment will only bring minimal, if any, benefits in response capability. Esso has assessed that sufficient equipment is available in Tier I & II equipment stockpiles located in Victoria to support shoreline protection and response requirements during the initial response phase (first 48hrs).	Not adopted
Resource to implement shoreline protection strategies prior to minimum shoreline contact time.	Reduce environmental impacts to estuaries.	Stochastic modelling of 100 weather and current scenarios indicates a minimum time to shore of 20hrs (Lakes Entrance / Seaspray) at low threshold and 30hrs (Lakes Entrance) at moderate threshold, with other weather combinations indicating longer times to shore. Given the complexity of implementing tactical response plan at Lakes Entrance an estimated 103 personnel are required to implement the response strategies in up to five locations. Additional cost in maintaining response capacity of this size to implement TRP's prior to shoreline impact is disproportionate to the risk.	Not adopted

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
		Esso has assessed that sufficient equipment is available in Tier I & II equipment stockpiles located in Victoria to support shoreline protection and response requirements during the initial response phase (first 48hrs).	
Agreement with response company	Access to additional shoreline protection and clean-up equipment and personnel.	Esso owns equipment that can be used for shoreline protection and clean-up and has an agreement in place with AMOSC and OSRL to allow access to AMOSC/OSRL equipment. Esso can provide some of its own responders, has agreements in place with labour hire companies and has access to personnel from AMOSC core group and OSRL. The cost of having an agreement in place with additional response companies outweighs the small benefit that would come from such an agreement.	Not adopted
Additional agreements in place with monitoring providers	Access to additional personnel for implementation of O3 Shoreline Assessment	There would be added costs associated with having additional agreements in place and assessing and maintaining the capability to respond. While the length of shoreline to be assessed is significant, the number of field teams only needs to be enough to stay 2-3 days ahead of the shoreline operations (IPIECA, 2014) in order to support the effective and timely implementation of shoreline cleanup and protection. The Third Party OSMP Consultant has access to up to 24 staff with shoreline assessment experience. Logistics planning based on the SHA WDCS ~~and TWA P&A WCDSs~~ affected TRP's indicates that based on a scaling up of resources this would be sufficient for the implementation of the OSMP O3 module. The resources available through the existing agreement easily meet this requirement. In the case of a Level 3 incident, Esso would draw upon relationships and/or agreements with SCAT specialists that will be called upon on a best endeavours basis.	Not adopted
Increase number of trained personnel	Additional trained personnel available who could direct untrained laborers.	There is a significant cost associated with increasing the number of trained personnel and maintaining training status. Esso has access to AMOSC core group and State Response Team trained personnel in addition to agreements with labour hire companies which is sufficient to meet required the capability. Should additional personnel be required to support a response, just in time training can be utilised to train labourers and management staff for these laborers.	Not adopted
Agreements with vessel operators	Rapid and guaranteed access to vessels in the event of a spill.	As described above, Gippsland Ports can provide suitable vessels for nearshore response activities. Some agreements are in place with third party vessel operators to supply additional vessels. Capability assessment indicates that vessel requirements are able to be met so the costs	Not adopted

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
		of additional agreements with vessel operators are not justified.	
TRP / GRPs for the whole coastline	Increased understanding of capability requirements beyond the areas currently covered by TRPs.	TRPs have been developed for priority sites that are appropriate for shoreline response, covering a large stretch of coastline. TRP's are supported by the Shoreline Protection & Clean Up Plan which provides non-location specific guidance. Given the low likelihood for shoreline exposure beyond this area, the benefit of addition TRPs is considered minimal.	Not adopted

8. Oiled Wildlife Response

8.1 Response Option Description

Coastal areas are most likely to have the largest number of affected wildlife from an oil spill given that coastal areas provide habitat for breeding and foraging as well as protection from the elements. The scale of the impacts to wildlife does not correlate with the amount of oil spilled but is dependent on factors such as the timing and location of an incident, the product type, oceanography and weather patterns, and the corresponding movements of species that feed, nest or generally inhabit a particular area.

Oiled wildlife response (OWR) is a combination of activities with the objective to minimise the impacts of an oil spill on wildlife (such as birds, mammals and reptiles) by both prevention of oiling where possible and mitigating the effects on individuals following an oil spill incident.

Oiled wildlife response consists of a three-tiered approach involving:

- Primary: Situational understanding of the species/populations potentially affected (NEBA, SCAT, aerial surveillance);
- Secondary: Deterrence or displacement strategies (e.g. hazing, visual flags/balloons, barricade fences; or pre-emptive capture); and
- Tertiary: Recovery, construction of operating unit, transport, waste management, veterinary examination, triage, stabilisation, cleaning/washing, rehabilitation, release.

The oiled wildlife response may lead to the survival of vulnerable wildlife populations. The level of oiled wildlife response required can be scaled up or down based on the predicted number of wildlife affected.

Site-specific wildlife reconnaissance would be undertaken on foot, by vehicle, by vessel or by aircraft, and should be conducted across areas potentially at risk. This activity is key to gather baseline information on the numbers of wildlife present and/or individuals oiled.

Information from the reconnaissance is then used to inform the NEBA and assist the IMT to select suitable response options.

Ongoing surveillance and monitoring may utilise surveillance and monitoring aircraft and vessel resources.

An Area Response Plan has been developed for Gabo Island which provides guidance on initial oiled wildlife response actions. A number of Species Response Plans have also been developed to provide responders with guidance on appropriate response strategies for individual species.

Advantages of oiled wildlife response:

- Protection / hazing methods may minimise oiling of wildlife;
- Reduces hydrocarbon exposure to wildlife e.g. cetaceans, birds

Disadvantages of oiled wildlife response:

- Presents safety risks;
- Distress caused to wildlife;
- Labour intensive
- Increase in environmental impacts e.g. generates waste and potential for secondary contamination

8.1.1.1 Protection of nesting/haul-out sites

Sensitive areas may be protected from the spill using protection and deflection (Section 7.1.1) and containment and recovery (Section 6) response options.

8.1.1.2 Hazing and deterrence

Hazing and deterrence are terms used for activities that are undertaken to prevent or discourage wildlife from entering contaminated sites or move them away from areas that are likely to be affected by the spill. A potential negative outcome of hazing can be disturbance of target biota with potential for behavioural impacts and stress-related responses.

8.1.1.3 Pre-emptive capture

Pre-emptive capture is the capture of healthy, unoiled wildlife and transporting them to an area that is unlikely to be affected by the spill. Potential negative impacts of this method is inadequate capture techniques that have potential to cause stress, exhaustion or injury to wildlife and pre-emptive capture could cause undue impacts when oiling is not certain.

8.1.1.4 Triage assessments

Depending on the numbers and species of animals affected from the spill, a triage assessment may be required to ensure the best chance of long term survival. The assessment process is typically undertaken by a veterinarian under direction of the state agency.

8.1.1.5 Rehabilitation centres for oiled wildlife

Rehabilitation methods have been developed that aim to effectively reverse the effect of oiling, and return the health of an oiled animal back to an assumed pre-oiling state. The key stages associated with rehabilitation are:

- Capture;
- Transportation;
- Stabilisation;
- Decontamination;
- Conditioning; and
- Release.

Potential negative impacts of wildlife rehabilitation are inefficient techniques at any of the above key stages can have the potential to cause injury, stress and pressures to wildlife.

8.1.2 Waste management

OWR generates large volumes of waste contaminated with hydrocarbon attributed to large volumes of water associated with cleaning, washing and rehabilitating the oiled wildlife. Estimated volumes are provided in Table 8-1. Refer to Section 9.3 for waste handling.

Table 8-1 Estimated Waste Types and Volumes

Waste Type	Waste Volume	No. of Units	Estimated Volume
Waste Water	1 m^3 per unit (1 unit per bird)	50[1]	50 m^3
PPE	5 kg per unit	50[1]	250 kg, ~2 m^3

[1]Number of units based upon a Level 3 incident as described in DPAW (2014). This was considered to provide a suitable indication as to the number of units potentially exposed in lieu of any other appropriate estimation tool.

8.1.3 State Government Agencies

In response to a spill, an Oiled Wildlife Response will be led by the respective state response agency.

The State Governments of Victoria, Tasmania and New South Wales will ultimately decide, through their control agencies, how oiled wildlife spill response operations will occur on these shorelines, however, Esso will make the Shoreline Protection Plan and Tactical Response Plans and resources to support the response available.

8.1.3.1 Victoria

The DELWP (Department of Environment, Land, Water and Planning) has primary responsibility for wildlife impacted by marine pollution in Victorian state waters, which will be defined in the Victorian Emergency Wildlife Plan for Marine Pollution (under development) and the Victorian State Maritime Emergencies (non-search and rescue) Plan (SMEP).

8.1.3.2 Tasmania

The control agencies within Tasmania are Tasmanian Ports Corporation (Tasports) within port waters and the Tasmanian EPA outside of port waters. The state Tasmanian Marine Oil Spill Contingency Plan (TasPlan) is administered by the EPA and is integrated with the National Plan, the Tasports Oil Spill Contingency Plan, the Tasmanian Emergency Management Plan and the Tasmanian Oiled Wildlife Response Plan (WildPlan).

8.1.3.3 New South Wales

New South Wales Maritime is the control agency for marine pollution control incidents within state waters in accordance with the NSW State Emergency Management Plan (EMPLAN) and the NSW State Waters Marine Oil and Chemical Spill Contingency Plan which is a sub-plan of the EMPLAN.

If an incident occurs in Commonwealth waters and has the potential to enter state waters, State Agencies must be immediately notified and Esso will support and provide resources when requested. Esso personnel may also be deployed under the direction of State to undertake wildlife response activities, however only trained people can interact with oiled fauna species.

8.2 Environmental Impact Assessment of Oiled Wildlife Response

Nearshore OWR activities are likely to be undertaken on foot or by smaller crafts that may be launched from a number of different locations along the coastline. Access to the crafts, equipment and transit to the affected areas may disturb local fauna and sensitive habitats.

A number of activities associated with this response involve direct contact with wildlife e.g. pre-emptive capture, rehabilitation and cleaning animals, and their release. These activities will only be undertaken by trained personnel and vets.

Wildlife rehabilitation centres will be constructed where required and should include reliable systems for the supply of potable water, electricity, heating or cooling, and ventilation that meet the specific wildlife requirements as well as amenities for personnel including food and lodging, waste disposal and communications. The construction of rehabilitation centres for OWR activities will be controlled by the state agency.

One of the disadvantages of running a rehabilitation centre is that it generates large volumes of waste. There is also a potential for secondary contamination through the handling of oiled wildlife and waste generation. The oily waste must be handled and disposed of correctly to prevent secondary contamination from contaminated equipment and PPE.

8.2.1 Impact Assessment

An impact assessment for each aspect has been undertaken and additional controls have been identified to minimise the environmental impacts associated with Oiled Wildlife Response which are detailed within the ALARP assessment. Further assessment of the acceptability of these impacts in an oil spill response context and controls identified for minimising the environmental impact of OWR activities are described below.

Change to the function, interests or activities of other users that could occur through disruption to recreational and commercial activities from an OWR are provided in Table 8-2.

Table 8-2 Environmental Aspect: Physical Presence - Nearshore and Shoreline Users

Affected Receptor	Impact Assessment	Consequence Level
Socioeconomic (fisheries, tourism, culture)	Recreational fishing is generally concentrated inside the Gippsland Lakes or along the Ninety Mile Beach coastline. Additional vessels and personnel in the area may cause disruption to fishing activities. The movement of personnel, vehicles and equipment may disturb or damage aboriginal or non-aboriginal cultural heritage artefacts or sites. The mobilisation of equipment and personnel for OWR activities will be localised. The Oil Spill Tactical Response Plans (TRPs) detail socioeconomic sensitives for each location. The response activities will be in accordance with state response agency directions and Esso will provide the incident specific NEBA, TRPs and Shoreline Protections Plan and support where requested. The additional presence of vessels and personnel will only be short-term and in localised area for the response period. Once the response has been stood down nearshore socioeconomic activities can resume without disruptions, therefore the consequence of the impacts of the response activity is considered to be Level III.	III

The environmental impacts associated with containment and recovery operations include:

- Physical Presence – Interaction with Fauna and Flora
- Physical Presence – Sensitive and protected areas and parks
- Waste generation and Secondary Contamination

Table 8-3 Environmental Aspect: Physical Presence - Interaction with Fauna and Flora

Affected Receptor	Impact Assessment	Consequence Level
Physical Presence - Interaction with Fauna and Flora	The sandy beaches, mangroves and salt marshes in the Bass Strait provide potential foraging and breeding habitat for numerous bird species and benthic communities. The flora and fauna within these habitats have the potential to be disturbed due to large numbers of personnel accessing sites. Human presence may also cause ground disturbance due to construction of OWR rehabilitation centers. Fauna casualties from OWR techniques have the potential to result in an incremental effect on fauna populations (though oiling is expected to pose a greater risk). However, there is still the potential for the techniques to result in localised degradation of the environment or effects on individuals as opposed to population level. Hazing and pre-emptive capture of wildlife may result in the prevention of species accessing their preferred resources. This approach may also result in additional disturbance/handling stress without any benefit as many species tend to return to sites from which they have been moved. This may result in reduced reproduction and reduced energy stored for migratory animals. The incorrect handling of fauna may also result in increased stress levels and therefore increased fauna casualties. OWR activities will generally be conducted onshore. Wildlife rehabilitation centers will be set up in areas which have site access, electricity and amenities for personnel including food and lodging,	III

Affected Receptor	Impact Assessment	Consequence Level
	waste disposal and communications. The Shoreline Protection and Clean-Up Plan and site specific Tactical Response Plans include information on staging areas and access points, personnel shall use existing road and paths for access to minimise the impacts of increased foot and vehicle traffic. Fauna and flora interactions as a result of oiled wildlife response and shoreline clean-up techniques will be localised and short term. Flora and fauna are expected to recover quickly once activities cease.	
Physical Presence - Sensitive and protected areas and parks	Potential impacts to sensitive and protected areas may be impacted from OWR activities. There is a potential that personnel may have to travel through sensitive areas to access wildlife or conduct hazing, wildlife deterrence activities. The OWR activities may adversely affect natural behaviors of biota, e.g. nesting of shorebirds and seabirds. Human presence may also cause ground disturbance due to construction of OWR rehabilitation centers. The mobilisation of equipment and personnel for OWR activities will be localised. The Oil Spill Tactical Response Plans (TRPs) detail environmental sensitives for each location. Temporary exclusion zones can be set up to avoid sensitive areas. The environmental consequence to sensitive marine areas is assessed as localised and short term, it will recover quickly once activities cease.	III
Waste Management and Secondary Contamination	Wildlife response activities, specifically running a rehabilitation center, generates large volumes of waste. There is a potential for secondary contamination through the handling of oiled wildlife and waste generation. The Esso Bass Strait Oil Spill Response Waste Management Plan, details requirement for selecting waste management options and equipment and storage to be utilised to prevent secondary contamination. The Shoreline Protection and Clean-Up Plan and site specific Tactical Response Plans include information on staging areas and access points. The generation of waste will be short-term and is localised for the response period, therefore, the consequence of the impacts of the response activity is considered to be Level III.	III

Table 8-4 Acceptability of Environmental Impacts from Oiled Wildlife Response

Factor	Demonstration Criteria	Criteria	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity	✓	All the aspects related to oiled wildlife response have been evaluated as having the potential to result in a maximum Level III consequence.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	All oil spill response activities are implemented with the aim of reducing the overall environmental impact. Mobilising an OWR is an inherent part of minimising the impacts from an oil spill incident on wildlife.
Legislative and other Requirements	Legislative and other requirements have been identified and met.	✓	Legislation and other requirements have been considered as relevant and include: • OPGGS Act 2006;

			• Protection of the Sea (Prevention of • EPBC Act; • Wildlife Act 1975 (Vic); • Nature Conservation Act 2002 (Tas); and • National Parks and Wildlife Act 1974 (NSW).
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed control measures are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist".
	Meets ExxonMobil Environmental Standards.	✓	There is no standard related to oiled wildlife response, however the controls proposed meet the strategic objectives of the Upstream Environmental Standards.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives.	✓	Proposed control measures meet: • OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and • OIMS System 8-1 objective to clearly define and communicate OI requirements to contractors. • OIMS System 10-2 objective to ensure effective response to emergencies and business disruptions that threaten the safety, security and health of the public, contractors and employees, the environment, asset integrity, and critical business operations
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised.

Table 8-5 ALARP Demonstration of Potential Impacts of Oiled Wildlife Response

ALARP Decision Context and Justification	Decision Context A Oiled wildlife response activities are standard practice for hydrocarbon spills to minimise the impacts resulting from an oil spill on wildlife. There is a good understanding of potential impacts from oiled wildlife response activities. This response option would be supported by an incident specific NEBA. All activities undertaken in state waters will be led by the state control agency. Good Practice control(s) have been identified to ensure environmental impacts associated with mobilising this response are reduced to ALARP, these controls will be implemented by the State Control Agency in a response scenario and have been included in the OPEP. Esso believes ALARP Decision Context A should apply.		
Good Practice	**Adopted**	**Control**	**Rationale**

NEBA completed prior to conducting OWR operations.	✓	Incident specific NEBA.	The NEBA supports the implementation of the response strategies, and an operational NEBA is undertaken throughout the emergency response.
Minimise impacts to coastal environmental sensitivities.	✓	Primary & Secondary Shoreline Tactical Response Plans (TRPs).	Shoreline Protection Plan & Tactical Response Plans (TRPs) that consider local environmental sensitivities and habitats are provided to the control agency.
Incident specific Waste Management Plan.	✓	Bass Strait Oil Spill Response Waste Management Plan.	The Esso Emergency Response Waste Management Plan will assist in the development of an incident specific Waste Management Plan.
Ensure daily OWR operations are recorded (numbers, type and status of fauna)	✓	Daily OWR Records	Daily logs and records of oiled wildlife response operations demonstrate that OWR was deployed safely, effectively and following consideration of environmental conditions.
Exclusion zones established	✓	Exclusion zones	The OPEP requires that exclusion zones are put in place which consider health and safety and environment risks. These exclusion zones are determined in consultation with the state control agency.

8.3 Capability Assessment of Oiled Wildlife Response

A detailed capability assessment has been undertaken to ensure that Esso has access to sufficient resources to complete oiled wildlife response activities in a timely manner. The assessment concluded sufficient resources are available within acceptable timeframes to conduct this response.

Oiled wildlife is led by the state government and a variety of organisations will provide resources to assist the response, therefore

Table 8-6 details the resources available by organisation.

Table 8-6 Oiled Wildlife Resources Availability

Organisation	Resource Availability	Expected Timeframe
DELWP	<u>Resources</u> 1 x OWR Kit Bairnsdale) 1 x OWR Kit (Colac) 1 x OWR Kit (Port Phillip) 1 x OWR Kit (Warrnambool) 1 x State-wide Trailer <u>Agreement - Phillip Island Nature Park</u> 6 x staff - Wildlife emergency response. 17 x Wildlife Team Leaders. 5 x IMT Members. Approx. 45 volunteers – Collection/Facility Operations/Rehabilitation. Approx. 20 staff – Animal Feeding.	DELWP will make the decision to stand up resources which are based in Victoria. They are expected to be available <24 hours from request for services.
ExxonMobil	<u>Personnel</u> 6 x Esso Australia IMT members with OWR training Regional Response Team - OWR Core Team 12 x Trained Personnel	Remote support <12 hours from notification.

Organisation	Resource Availability	Expected Timeframe
		In-country support <72 hours from notification.
AMOSC	Resources 2 x OWR Containers (Geelong and Fremantle). 4 x OWR Box Kits. Personnel OWR Coordinator 18 x OWR Industry Team Contingency Agreements Memorandum of Understanding with Phillip Island Nature Park Call off Contract with DWYERtech NZ. A minimum of two personnel teams, to fulfil role of facilities manager and facilities coordinator.	Geelong container available onsite <24 hours of request for services. Kits would be available at site <24 hours of request for services. OWR Coordinator <24 hours OWR Industry Team <48 hours DWYERtech available <24 hours of AMOSC request for service.
OSRL	Resources 3 x OWR Search and Rescue kits 1 x OWR Intake and Triage kit 4 x Cleaning and Rehabilitation kits 1 x Wildlife Rehabilitation Unit 50% of the above inventory is available during an incident. Agreements Sea Alarm 1 x Full time availability of one Sea Alarm expert for advice and potential mobilisation to the affected site. 1 x Full time availability of one Sea Alarm expert for advice and response support. This expert will not be mobilised but provide advice and support from Sea Alarm office in Brussels or OSRL Premises.	Singapore based equipment can be mobilized to Melbourne airport <72 hours. Can be activated 24/7 as part of a wider OSRL mobilization.
AMSA	Resources 4 x OWR Containers Personnel National Plan: State/NRT Personnel (>100 persons)	Available through NATPLAN. Containers process approximately 100 units per day. Deployment of such resources to the Gippsland region would be expected to take 48-72 hours (road travel) from request for services.
NSW Maritime	Resources 1 x OWR Container	Available through NATPLAN. Containers process approximately 100 units per day. Deployment to the Gippsland region would be expected to take 48-72 hours (road travel) from request for service.
WA Department of Biodiversity and Attractions	Resources 1 x OWR Container	Deployment to the Gippsland region would be expected >72 hours (road travel) from request for service.
Waste Management Contractor	Onshore waste management arrangements.	Esso have a contract with a third party waste management service to provide transport and disposal of solid and liquid wastes.

Organisation	Resource Availability	Expected Timeframe
		4,500 m^3 bulk hard waste (soil/sand). 3,000,000 L of liquid waste (oil in water).

Table 8-7 Oiled Wildlife Resources Availability

Good Practice	Adopted	Control	Rationale
Pre-arranged access to equipment and personnel to support OWR.	✓	Agreement in place with AMOSC.	Agreement with AMOSC provides resources and equipment required for OWR activities.
Pre-arranged access to equipment and personnel to support OWR.	✓	Agreement in place with OSRL.	Agreement with OSRL will provide equipment and personnel for OWR activities.
Pre-arranged access to personnel to support oiled wildlife response.	✓	ExxonMobil Regional Response Team	ExxonMobil have a global team available for OWR activities.
Agreement with waste contractor in place.	✓	Agreement with waste management contractor.	Waste arrangements for removal of waste to approved disposal or treatment facilities in accordance with EPA requirements.

Table 8-8 Consideration of Additional/ Alternative/ Improved Capability for Oiled Wildlife Response

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
Develop OWR Management Plan for the Bass Strait.	Reduced time to implement strategy.	Regulations establish that the State is responsible for management of wildlife impacted by marine pollution and the State has established plans and arrangements for this hazard. In consultation with State agencies, Esso has developed an oiled wildlife area response plan for Gabo Island and also Species Response Plans to provide supplementary information for management of oiled wildlife.	Not Adopted.

9. Waste Management

9.1 Response Option Description

The response to an oil spill often results in the rapid generation and accumulation of large quantities of oily waste. Waste generated from an oil spill response may come in many forms including; oily solid and liquid wastes, contaminated equipment and wash water from recovery activities and a range of mixed consumables required by the response team and activities.

Emulsified oil, oiled sand, gravel and entrained debris can increase the volume of waste to many times the volume of oil originally spilt. This waste often exceeds the capacity of the locally available waste management infrastructure.

The quantity of waste produced from a spill is influenced by many factors, principally the quantity of oil spilled, the environmental fate of that oil and the clean-up strategy and techniques adopted.

Waste management within Australia is regulated and managed by each state independently through each states Environmental Protection Agency (EPA). The majority of waste management activities associated with an oil spill response from a Bass Strait operation would be undertaken within Victoria.

9.2 Impact Assessment of Waste Management

Impacts from the containment and recovery of waste offshore and from clean-up of shorelines impacted by oil have been described in Section 6.2 and Section 7.2 respectively.

Accidental loss of waste during recovery, transport and disposal activities may result in secondary contamination. Secondary contamination is the spread of oil to otherwise unpolluted areas via response activities associated with people, transport and equipment. Secondary contamination could lead to pollution of the environment adjacent to storage areas or runoff of waste into waterways.

The Esso Bass Strait Oil Spill Response Waste Management Plan, details requirement for selecting waste management options and equipment and storage to be utilised to prevent secondary contamination. The Shoreline Protection and Clean-Up Plan and site specific Tactical Response Plans include information on staging areas and access points (refer Section 9.3.2 for details).

The generation of waste will be short-term and is localised for the response period, therefore, the consequence of the impacts of the response activity is considered to be Level III.

Table 9-1 Acceptability of Environmental Impacts from Waste Management

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity	✓	The impacts associated with generation of waste during oil spill cleanup activities have been evaluated to have a potential Level III consequence.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	The potential impact associated with this aspect is limited to a localised short-term impact, which is not considered as having the potential to affect biological diversity and ecological integrity.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The proposed control measures align with the requirements of: • OPGGS Act 2006. • Emergency Management Act 2013 (Vic). • Emergency Management Act 1989 (NSW). • Emergency Management Act 2006 (Tas). • Wildlife Act 1975 (Vic).

Factor	Demonstration Criteria	Criteria Met	Rationale
			• EPBC Act. • Wildlife Act 1975 (Vic). • Nature Conservation Act 2002 (Tas). • National Parks and Wildlife Act 1974 (NSW). • Environment Protection Act 2018 (Vic) • Environmental Management and Pollution Control Act 1994 (Tas)
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed control measures are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist".
	Meets ExxonMobil Environmental Standards.	✓	The responsible management of waste collected from oil spills meets the Upstream Waste Management Standards which calls for consideration of the waste hierarchy. Further, the use of piles meets expectations of the Upstream Water Management Standard The Upstream Water Management Standards and standards for appropriate disposal of contaminated water.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives.	✓	Proposed control measures meet: • OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and • OIMS System 8-1 objective to clearly define and communicate OI requirements to contractors. • OIMS System 10-2 objective to ensure effective response to emergencies and business disruptions that threaten the safety, security and health of the public, contractors and employees, the environment, asset integrity, and critical business operations
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised.

Table 9-2 ALARP Demonstration of Environmental Impacts from Waste Management Activities

ALARP Decision Context and Justification	Decision Context A Waste management is a standard practice resulting from hydrocarbon spills cleanup. There is a good understanding of potential impacts from waste management activities and the regulatory requirements to manage waste in accordance with State based regulations. Good Practice controls have been identified to ensure environmental impacts associated with mobilising this response are reduced to ALARP. These controls

	will be implemented by the state led control agency in a response scenario and have been included in the OPEP. Note that the response must be led by State Control Agencies, with Esso providing support and resources when requested. Esso believes ALARP Decision Context A should apply.		
Good Practice	**Adopted**	**Control**	**Rationale**
Implement measures to minimise secondary contamination at temporary storage locations	✓	Implement measures to minimise secondary contamination at temporary storage locations	In order to minimise the potential impacts from secondary contamination at waste storage locations, each hot zone temporary holding site will have • bunding adequate to hold the daily bagged totals • will be initially sampled to establish baseline 'clean' levels for final restoration • access for waste removal vehicles to transit from cold to hot zones

9.3 Capability Assessment of Waste Management

A detailed capability assessment has been undertaken to ensure that Esso has access to sufficient resources available to manage waste as a result of spill clean up operations (both offshore containment and recovery (Section 6) and shoreline protection and clean-up (Section 7)) to ensure that waste is removed from clean-up sites and disposed of in a timely manner.

The availability of resources is assured through contractual arrangements with waste handling and processing providers, response agencies, industry bodies and labour hire organisations. Incident response planning is done in accordance with the Esso Waste Management Plan. These good practice measures are summarised in Table 9-3 with additional considerations shown in Table 9-4.

Table 9-3 Waste Management Resources Availability

Good Practice	Adopted	Control	Rationale
Pre-arranged access to vessels for waste management	✓	Agreement with third party suppliers for provision of additional vessels.	Agreement with supplier of vessel services has provision for the supply of additional vessels.
Pre-arranged access to additional equipment for waste management	✓	AMOSC agreement.	Agreement with AMOSC provides access to additional resources and operational personnel for shoreline protection and clean up equipment. Temporary waste storage, decontamination stations, PPE stockpile containers and transfer pumps are included
Pre-arranged access to additional labor.	✓	Personnel hiring agreements.	Esso has personnel hiring agreements in place which can be utilised to provide personnel for waste management activities.
Reduction of solid waste volumes	✓	Training / induction of response personnel in shoreline cleanup operations	Waste volumes can be reduced through provision of just in time training to response personnel with oversight by experienced personnel.
Pre-arranged Waste facilities.	✓	Agreement with waste management contractor.	Waste arrangements for removal of waste to approved disposal or treatment facilities in accordance with EPA requirements.

Good Practice	Adopted	Control	Rationale
			Pre-planning for transport, temporary storage and scale up of waste management arrangements.
Pre-arranged Heavy Plant Equipment	✓	Agreement with contractor for heavy lift equipment	Agreement with third party provides access to heavy plant equipment for shoreline protection and clean up.
Pre-arranged access to personnel to support Tier III response activities.	✓	ExxonMobil Regional Response Team AMOSC Team & Core group OSRL	ExxonMobil have a global team available to assist response for Tier III activities. ExxonMobil has an agreement with AMOSC and OSRL to provide highly trained personnel from within AMOSC's core group and staff.
Access to Shoreline Response Trailers	✓	2 x Shoreline Response Trailers owned by Esso	Trailers equipped with shoreline cleanup first strike equipment available for immediate deployment.
Incident specific Waste Management Plan.	✓	Bass Strait Oil Spill Response Waste Management Plan	The Esso Emergency Response Waste Management Plan will assist in the development of an incident specific Waste Management Plan.

Table 9-4 Consideration of Additional/ Alternative/ Improved Capability for Waste Management

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
Additional, Alternative, Improved Controls were considered but none identified.			

9.3.1 Waste capability methodology

Waste management capability assessment is based on deterministic outcomes from modelling of the worst case discharge from the facility/field with the worst-case potential. For solid waste the Seahorse workover scenario of 127 kbbl total spill volume representing a LOWC from a crude well close to shore (Refer Volume 2, Section 6.7.2), is the scenario which resulted in the largest volume of oil ashore and is used to demonstrate capability of waste handling from shoreline cleanup. For liquid waste the Marlin (MLA) workover scenario of 519 kbbl total spill volume representing LOWC from a crude well in the northern fields (Refer Volume 2, Section 6.7.2), is the scenario which results in the largest spill volume and is also the scenario used to demonstrate capability of dispersant application in Section 5.4.

The assessments are conservatively based on an unmitigated amount of oil stranding on the shoreline for solid waste and for surface oil for liquid waste. While unmitigated volumes have been used for the capability assessments, the volumes of stranded oil and surface oil will be significantly reduced in a response situation through the use of offshore response strategies such as dispersant application which will reduce the amount of surface oil for offshore containment and recovery and will therefore also result in reduced volume of oil being stranded ashore and the quantity of waste generated as a result of cleanup.

Whereas capability has been demonstrated on this SHA scenario, Esso's capability to respond is not limited to the areas described by this scenario. The response capability is designed to enable response to the areas that could be affected by a spill from the Bass Strait activities described in Volume 2.

Capability for handling waste is determined for the duration of the spill scenario (98 days), however it is important to note ~~noting~~ that:

- Victoria DoT will have a major influence on waste streams after the first 7 days,
- Victoria EPA and EM VIC will also impact waste stream decisions after 7 days.

Solid Waste

Table 9-5 shows the volume and distribution of oil ashore resulting from the SHA workover WCDS (deterministic model scenario [run 35]) which represents the largest volume of oil ashore for the Bass Strait operations activity. The total volume (without bulking) to be stranded ashore is predicted to be 3,123 m^3 affecting 14 sub-Local Government Areas, with a total shoreline length of 254 kms. The minimum time to contact is predicted to be 36 hrs, occurring at Ninety Mile Beach. Each location has been assessed based on the shoreline type (sand, rock, cliff, tidal flats etc.) to determine what proportion can be accessed to clean. The volume of oil ashore accessible to clean has been calculated based on the accessibility and a bulking factor of 10 times the volume of oil has been incorporated to allow for volume of sand and other material which is collected with the oil. The resources required to respond to this scenario spill are shown in the SHA Quick Reference Guide (QRG) (Refer Appendix A, OPEP). The QRG shows 1614 workers would be allocated for beach clean-up (807 per shift) and the table shows the workers distributed proportionally to the volume ashore at each location. Based on the assumption that the oil is stranded at a constant rate over the 98 day scenario period, the volume of waste generated per day is shown, assuming that 1 m^3 per/person/day is able to be cleaned per guidance provided in the ExxonMobil Oil Spill Response Field Manual. The volume of waste generated determines the number of trucks required per day at each location (based on 25T capacity per truck); for this worst case scenario this amounts to 13 trucks per day.

Table 9-5 Total shoreline waste volumes that may occur from a WCD Scenario (SHA crude deterministic [run 35]) - Basis for calculating resource needs

Location	Minimum time before shoreline accumulation (hours) >100 g/m²	Max vol ashore deterministic m³	Max length shoreline contacted deterministic	Sand %	Rock % (Sheltered)	Rock % (Cliff face/reef)	% Accessible	Avg onshore loading per day m³	Avg onshore bulked to clean/day m³	No of people cleaning	m³ cleaned /day	Number of trucks needed per day	Days till full truck load collected
Ninety Mile Beach	36	10.13	3.00	100	0	0	100	0.1	1.0	3	1	0.04	24.19
Seaspray	42	46.08	24.00	100	0	0	100	0.5	4.7	12	5	0.2	5.32
Ocean Grange	43	426.77	25.50	100	0	0	100	4.4	43.5	110	44	1.7	0.57
Lakes Entrance (West)	45	278.17	27.00	100	0	0	100	2.8	28.4	72	28	1.1	0.88
Woodside Beach	45	16.24	12.00	100	0	0	100	0.2	1.7	4	2	0.1	15.08
Lakes Entrance	47	159.14	19.50	100	0	0	100	1.6	16.2	41	16	0.6	1.54
Lake Tyers Beach	50	371.31	21.00	98	0	2	100	3.8	37.9	96	38	1.5	0.66
Marlo	53	543.74	18.00	100	0	0	100	5.5	55.5	141	55	2.2	0.45
Cape Conran	54	147.24	13.50	50	0	50	50	1.5	15.0	38	15	0.6	1.66
Golden Beach	55	126.06	21.00	100	0	0	100	1.3	12.9	33	13	0.5	1.94
Point Hicks	72	222.93	19.50	90	0	10	90	2.3	22.7	58	23	0.9	1.10
Corringle	87	448.28	18.00	100	0	0	100	4.6	45.7	116	46	1.8	0.55
Sydenham Inlet	99	280.55	19.50	100	0	0	100	2.9	28.6	72	29	1.1	0.87
Croajingolong (West)	101	46.35	12.00	80	0	20	80	0.5	4.7	12	5	0.2	5.29
Totals		**3123**					**91%**	**3123**	**31,230**	**808**	**318**	**13**	

OWR Waste

Where oiled wildlife response (OWR) is required, it is managed by the state response agency with support from Esso through provision of resources such as fully equipped OWR containers including washing / storage facilities. The need for waste handling would be managed via the state. Based on Section 8.1.2 which identifies that for a Level 3 incident spill, per this scenario, an estimated total of 52 m^3 of OWR waste would be generated across the affected locations. This corresponds to approximately 2 – 5 trucks for handling non-flammable liquids over the duration and 1-2 trucks for solid wastes. Temporary storage would be provided at beach head control points at each impacted location and transferred to layup areas such as Longford if required before being transported to waste processing facilities.

Liquid Waste

The volume of liquid waste is calculated based on the volume of oil which is estimated to be recovered through the offshore containment and recovery strategy as described in Section 6 above. The resourcing requirements in each Quick Reference Guide (QRG) show the number of strike teams required for each spill, for the MLA Crude scenario (the scenario which results in the largest spill volume) used here to demonstrate capability, the QRG shows four strike teams will be needed to respond for offshore containment and recovery. The maximum volumes of oil and waste recovered is based on the highest volume (upper range) of oil that is predicted to be recovered each day by each strike team; therefore, the maximum volume of liquid waste per day is predicted to be 160 m^3, equivalent to 160 kL (40 m^3 x 4 strike teams). Table 9-6 shows the total waste liquid volume accumulated daily and over the duration of the spill scenario.

Table 9-6 Total liquid waste volumes that may occur from Containment & Recovery - Basis for calculating waste resource needs

Containment and Recovery	**Liquid Volume**		**Transport Needs**
	Lower range kL	Upper range kL	Trucks per day needed (Upper range)
Cleanup volume/ strike team/ day	5	40	
Number of strike teams	4	4	
Volume collected per day	20	160	6
Number of days of cleanup*	96	96	
Total amount liquid waste collected over 96 days	**1920**	**15360**	

*A conservative 96 days of cleanup is assumed with 4 strike teams, in practice the first strike team will be available within 48 hrs however the activation of 4 teams will take longer therefore reducing the volume of oil that is recovered in the initial days of the response.

Transport, storage and processing - VIC

Transportation of waste is provided by the waste contractor; Table 9-7 below shows the availability of trucks per day and their capacity. Table 9-8 provides additional equipment and temporary storage which is available within 48 hours and can be used in layup or temporary storage sites to facilitate the waste management process. Additional equipment will be hired by contractors through equipment hire services.

Table 9-7 Solid and Liquid Transport Capability Victoria

Transport**	Liquids		Solids
	ISO (Flammable)	Non Flammable	
Trucks per day	10	10	20
Volume per truck	30 kL	20 kL	25 T
Volume transported /day (1 trip each)*	300 kL	200 kL	500 T

** The number of trucks per day is based on 48 hrs+ from spill occurring, trucks are available prior to the 48 hrs but are not likely to be needed in that timeframe

*Capability is conservatively based on one trip per day per truck, multiple trips would be possible depending on the specific logistics requirements, although not needed for the scenarios presented in this EP.

Table 9-8 Additional equipment and temporary storage capability

Additional Resources	Resource		Available within 48 hours
Equipment	Cleanaway	EPA approved walking floor truck 24 t loads	3
	Fergusons	Rough terrain forklift	2
Temporary solid waste storage	Esso	Plastic drums (~200 liter)	70
		Skips approx. 15 m^3 (not suitable for transport when loaded)	5
	Cleanaway	Bulk bins hook lift 10 t pay loads;	2
Temporary liquid waste storage	Esso	Fast Tanks	5
		Stainless Steel IBC (2 kL)	15
		Plastic drums (~200 liter)	70
	AMOSC	Lancer barge (25 kL capacity)	4
		Deck Bladders (25 kL capacity)	6
		Viko Tanks (13 kL capacity)	2
		Fast Tanks	6
		Collapsible storage tank	4
		IBC (1 kL)	13
	Cleanaway	Poly Tanks (50 kL)	10

Accumulated waste is taken directly to designated waste facilities where waste can be stored and processed. Where waste volume exceeds processing rate, it is stored at the waste facility (where possible) or at offsite storage facilities where it can be progressively transported for processing.

Table 9-9 shows the storage and processing facilities available to Esso to handle solid and liquid waste. The table shows that waste facilities have capacity to store solid waste (up to 33,500 T) on site, however not liquid wastes. Where daily liquid waste volume generated exceeds the daily liquid waste processing capacity, the waste must be stored at offsite facilities and transported from there for processing. Esso's Long Island Point (LIP) facility has the capacity to store up to 63,000 kL in two separate tanks.

Table 9-9 Solid and Liquid Storage and Processing Facilities in Victoria

Facility	Liquids			Solids		
	Storage	Processing	Trucks/day	Storage	Processing	Trucks/day
	kL	kL /day	able to be processed	Tonne	Tonne/day	able to be processed
Waste Facility						
Dutson Downs		40	1.3			
Cleanaway Campbellfield		60	2			
Cleanaway Laverton		60	2			
Cleanaway Dandenong		60	2	200	60	2.4
Veolia Treatment Plant		60	2	2500	50	2
Renex Treatment Facility				25000	215	8.6
Environpacific				5500	725	29
Storage Facility						
Esso LIP Crude Oil Tank	60000					
Esso LIP Ballast Tank	3000					
Barry Beach Marine Terminal				300		
Total	**63000**	**280**	**9**	**33500**	**1050**	**42**

*The Esso Longford site can temporarily store solid waste subject to attaining an amendment to its existing licence for emergency purposes. Two separate areas have been identified that could store minimum 300 m^3 and 25,000 m^3 of solid waste respectively. Longford site would be used if required (primarily as a layup facility before transporting to waste facility) and its storage capacity would be in addition to that shown in the table above.

Figure 9-1 shows the storage and processing locations in Victoria in relation to the potential locations for shoreline accumulation per the modelling scenario. In this case, and as shown in Table 9-5, the highest volumes are accumulated at Marlo, Corringle, Ocean Grange and Lake Tyers.

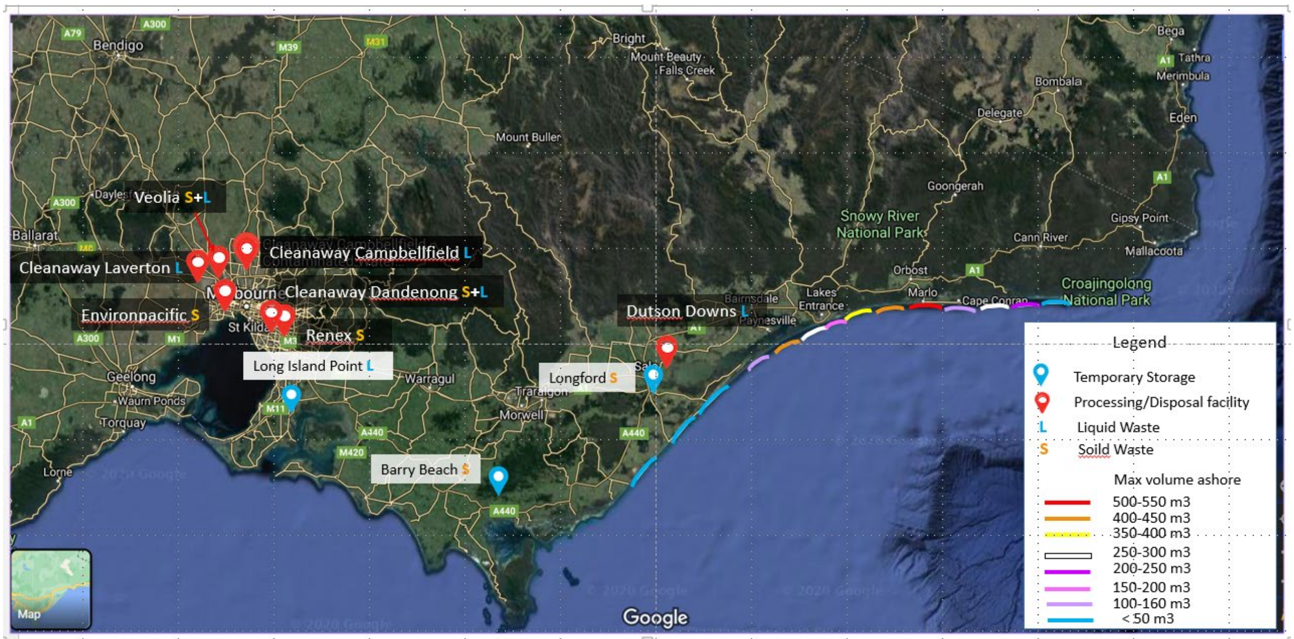


Figure 9-1 Waste storage and processing facility locations in Victoria, proximity to accumulation sites from worst case oil ashore scenario

Transport, storage and processing- NSW

If a spill reached shorelines in NSW, waste from beach clean-up would need to be processed in NSW. As offshore containment and recovery occurs near the source of the spill, it is unlikely that oily water waste collection/processing would be needed in the NSW. Table 9-10 shows transport availability in NSW. The locations available for storage and processing solids and liquids are shown in Figure 9-2. Processing capacity for NSW is shown in Table 9-11.

Table 9-10 Solid and Liquid Transport Capability NSW

Transport	Liquids		Solids
	ISO (Flammable)	Non Flammable	
Trucks per day	4	10	20
Volume per truck	20 kL	20 kL	25 T
Volume transported /day (1 trip each)	80 kL	200 kL	500 T

Figure 9-2 Waste storage and processing facilities in NSW

Table 9-11 Solid and Liquid Storage and Processing Facilities in NSW

Facility	**Liquids**			**Solids**		
	Storage	Processing	Trucks/day	Storage	Processing	Trucks/day
	kL	kL /day	able to be processed	Tonne	Tonne/day	able to be processed
Waste Facility						
Envirogard Erskine Park					3000	120
Suez Kemps Creek					460	18
Unanderra Oily Water Treatment Plant	640	80	4			
Port Kembla Oily Water Treatment Plant		300	15			
Windsor	100	200	10			
Total	**740**	**580**	**29**		**3460**	**138**

9.3.1.1 Capability Summary Solid Waste

The theoretical worst case spill scenario for oil ashore (SHA workover scenario which represents the largest volume of oil ashore) predicts that 32,230 m^3 of bulked solid waste would accumulate over 14 locations on the Gippsland coast (refer Table 9-5). The daily quantities of waste collected is equivalent to the predicted amount of oil deposited ashore at each location each day, as sufficient workers for cleaning have been allocated to clean all of the oil stranded per day. Based on the daily quantity of waste collected each day (318 m^3), the number of trucks required for transporting the waste per day is 13 (refer Table 9-5). With twenty trucks being available each day for transportation of solids (refer Table

9-7), waste can be transported directly to waste processing facilities (refer Table 9-9) which have the capacity to process up to 1050 m^3 per day, or store up to 33,500 m^3 if processing was not limited. As also shown in Table 9-9, additional temporary or layup storage of solids is available at Longford, or Barry Beach Marine Terminal, closer to the affected receptor sites providing additional logistical flexibility (Refer Figure 9-1).

9.3.1.2 Capability Summary Liquid Waste

The QRG for the MLA theoretical spill scenario (the scenario which results in the largest spill volume) allocates four strike teams to enact offshore containment and recovery. The number of strike teams have been used to determine the upper range of liquid waste that would be generated, indicating that 160 kL/day would need to be handled each day for 96 days (refer Table 9-6). Liquid waste will be shipped to Barry Beach Marine Terminal where it will be offloaded directly into trucks. Table 9-6 shows that 6 trucks per day are needed to transport 160 kL, which can all be transported by ISO trucks able to handle flammable liquids if this was needed, without having to use the non-dangerous goods rated trucks. Esso would work with the transport company and the authorities to classify the liquid waste stream, however it is unlikely that all waste would be classified as flammable given it would be mixed with seawater and would have undergone some degree of evaporation and weathering.

As the waste facilities are able to process up to 280 kL/day (9 truckloads) of liquid waste, the waste would be taken directly to the facilities for processing without needing temporary storage (refer Table 9-9). If processing was not able to occur at this rate, liquids would be temporarily stored at the Esso LIP facility until such time as it could be processed.

9.3.2 Response Planning

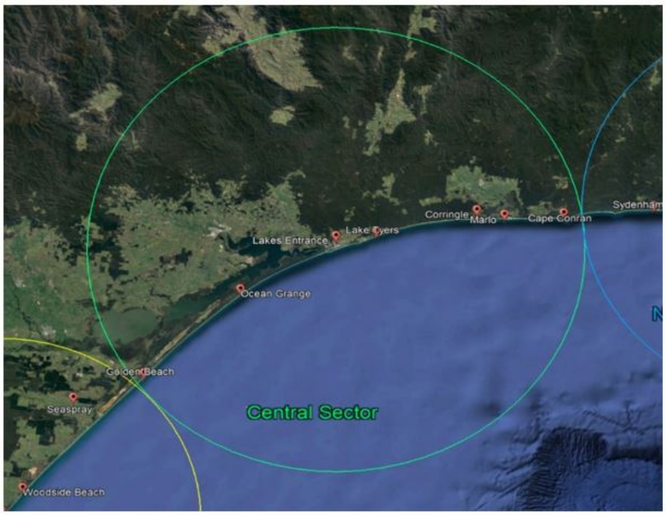
The Waste Management Plan outlines collection and transfer methodology for the two primary waste streams – oil/water liquid stream (from offshore C&R activities) and oil/solid stream (from shorelines) as has been shown in Section 9.3.1 above. The waste plan would be enacted from Day 2 of a response to allow operational response strategies to be employed. This is consistent with the resourcing needs being shown from the 48 hr timeframe. Unmitigated marine oil spill modelling would be conducted at the time of the spill to evaluate shoreline response clean up requirements based on time of impact and geographic sectors that would likely be impacted by ~~an~~ the unmitigated marine oil spill, producing a listing and analysis of the receptors, likely volume ashore with time of predicted impact and accessibility at each location per the information provided in Table 9-5. This will form the basis for the development of incident specific response plans outlining shoreline sector designations, expected waste volumes and waste transfer processes for specific locations in each sector. The shoreline sector designations provide an overview of the scale of the response and allow a breakdown of the tasks into segments. Location specific plans within each sector describe the waste transfer process at that location with consideration given to site specific access points, hotspot storage locations and site specific equipment and resource needs. Figure 9-3 to Figure 9-5 show the overall sector designations and the central sector example for the SHA workover scenario (which represents the largest volume of oil ashore per Section 9.3) and an example of a corresponding Tactical Response Plan for one of the locations within the sector. While Esso has assessed resource requirements and has plans and necessary agreements in place to be able to execute those plans, the State Control Agency will ultimately determine how waste will be managed for any waste collected in State waters and shorelines. Through use of liaisons, Esso will coordinate access to plans and resources for waste management.

Waste Management – Overview FOR SHA WORKOVER SCENARIO	
Proposed Activity	Waste generated by shoreline clean-up teams will be collected from multiple coastal locations, transferred to centralised distribution points and then transported to designated waste treatment facilities.
Shoreline Sector Designations	The following sectors have been identified as likely to be impacted by oil from the Seahorse workover WCDS spill well location: **Sector 1 - Central Sector** **Sector 2 - South West Sector** **Sector 3 - North East Sector**

Sector Boundaries	
Map Extent	**Lat/Long**
Clonmel Is	**38°42'41.93"S 146°42'9.00"E**
Cape Howe	**37°30'8.17"S 149°58'42.51"E**
Potential Impacted Shoreline (kms)	**275 kms**
Predicted Total Waste Volume (WCD)	**31,230m³**

Figure 9-3 Example overall sector designations for SHA workover WCDS

Overview – Central Sector



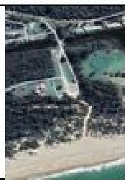
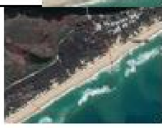
Sector Boundaries	
Map Extent	**Lat/ Long**
Golden Beach	**38°13'41.69"S 147°22'28. 11"E**
Cape Conran	**37°48'44.00"S 148°43'41.85 E**
Potential Impacted Shoreline (kms)	**165 kms**
Predicted Waste Volume (WCD – 96 days)	**23,040m³**

Expected waste volumes (Per day)			
Lakes Entrance	16m³	Lake Tyers Beach	28m³
Golden Beach	13m³	Marlo	55m³
Ocean Grange	44m³	Cape Conran	15m³
Lakes Entrance West	28m³		
Corringle	44m³	**Total**	245m³

Figure 9-4 Example Central sector designation for SHA workover WCDS

Lakes Entrance

Waste Transfer process	
1	Waste accumulated on shoreline is transported to collection points along each beach. Depending on local logistics and access for vehicles between shoreline locations, additional collection points may be used between beaches and vessel collection point.
2	Waste at collection points are transferred out of the hot zones and onto the vehicle access points at each decontamination station – vehicles are jet-washed to eliminate secondary contamination (into a bunded area) and the vehicle departs.
3	Hazardous waste is stockpiled at laydown area adjacent to both Lakes Entrance heads for transfer to B-Double.
4	Waste is either transferred to the nominated treatment facility or onto Longford waste temporary holding.

Logistics	Location	Requirements/Considerations
Primary Collection Point/s	Lakes Entrance beach (~34km) Various locations	Accessible by vehicle
Transfer Point/Laydown (Lakes Entrance East)	Eastern Beach road West of golf course 	Manual handling/mechanical lift capacity for offloading. Waste transfers to B-Double for onward movement to designated Waste Treatment Facility.
Transfer Point/Laydown (Lakes Entrance West)	Ocean Grange Track Beach Access Track 	4WD vehicles and trailers to be used for transport on Ocean Grange track, no B-Double access. Only road access to Lakes Entrance West.
Waste Treatment Facility	Primary: Dutson Downs waste treatment plant Secondary: Cleanaway Longford Gas Plant temporary storage	Pending acceptance of waste.
Personnel transfer	Great Lakes Airport (YGRL)	Regional airfield 6km North of Lakes Entrance
	Vehicle from Melbourne	~320km 4hrs.

Equipment	Units	Requirements/Considerations
25kg heavy duty plastic bags	1,760	= (27m^3/day x 40 per 1m^3) + (16m^3/day x 40 per 1m^3)
B-double truck and trailer combination	2	30t (m^3) per unit. 2 loads required per day.
Rough terrain forklift	2	One either side of the Inlet for each collection area.
UTV	2	Personnel transport in addition to 4WD and local vehicles
FOB/Sector command post	1	Facility portable office, or cabin onsite to coordinate movements

Figure 9-5 Example Tactical Response Plan for one response location within the Central sector for the SHA workover WCDS *continued overleaf*

<table>
<tr><th colspan="4">1. Waste Management: Lakes Entrance</th></tr>
<tr><td>Desired Outcome</td><td colspan="3">Teams access the shoreline using appropriate vehicles/vessels at pre-determined sites (from SCAT recommendations) to remove waste accumulated by shoreline clean-up teams.</td></tr>
<tr><td rowspan="20">Conduct</td><td rowspan="2">Transport</td><td colspan="2">Vehicles/vessels capable of providing access to Lakes Entrance for team or teams of personnel (up to 25 pax) to manually or mechanically remove accumulated waste.</td></tr>
<tr><td colspan="2">Vehicle (or potentially vessels) capable of transporting teams and equipment to and from pre-determined sites, and waste (plastic bag waste) from Lakes entrance West to Lakes Entrance East collection point.</td></tr>
<tr><td colspan="3">Equipment</td></tr>
<tr><td rowspan="3">Offshore – for all vessels</td><td colspan="2">Waste storage – sealed skips or containers capable of holding collected hazardous waste</td></tr>
<tr><td colspan="2">Decontamination equipment – full decontamination of personnel and shoreline equipment</td></tr>
<tr><td colspan="2">HSSE and First Aid equipment (May include specialist safety equipment related to the treatment of issues related to local region or environment)</td></tr>
<tr><td rowspan="6">Onshore</td><td colspan="2">Waste storage – heavy duty plastic bags (Max 25lt)</td></tr>
<tr><td colspan="2">Shoreline response tools and equipment (appropriate collection and cleaning equipment will require validation prior to or during deployment)</td></tr>
<tr><td colspan="2">Site setup and site management equipment</td></tr>
<tr><td colspan="2">Communications equipment (UHF, VHF, Satphone, Spot gen3, BGAN)</td></tr>
<tr><td colspan="2">HSSE equipment including PPE and First Aid</td></tr>
<tr><td colspan="2">Decontamination equipment – personnel decontamination to reduce potential for secondary contamination as personnel leave the shoreline.</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td rowspan="4">Personnel</td><td>Divisional Command</td><td>HSE Safety Officers</td></tr>
<tr><td>Sector Commands</td><td>General labourers</td></tr>
<tr><td>Team Leads</td><td>Local Ranger</td></tr>
<tr><td>Decontamination Teams</td><td></td></tr>
<tr><td>Method</td><td colspan="2">All-terrain vehicles are used to transport personnel and equipment to pre-determined locations along the Lakes Entrance shoreline. Teams transfer by day from vehicle to the shoreline and conduct waste recovery operations. Welfare, equipment movements and waste collection are managed with ongoing vessel & vehicle support and teams are returned to the mainland overnight.</td></tr>
</table>

Figure 9-5 Example Tactical Response Plan for one response location within the Central sector for the SHA workover WCDS

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Appendix A – Bass Strait Oil Pollution Emergency Plan

Esso Australia Resources Pty Ltd

Bass Strait

Oil Pollution Emergency Plan

Document Number: AUGO-EV-ELI-001

OIMS MANUAL - DOCUMENT CONTROL DETAILS

TITLE:	Bass Strait Oil Pollution Emergency Plan
REVISION:	Rev 8.2
REVISION STATUS:	NOPSEMA RFFWI for SHA / TWA P&A EP
DATE OF ISSUE:	28 August 2023
DOCUMENT ADMINISTRATOR:	Environment & Regulatory Advisor
OIMS DOCUMENT CATEGORY:	Special Controls Mandatory
MPI CLASSIFICATION:	None
RETENTION PERIOD:	IND, MIN ACT+10+LC (Indefinite, Retain while current + 10 years, then obtain Law Clearance prior to disposal)
MASTER STORAGE LOCATION:	UDocs (OIMS 10-2 Emergency Prep & Response)

APPROVALS:

Rev 8.2	Name	Position	Signature	Date
Prepared by:	Natasha Carroll	EP&R Coordinator	On File	28 August 2023
Approved By:	James Buckingham	Offshore Asset Manager	On File	28 August 2023

Endorsed / approved by Esso Australia Pty Ltd, for and on behalf of Esso Australia Resources Pty Ltd.

REVISION HISTORY

Rev	Revision / Status	Date	Prepared by	Approved By
8.2	Updates to State Government Departments Update to Wells ERP reference	24 August 2023	Natasha Carroll	James Buckingham
8.1	Minor change SSDI /State Control Agency/updates to scope	9 December 2020	Sean Hine	
8	NOPSEMA RFFWI for SHA/TWA P&A EP	27 August 2020	Sean Hine	Simon Kemp
7.1	Administrative change to Sections 5.9 & 6.3 and inclusion of SHA / TWA P&A QRGs	2 July 2020	Sean Hine	
7	NOPSEMA RFFWI for Bass Strait Operations EP	10 June 2020	Sean Hine	Simon Kemp
6	NOPSEMA RFFWI for WTA P&A EP	20 February 2020	Sean Hine	Simon Kemp
5	Issued for NOPSEMA acceptance as part of the WTA P&A EP – only Appendix D revised	31 December 2019	Sean Hine	Simon Kemp
4	NOPSEMA RFFWI(2) for JUR Drilling EP – only Appendix D revised	30 December 2019	Sean Hine	Simon Kemp
3	NOPSEMA OMR for JUR Drilling EP – only Appendix D revised	2 December 2019	Sean Hine	Simon Kemp
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B	For Internal Review	2 September 2019	Sean Hine	Simon Kemp
0	Issued for NOPSEMA acceptance as part of the JUR Drilling EP	19 August 2019	Sean Hine	Simon Kemp

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Definitions and Abbreviations

ADIOS2	Automated Data Inquiry for Oil Spills 2
ALARP	As low as reasonably practicable
AMOSC	Australian Marine Oil Spill Centre
AMOSPlan	Australian Marine Oil Spill Plan
AMSA	Australian Maritime Safety Authority
BBMT	Barry's Beach Marine Terminal
BIA	Biologically important area
CA	Control agency
CG	AMOSC core group
CMR	Commonwealth Marine Reserve
CoP	Common Operating Picture
DA	Described Area (see Volume 1 – Description of the Environment)
DEECA	Department of Environment, Energy and Climate Action
DPIPWE	Department of Primary Industries, Parks, Water and Environment (Tasmania)
DODI	Diamond Offshore Drilling Inc
DoEE	Department of the Environment and Energy (Cth)
DTP	Department of Transport & Planning (Vic)
DRET	Department of Resources, Energy and Tourism (Cth)
EAPL	Esso Australia Pty Ltd
EMBSI	ExxonMobil Biomedical Sciences Inc
EMD	Emergency Management Division (part of DTP)
EMMV	Emergency Management Manual Victoria
EP	Environment plan
EPA	Environment Protection Authority
EP&R	Emergency preparedness and response
ERM	Emergency response manual
ERR	Earth Resource Regulation (part of the DEECA)
ERT	Emergency response team
ESG	Emergency support group
EUL	Environment unit lead
EWMS	Esso Work-Method Statement
FWADC	Fixed-wing aerial dispersant capability
GOR	Gas–oil ratio
IAP	Incident action plan
IC	Incident commander
ICP	Incident command post

ICS	Incident command system
IMH	Incident management handbook
IMT	Incident management team
IPIECA	International Petroleum Industry Environmental Conservation Association
JSA	Job safety analysis
JSCC	Joint Strategic Coordination Committee
KEF	Key ecological feature
LIP	Long Island Point
LSC	Logistics Section Chief
LCM	Lead Country Manager
LOC	Loss of containment
LOWC	Loss of well control
MDO	Marine diesel oil
MENSRP	Maritime Emergency (Non-search and Rescue) Plan
MES	Monitoring, evaluation and surveillance
MOH	Medical and occupational health personnel
MNES	Matter of National Environmental Significance
NATIONAL PLAN	National Plan for Maritime Environmental Emergencies.
NEBA	Net environmental benefit analysis (Items of)
NES	National environmental significance
NM	Nautical mile (also M, nmi)
NOAA	National Oceanographic and Atmospheric Administration (USA)
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
OIM	Offshore installation manager
OSC	Operations section chief
OPEP	Oil Pollution Emergency Plan
OPGGSA	Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth)
OSA	Oiled shoreline assessment
OSMP	Oil Spill Monitoring Program
OSR	Oil spill response
OSRA	Oil Spill Response Atlas
OSRL	Oil Spill Response Limited
OSTM	Oil spill trajectory modelling
OWR	Oiled wildlife response
PCR	Production control room
PEAR	People, environment, assets, reputation
P&GA	Public & Government Affairs

PPE	Personnel protective equipment
PSC	Planning section chief
PSZ	Petroleum safety zone
POLREP	Pollution report form
POWBONS	Pollution of Waters by Oil and Noxious Substances Act 1987 (Cth)
RRT	Regional response team
SC	Section chief
SCAT	Shoreline clean-up assessment technique
SDS	Safety data sheet (formerly MSDS)
SERP	Victorian State Emergency Response Plan
SMV	Surveillance Monitoring and Visualisation
SO	Safety Officer
SSH&E	Safety, security, health, and environment
SITREP	Situational report
SITL	Situation unit lead
SITU	Situation unit of the incident management team
SMPC	State Marine Pollution Controller
SOPEP	Shipboard Oil Pollution Emergency Plan
SREC	Safety Resilience and Emergency Coordination (part of DTP)
TASPLAN	Tasmanian Marine Oil Spill Contingency Plan
TRP	Tactical response plan (see Volume 3)
WCDS	Worst Case Discharge Scenario
WOMP	Well operations management plan
WMP	Waste management plan
WMM	Waste management manual
WWV	ExxonMobil Drilling Worldwide Ventures
VM	Vessel Master

1 Spill Response Operations

This section of the plan details the actions that Esso will undertake in the event of a hydrocarbon spill resulting from an Esso activity.

All staff are to be guided by the spill response incident flow chart in Figure 1-1.

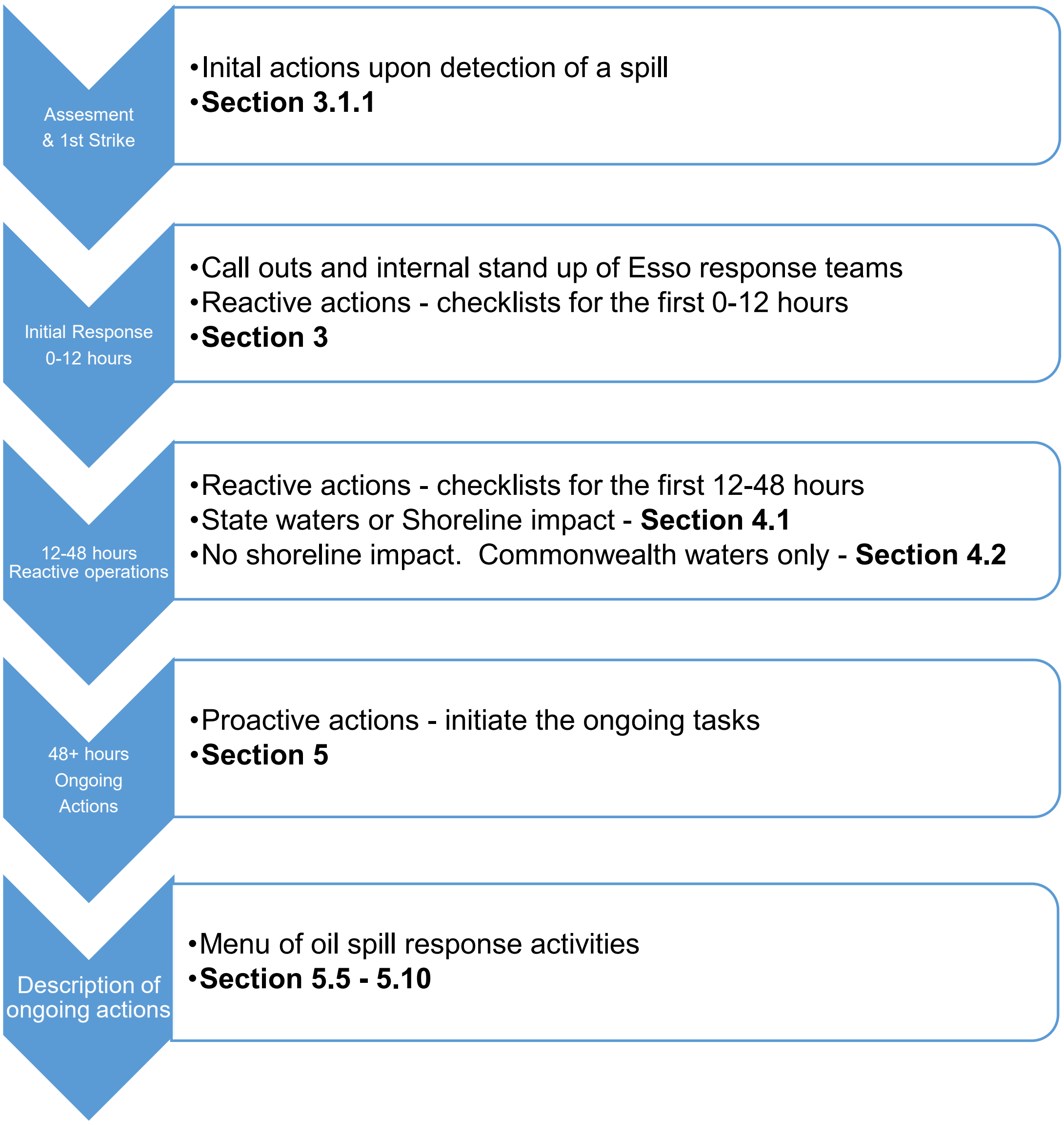


Figure 1-1 Spill Response Incident Flow Chart

Sustain spill response until termination end points (refer to Section 5) and environmental performance objectives are reached for each activity.

2 Quick Reference OPEP Information

2.1 Location

This OPEP applies to spills from petroleum activities linked to Esso's Gippsland Basin operations and project activities as described in Volume 2 (and Volumes 2a, 2b, 2c, 2d etc., hereafter referred to as Volume 2) of the Environment Plan.

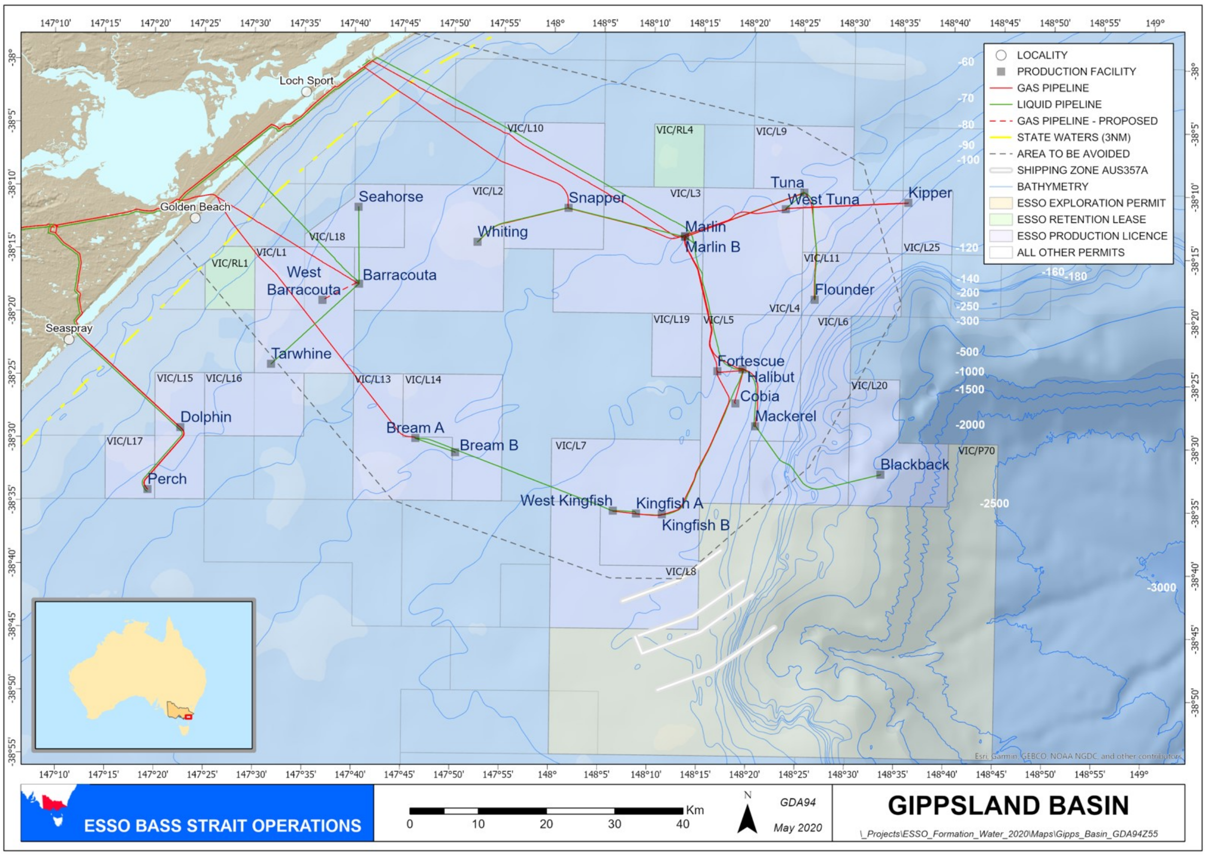


Figure 2-1 Asset Location

2.2 Potential Oil Types

- Condensates (Group I)
- Marine Diesel Oil (Group II)
- Light Crude (Group II)
- Persistent Crude (Group IV)

Properties of hydrocarbons used for modelling are detailed in Section 7.2.2.

2.3 Potentially Exposed Area

Stochastic spill trajectory modelling has been conducted to evaluate the effect of worst case discharge scenarios from Esso's Bass Strait petroleum activities.

In addition to the stochastic modelling, deterministic runs were also assessed and presented based on the following criteria;

1. largest volume of oil on shorelines;
2. longest length of shoreline contacted at or above 100 g/m^2 (actionable shoreline oil);

3. minimum time before contact to nearby shoreline by visible oil (0.5 g/m^2); and
4. largest swept area of oil on the sea surface above 10 g/m^2 (actionable sea surface oil).

The criteria listed above were determined for the “worst case” simulation between the modelled scenarios.

Appendix D - Quick Reference Guides provides maps and a descriptions of predicted impacts of the representative worst case scenarios.

An extensive description of the different types of sensitivities can be found in Volume 2 of the Environment Plan related to each activity.

3 Initial Oil Spill Response Actions – Assessment & Escalation 0–12 hours

3.1 Flowchart of Initial Processes

Upon detection of a spill, Esso will undertake a three-step process, as follows:

1. Assessment of Spill

↓

2. Notifications and Immediate Actions

↓

3. Stand Down or Monitoring or Escalation

Each step is outlined in greater detail below.

3.1.1 Assessment of Spill – Emergency Response Incident Management Teams

Upon detection of a spill, Esso will form a field-based Emergency Response Team (ERT), which will undertake the following actions:

- Begin a risk assessment in order to determine (and then execute) safety mitigations,
- Determine the size, bearing/trajectory and fate (weathering) of the spill,
- Judge the potential environmental impacts and the appropriate actions necessary to reduce those impacts,
- Execute any available source control options/first-strike response actions, and
- Notify the shore-based Esso duty IC of the incident await further instructions as to the appropriate actions to take.

The ERT is to use the following checklist as a way to direct these immediate steps.

Table 3-1 ERT Immediate Actions

ERT Immediate Actions			
Who	**What**	**Minimum time to implement**	**✓/✗**
Observer of Spill	Report the spill to the Offshore Installation Manager (OIM) or Vessel Master (VM).	ASAP	☐
OIM/VM	Secure operations, assess and report damage. Isolate spill source if it is safe to do so – implement pipeline de-pressurisation or leak response procedures. Refer to ERM V2-052-008 for response to unknown source.	ASAP	☐
OIM/VM	Ensure that all personnel are accounted for.	ASAP	☐
OIM/VM	Conduct a hazard assessment to determine the potential for fire, explosion, and hazardous/toxic vapours as well as to define the personal protective equipment (PPE) needed by responders.	ASAP	☐

ERT Immediate Actions			
OIM/VM	Implement spill mitigation measures to prevent further oil from entering the water, providing it is safe to do so. Activate the ERT as required.	ASAP	☐
OIM/VM	Report the incident to the Field Superintendent. The Field Superintendent is then to initiate upward internal communications to the Duty Incident Commander. Observe and include the following information in the brief: • Number of injuries. • Note ongoing immediate hazards to life (such as risk of fire or explosion). • Description of incident. • Location of the incident. • Status of source. • Time of incident. • People and assets involved in the incident. • Current field objectives/actions. • Details of support required from the Esso IMT.	ASAP	☐
OIM/VM	Observe and report on weather and sea states, including: • Current/tide-stream speed, direction and period • Wind speed, direction and period • Wave height and direction • Swell height and direction.	ASAP	☐
OIM/VM	Observe and determine the spill trajectory (manual estimation), noting: • The speed and direction of the spill.	ASAP	☐
OIM/VM	Observe and determine the likely spill type and volume: • Is the source contained, ongoing, isolated or stopped? • Provide a visual description of the slick (e.g. is it breaking up, floating, sinking, etc.) • What type of spill is it (diesel, gas, condensate, slops, light crude or waxy crude oil)? • Calculate/estimate the spill volume	ASAP	☐
OIM/VM	Observe and note any immediate sensitivities in the area at risk from the spill: • Note the presence of people, environmental sensitives (e.g. fauna, reef, etc.), as well as any of Esso's or other organisations' assets.	ASAP	☐
OIM/VM	Request helicopter overflight and commence regular surveillance of the spill. Evaluate spill weathering.	ASAP	☐
OIM/VM	Remain available to update the Offshore Incident Management Team.	Ongoing	☐
OIM/VM	Evaluate the incident and determine the incident classification/level based on the below national plan levels (refer to Table 3-3). Confirm this level with the on-call/duty Incident Commander.	ASAP	☐
OIM/VM	Report the incident to NOPSEMA as per Table 3-4.	ASAP and within 2hours	☐

Once the Duty IC has been notified of the spill, go to Table 3-2.

Table 3-2 IMT Immediate Actions

IMT Immediate Actions			
Who	What	Minimum time to implement	✓/×
Duty IC	Establish communications with the Platform/Vessel/ERT Leader, obtain situational awareness briefing and determine the next steps. Confirm the following details with the field-based team: • Incident details – what happened? • What are the current field operations? • What are the immediate incident objectives and priorities? • What support is required from the Esso IMT in order to execute the immediate objectives?	ASAP	☐
IC	Activate the Esso IMT – Deputy IC, OSC, PSC, LSC, SO and EUL, following which: • Provide an initial incident briefing to the Esso IMT • Commence the incident action-planning process • Commence the size-up of the incident • Establish incident response aim and objectives and offer support to the affected facility. • Begin working to meet incident and oil spill response objectives.	< 60 mins	☐
IC	Notify the ESG Leader of the incident and request ESG support as required.	ASAP	☐
IC	Notify SHE&S, P&GA and security of the incident.	ASAP	☐
IC	In conjunction with the PSC, EUL and the SHE&S team, determine and confirm the appropriate response level. Use the *Response Level Assessment* Table 3-3 below to drive this process.	4 hours	☐
IC, PSC and OSC	Determine the response required of Esso: • Stand down – no spill/no oil left • Level One – monitoring of site-based response until completion • Level Two or Three – significant field and IMT escalation with significant additional resources required.	5 hours	☐
Once ERT- and IMT-based assessment tasks are completed, move on to Section 3.1.2			

3.1.2 Notifications and Immediate Actions

Once a spill has occurred, the Esso IMT is required to complete several statutory notifications, which vary based on the spill level. Notifications and immediate actions are to be concurrently completed by different members and sections of the IMT.

As these tasks are completed, the Esso IMT should be aiming to mobilise resources in line with the following guide:

Table 3-3 Response Level Assessment & Resourcing Guide

Response Level Assessment

On the basis of information gathered by the ERT/IMT, and in conjunction with the PSC/SHE&S team, a spill level is to be determined using the following indicators:

Criteria	Level One Indicators	Level Two Indicators	Level Three Indicators
Type	Non-persistent oils (>50% loss after 24 hours)	Persistent oils (<50% loss after 24 hours)	Persistent oils (<25% loss after 24 hours)
Location	Located within a 3 NM radius of the spill location	Spreading/moving into adjacent waters, presenting a threat to state waters	Spreading/moving into state waters and shorelines
Direction/heading	Not moving/heading offshore	Heading onshore/towards state waters	
Spill status	Small single release	Ongoing/large single release	
Ecological impact	Isolated impacts/no impact; natural recovery expected within days/weeks	Significant impacts across a single area; natural recovery may take weeks/months	Significant impacts across a large area; recovery may take months/years
If any one of the above criteria are triggered, adopt the higher-level response until de-escalation can occur.			

Resourcing Guide by Level		
Level 1 Response	Level 2 Response	Level 3 Response
• Dealt with predominantly by the ERT, using existing Esso business-as-usual resources*. • Supported by Victoria-based Esso resources; may involve the use of AMOSC technical advice or resources. • Of short duration. • Requires Tier One (local) resources.	• Requires assistance external to the site and a formal command and control structure. • IMT and ERT stood up; planning 'P' process implemented as soon as possible. • ERT resources supplemented by AMOSC resources, Victoria State and NatPlan resources. • Of short or medium-term duration. • Potential for significant state government engagement (shoreline and P&GA). • Requires both Tier One and Tier Two resources.	• Requires expanded IMT and full use of ICS processes with multiple planning periods. • Planning 'P' process used fully. • Extensive external national and (potentially) global resources (both in terms of personnel and technical and equipment-based resources). • Results in a lasting campaign/project duration. • Requires significant state and Australian government engagement. • Tiers One, Two and Three resources mobilised.

**Esso activities involving other facility operators (e.g., MODU for a drilling campaign) may form agreements through bridging documents to coordinate Level 1 response activities within the assigned operating area (usually 500m radius from location).*

The required notifications are outlined in Table 3-4.

Table 3-4 Notifications

Notifications			
Who	**What**	**Minimum time to implement**	**✓/✗**
IC or Deputy IC	A reportable incident is one that has caused, or has the potential to cause, moderate to significant environmental damage (interpreted as the following): • Unplanned release of hydrocarbon liquid or chemicals exceeding > 80 L into the marine environment caused by, or suspected to have been caused by, petroleum activities. • Unplanned injury or death of a cetacean or listed threatened/migratory/marine species caused by, or suspected to have been caused by, petroleum activities. Required for: all spills > 80 L Ensure the NOPSEMA Duty Officer has been notified: Tel: 1300 674 472 Relay the known key facts of the spill – location, source, size and type – as well as incident factors causing the spill, and current assessed spill level. Report incident to the DEECA ERR Duty Officer: Tel: 0419 597 010 Relay the known key facts of the spill – location, source, size and type – as well as incident factors causing the spill, and current assessed spill level.	<2 hours	☐
EUL	Follow up with a written record of the oral notification to NOPSEMA as soon as practicable.	As soon as practicable	☐
EUL	A written report must be provided to NOPSEMA as soon as practicable, but in any case within 3 days[1] of a reportable environmental incident (as described above) unless otherwise agreed by NOPSEMA. This report can be made on NOPSEMA report form N-03000-FM0831. A copy of the written report must be given to DEECA ERR within 3 days. ERRChiefInspector@ecodev.vic.gov.au A copy of the written report must be given to both NOPTA within 7 days of giving the written report to NOPSEMA.	<3 days < 7 days after report given to NOPSEMA	☐
Vessel Master	Required for: all spills from vessels. Notify the Rescue Coordination Centre: Tel: 1800 641 792 Follow up with the completion and submission of a pollution report. https://www.amsa.gov.au/forms/harmful-substances-report-polrep-oil	<2 hours <24 hours	☐

[1] As per Schedule 3 of the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (Cth) and as outlined in the NOPSEMA Notification and Reporting of Environmental Incidents Guidance Note N-03000-GN0926.

Notifications			
Who	**What**	**Minimum time to implement**	**✓/✗**
	Relay the known key facts of the spill – location, source, size and type – as well as incident factors causing the spill, and current assessed spill level.		
EUL	Required for: all spills > 80 L Notify the DEECA ERR and NOPTA via email: Email: DJPR: Operational.reports@ecodev.vic.gov.au Email: NOPTA: reporting@nopta.gov.au Relay the known key facts of the spill – location, source, size and type – as well as incident factors causing the spill, and current assessed spill level.	<6 hours	☐
IC or Deputy IC	Requirement: all spills that could impact Victorian state waters (> 80 L). Notify the DTP SREC State Duty Officer: Tel: 0409 858 715 Email: semdincidentroom@ecodev.vic.gov.au Relay the known key facts of the spill – location, source, size and type – as well as incident factors causing the spill, and current assessed spill level. For Level Two and Level Three spills, exchange liaison officers between Esso and the DTP SREC.	<6 hours	☐
	Required for: all spills that could impact NSW waters. Notify the *Transport for NSW* Duty Officer of the need to stand-up state response arrangements. Transport for NSW Duty Officer: Tel: 02 9962 9074		☐
	Required for: all spills that could impact Tasmanian waters. Notify the Tasmanian DPIPWE of the need to stand-up state response arrangements. Tasmanian DPIPWE Pollution Incidents and Complaints: Tel: 1800 005 171 The initial verbal notification must be followed up by an email containing a more detailed Pollution Incident Report to incidentresponse@epa.tas.gov.au		☐
EUL	Required for: all spills that are within a marine park, or could impact a marine park. Notify the Director of National Parks via the 24-hour Marine Compliance Duty Office: Tel: 0419 293 465	<12 hours	☐
EUL	Required for: all spills that impact or have the potential to impact on matters of national environmental significance (NES) including protected and migratory species, Commonwealth Marine Reserves and Ramsar Wetlands. Notify the Department of Agriculture, Water and the Environment: Tel: 1800 803 772	< 12 hours	☐
Once all appropriate authorities have been notified, move onto the appropriate immediate actions tables, for levels **one, two** or **three** below, depending on severity.			

Following the notifications, immediate actions by spills level are as follows coded by planning, operations, and logistics sections/areas:

Table 3-5 Level One - 0-12 hour Actions

Level One 0-12 hours			
Who	**What**	**Minimum time to implement**	**✓/✗**
IC	In conjunction with the ESG leader, ensure all necessary regulatory notifications have been made.	12 hours	☐
IC	Commence the planning cycle (the 'stem' of the planning 'P'): • Establish incident aim • Establish incident response aim and objectives • Determine appropriate initial strategies and tactics to achieve objectives.	ASAP – <2 hours	☐
OSC	If the source is not controlled, establish a Source Control Branch to develop and implement the Source Control Plan.	ASAP	☐
OSC	Undertake aerial surveillance: • Deploy surveillance by crew change or contracted aircraft. • Initiate mobilisation of a trained aerial observer – Esso or AMOSC. • Obtain photographs or video footage. • Obtain completed aerial observer's report and pass to the PSC/SITL.	ASAP, then 2x daily	☐
OSC	Deploy a regular watch of the affected assets/vessel – confirm heading/changes to the situation.	ASAP then by reporting exception.	☐
LSC	Confirm the location of aerial and marine assets currently contracted to Esso.	4 hours	☐
PSC	Initiate specific elements of O1 of OSMP, including the tasks below.	ASAP	☐

PSC	Monitor and predict weather and sea states:
	• Consult meteorology services to determine water current and wind speed data, either from http://www.bom.gov.au, http://www.marineweather.net.au, or MetConnect (http://www.metconnect.co.nz):
	  ○ Username: Esso
	  ○ Password: basswx.
		4 hours	☐

PSC	Conduct a manual forecast of the spill trajectory: • Determine the direction of the spill. • Determine if the spill is likely to cross into state waters or shorelines or if it might impact other sensitivities.	4 hours	☐
PSC	Should oil cross into state waters or impact shorelines, organise third-party trajectory modelling of the spill trajectory: • Organise urgent oil-spill trajectory modelling via AMOSC, OSRL, or EMBSI.	4 hours	☐
SITL	Establish a common operating picture – a graphical representation of the spill and its location. • Display overflight, OSTM/manual vectoring data on CoP.	4 hours	☐

Level One 0-12 hours			
Who	**What**	**Minimum time to implement**	**✓/✗**
PSC	Prepare and disseminate SITREPs as more information becomes available. The IC is responsible for determining the frequency of these updates.	Ongoing	☐
PSC	Consult the preparedness NEBA and Appendix D – Quick Reference Information to identify potential exposed environmental sensitivities based on spill trajectory, and develop an incident action plan, including a spill-specific NEBA (ref OPEP 5.2).	12 hours	☐
EUL	Activate the OSMP 'O' modules 1.1, 1.2, 1.3 and 4.1	ASAP	☐
EUL	Review the OSMP to determine which other modules may need to be initiated.	ASAP	☐
Once these actions are complete, please move to **Section Four** of this plan			

* Ability to deploy subject to available daylight and weather conditions

Table 3-6 Level Two - 0-12 hour Actions

Level Two 0-12 hours			
Who	**What**	**Minimum time to implement**	**✓/✗**
IC	Seek alignment on incident objectives from the ESG.	ASAP	☐
IC	In conjunction with the ESG leader, confirm all necessary regulatory notifications have been made.	<2 hours	☐
IC	Commence the planning cycle (the 'stem' of the planning 'P'): • Establish the incident response aim. • Establish the incident objectives. • Determine appropriate strategies and tactics to achieve objectives.	ASAP – <6 hours	☐
IC	Establish a locally based Esso IMT, including representatives from the Deputy IC, Ops SC, Aviation Unit, Log SC, Planning SC, Environmental Unit and Situation Unit.	<2 hour	☐
IC	Establish a line of communications with DTP IMT and exchange Liaison Officers.	ASAP – <2 hours	☐
IC/OSC/PSC	Determine and agree on the need for a separate Source Control Branch	ASAP	☐
OSC	If the source is not controlled, establish a Source Control Branch to develop and implement the Source Control Plan.	ASAP	☐
OSC	Undertake aerial surveillance: • Initiate aerial surveillance using the crew change helicopter or contracted aircraft. • Initiate the mobilisation of a trained aerial observer – Esso or AMOSC • Obtain photographs or video footage of the incident • Obtain a completed aerial observer's report and pass to the PSC/SITL.	ASAP, then twice daily	☐
OSC	Mobilise a satellite tracking buoy to spill location (weather dependent).	ASAP – <12 hours	☐
LSC	Confirm the location of aerial and marine assets currently contracted to Esso. Confirm the location and availability of vessels of opportunity in Victoria, as follows: • Contact Atoll Offshore on 03 5116 1511 or 0409 803 588. • Contact Bhagwan Marine on +61 7 3907 3111 or 0409 979 551. • Confirm the location and availability of aerial assets that may be used for aerial observation. • Contact Bairnsdale Air Charter on 03 5152 4617. • Consider utilisation of idle fishing vessels (which meet required specifications) by calling Gippsland Ports on 0427 610 025 (Harbour Master) or 0427 833 388 (Chief Executive Officer)	4 hours	☐
LSC	Notify the waste contractor of potential resource needs.	<12 hours	☐

Level Two 0-12 hours			
Who	**What**	**Minimum time to implement**	**✓/✗**
LSC	Notify the marine and aviation FOBs of the need to conduct spill response operations and prepare area and hardstand. Marine bases • BBMT Marine Supervisor 0407 846 457 • Lakes Entrances 03 5116 1511 (Atoll Offshore) • Airfields • Esso Longford Heliport 03 5143 4256 • Bairnsdale Airport 0447 132 980	<6 hours	☐
LSC	Identify and call-out Esso Core Group members – establish current location and timeframe to deploy to field-based ICP.	<6 hours	☐

LSC	Request that the AMOSC Technical Advisor come to the site (IMT) and that the AMOSC Operations Officer enters the field (ICP).
	Request that AMOSC undertake the call-out of CG resources (these should be mobilised in the Gippsland region).
	Request that AMOSC hire and mobilise x 6 satellite tracking buoys to Longford Heliport.
	Discuss potential equipment and service needs (Must be spill-size and type specific) with AMOSC, consisting of:
	• Equipment for three x offshore containment & recovery strike teams, each comprising:
	  ○ 3 reels of Ro-boom (or a single high speed sweep system)
	  ○ Skimmer package comprising an LWS500 or similar
	  ○ Temporary vessel storage (deck bladders, intermediate bulk containers or towable barges)
	• Equipment to execute the shoreline TRPs
	  ○ Shore seal boom; fence boom; anchor kits and ancillaries.
	• Dispersant and National Plan aerial dispersant spraying capability.
	• Liaison to National Plan for the use of Victorian based C&R equipment
		<3 hours	☐

LSC	Stage BBMT-based dispersant and offshore containment and recovery equipment for deployment, consisting of: • 1 x AFEDO dispersant spray sets. • 10m^3 IBCs of Corexit 9500a • Waste liquid storage (vessel dependent). Move equipment package to wharf face, ready for load out.	<6 hours	☐
LSC	Prepare LIP-based nearshore/shoreline oil spill response equipment for deployment.	<24 hours	☐
LSC/PSC	Contact the waste management provider. Refer to PSC for advice on potential volumes and types of waste.	<24 hours	☐
PSC	Initiate specific elements of O1 of OSMP, including the tasks below.	ASAP	☐

PSC	Monitor and predict weather and sea states:
	• Consult meteorology services to determine water current and wind speed data, either from http://www.bom.gov.au, http://www.marineweather.net.au, or MetConnect (http://www.metconnect.co.nz):
	  ○ Username: Esso
	  ○ Password: basswx.
		4 hours	☐

Level Two 0-12 hours			
Who	**What**	**Minimum time to implement**	**✓/✗**
PSC	Conduct ADIOS2 forecasting of oil weathering and conduct manual vectoring of the spill trajectory, as follows: • Determine the direction of the spill. • Determine if the spill is likely to cross into state waters or shorelines or if it might impact other sensitivities.	4 hours	☐
PSC	Conduct a third-party trajectory modelling of the spill trajectory: • Organise urgent oil spill-trajectory modelling using AMOSC, OSRL, or EMBSI.	4 hours	☐
SITL	Establish a common operating picture – a graphical representation of the spill and its location. Display overflight and OSTM/manual vectoring data on the CoP.	6 hours	☐
PSC	Prepare and disseminate SITREPs as more information becomes available. The IC is responsible for determining the frequency of these updates.	Ongoing	☐
EUL	Consult the NEBA (Ref OPEP Section 5.2), identify potential exposed environmental sensitivities based on spill trajectory, and develop an incident action plan, including a spill-specific NEBA (ref OPEP 5.2).	ASAP	☐
EUL	Activate the OSMP 'O' modules 1.1, 1.2, 1.3, 2.1, 2.3 and 4.1	ASAP	☐
EUL	Review the OSMP to determine which other modules may need to be initiated.	ASAP	☐
EUL	Liaise with the States Scientific Support Coordination if it is anticipated that state waters or shorelines will be impacted.	6 hours	☐
EUL	Assess the need for and coordinate additional personnel to support the environmental unit.	12 hours	☐
EUL	Assess the need for and coordinate the development of specific plans, including the following: • Wildlife Management Plan • SCAT Plan • WMP • Sample Plan • Dispersant Plan • Remediation Plan. Monitor the environmental consequences of any actions. Participate in the development of plans for the next operational period.	12 hours	☐
Once these actions are complete, please move to **Section Four** of this plan.			

Table 3-7 Level Three - 0-12 hour Actions

Level Two 0-12 hours			
Who	**What**	**Minimum time to implement**	**✓/✗**
IC	Seek alignment on incident objectives from the ESG.	ASAP	☐
IC	In conjunction with the ESG leader, confirm all necessary regulatory notifications have been made.	<2 hours	☐
IC	Commence the planning cycle (the 'stem' of the planning 'P'): • Establish the incident response aim. • Establish the incident objectives. • Determine appropriate strategies and tactics to achieve objectives.	ASAP – <6 hours	☐
IC	Establish full, locally-based Esso IMT including representatives from Deputy IC, Ops SC, Aviation Unit, Log SC, Planning SC, Environmental Unit and Situation Unit.	<2 hours	☐
IC	Establish a line of communications with the Control Agency IMT and exchange Liaison Officers.	<2 hours	☐
IC	Offer a line of communication with the AMSA and swap liaison officers.	<2 hours	☐
IC / ESG	Initiate the activation of the ExxonMobil Regional Response Team. Tel: +44 1372 223 232	<24 hours	☐
IC/OSC/PSC	Determine and agree on the need for a separate Source Control Branch.	<2 hours	☐
OSC	If the source is not controlled, establish a Source Control Branch to develop and implement the Source Control Plan (this should be made up of pipeline or well engineering teams).	ASAP	☐
OSC	Undertake aerial surveillance: • Initiate aerial surveillance using the crew change helicopter or contracted aircraft. • Initiate the mobilisation of a trained aerial observer – Esso or AMOSC. • Obtain photographs or video footage of the incident. • Obtain a completed aerial observer's report and pass to the PSC/SITL.	ASAP, then twice daily	☐
OSC	Mobilise a satellite tracking buoy to spill location (weather dependent).	ASAP – <12 hours	☐
OSC	Deploy a twice-daily watch from assets/vessel – confirm heading/changes to the situation.	ASAP then by reporting exceptions.	☐
OSC/LSC	On the advice of the Drilling Engineer/Source Control Branch, mobilise the Subsea First Response Toolkit (SFRT) via the AMOSC.	4 hours	☐

Level Two 0-12 hours			
Who	**What**	**Minimum time to implement**	**✓/✗**
LSC	Confirm the location of aerial and marine assets currently contracted to Esso. Confirm the location and availability of vessels of opportunity in Victoria, as follows: • Contact Atoll Offshore on 03 5116 1511 or 0409 803 588 • Contact Bhagwan Marine on +61 7 3907 3111 or 0409 979 551. Confirm the location and availability of aerial assets of opportunity that are suitable for aerial observation tasks. • Contact Bairnsdale Air Charter on 03 5152 4617.	<3 hours	☐
LSC	Request that 3 x AMOSC Technical Advisors come to the site (IMT) and that 3 x AMOSC Operations Officers are deployed to enter the field (Marine or aviation ICPs). Request that AMOSC undertake the call-out of CG resources (these should be mobilised in the Gippsland region). Request that AMOSC hire and mobilise x 6 satellite tracking buoys to Longford Heliport. Discuss potential equipment and service needs (spill-type specific) with AMOSC, consisting of: • Equipment for three x offshore containment & recovery strike teams, each comprising: o 3 reels of ro-boom (or high speed sweep system) o Skimmer package comprising and LWS500 or similar o Temporary vessel storage (deck bladders, intermediate bulk containers or towable barges) • Equipment to execute the shoreline TRPs o shore seal boom; fence boom; anchor kits and ancillaries • Dispersant – 50 m^3 of Corexit 9500A to be moved to Bairnsdale Airport. *For worse case loss of well containment scenarios:* • Additional booming and skimming equipment from Fremantle and Exmouth for a further three x C & R strike teams • Liaison to National Plan for the use of Victorian, NSW and South Australian based C&R equipment, sufficient for a further four Strike teams. • Refer to Quick Reference Guides in Appendix D for further detail	<3 hours	☐
LSC	Notify the marine and aviation FOBs of the need to conduct spill response operations and prepare area and hardstand. Marine bases • BBMT Marine Supervisor 0407 846 457 • Lakes Entrances 03 5116 1511 (Atoll Offshore) • Airfields • Esso Longford Heliport 03 5143 4256 • Bairnsdale Airport 0447 132 980	<6 hours	☐

Level Two 0-12 hours			
Who	**What**	**Minimum time to implement**	**✓/✗**
LSC	Identify and call-out Esso Core Group members – establish current location and timeframe to deploy to field-based ICP	<6 hours	☐
LSC	Request OSRL technical resources and notify the OSRL Duty Manager of the potential need for resources, as follows: • Contact the OSRL Duty Manager in Singapore +65 6266 1566. • Request 5 x Technical Advisors to mobilise and join the IMT.	<6 hours	☐
LSC	Stage BBMT-based dispersant and offshore containment and recovery equipment for deployment: • 1 x AFEDO dispersant spray sets. • 10m^3 IBCs of Corexit 9500a • Waste liquid storage (vessel dependent). Move equipment package to wharf face, ready for load out.	<6 hours	☐
LSC	Notify waste contractors to prepare for potential liquid, and solid wastes – specific amounts and types to be determined.	<12 hours	☐
LSC	Prepare LIP-based nearshore/shoreline oil-spill response equipment for deployment.	<24 hours	☐
LSC/PSC	Contact the waste management provider PSC for advice on potential volumes and types of waste.	<24 hours	☐
PSC	Initiate specific elements of O1 of OSMP, including the tasks below.	ASAP	☐

PSC	Monitor and predict weather and sea states:
	• Consult meteorology services to determine water current and wind speed data, either from http://www.bom.gov.au, http://www.marineweather.net.au, or MetConnect (http://www.metconnect.co.nz):
	  ○ Username: Esso
	  ○ Password: basswx.
		4 hours	☐

PSC	Conduct ADIOS2 forecasting of oil weathering and conduct manual vectoring of the spill trajectory, as follows: • Determine the direction of the spill. • Determine if the spill is likely to cross into state waters or shorelines or if it might impact other sensitivities.	4 hours	☐
PSC	Conduct third-party trajectory modelling of spill trajectory: • Organise urgent oil-spill trajectory modelling via Esso/APASA/AMOSC. • Does the spill cross into state waters, shorelines or impact other sensitivities?	4 hours	☐
SITL	Establish a common operating picture – a graphical representation of the spill and its location. Display overflight and OSTM/manual vectoring data on the CoP.	4 hours	☐
PSC	Prepare and disseminate SITREPs as more information becomes available. The IC is responsible for determining the frequency of these updates.	Ongoing	☐

Level Two 0-12 hours			
Who	**What**	**Minimum time to implement**	**✓/✗**
EUL	Consult the NEBA (Ref OPEP section 5.2), identify potential exposed environmental sensitivities based on spill trajectory, and develop an incident action plan, including a spill-specific NEBA (ref OPEP 5.2).	ASAP	☐
EUL	Activate the OSMP 'O' modules 1.1, 1.2, 1.3, 1.4, 1.5, 2.1, 2.2, 2.3 and 4.1.	ASAP	☐
EUL	Review the OSMP to determine which other modules may need to be initiated.	ASAP	☐
EUL	Liaise with the States Scientific Support Coordination if it is anticipated that state waters or shorelines will be impacted.	6 hours	
EUL	Assess the need for and coordinate additional personnel to support the environmental unit.	12 hours	☐
EUL	Assess the need for and coordinate the development of specific plans, including the following: • Wildlife Management Plan • SCAT Plan • Waste Management Plan • Sample Plan • Dispersant Plan • Remediation Plan. Monitor the environmental consequences of any actions. Participate in the development of plans for the next operational period.	12 hours	☐
Once these actions are complete, please move to **Section Four** of this plan.			

4 Initial Oil Spill Response Actions: Reactive Operations 12–48 hours

Following the immediate action and assessment process, Esso will establish an IMT structure appropriate to mount actions as required for the response. Recommended minimum IMT structures are as below in Figure 4-1.

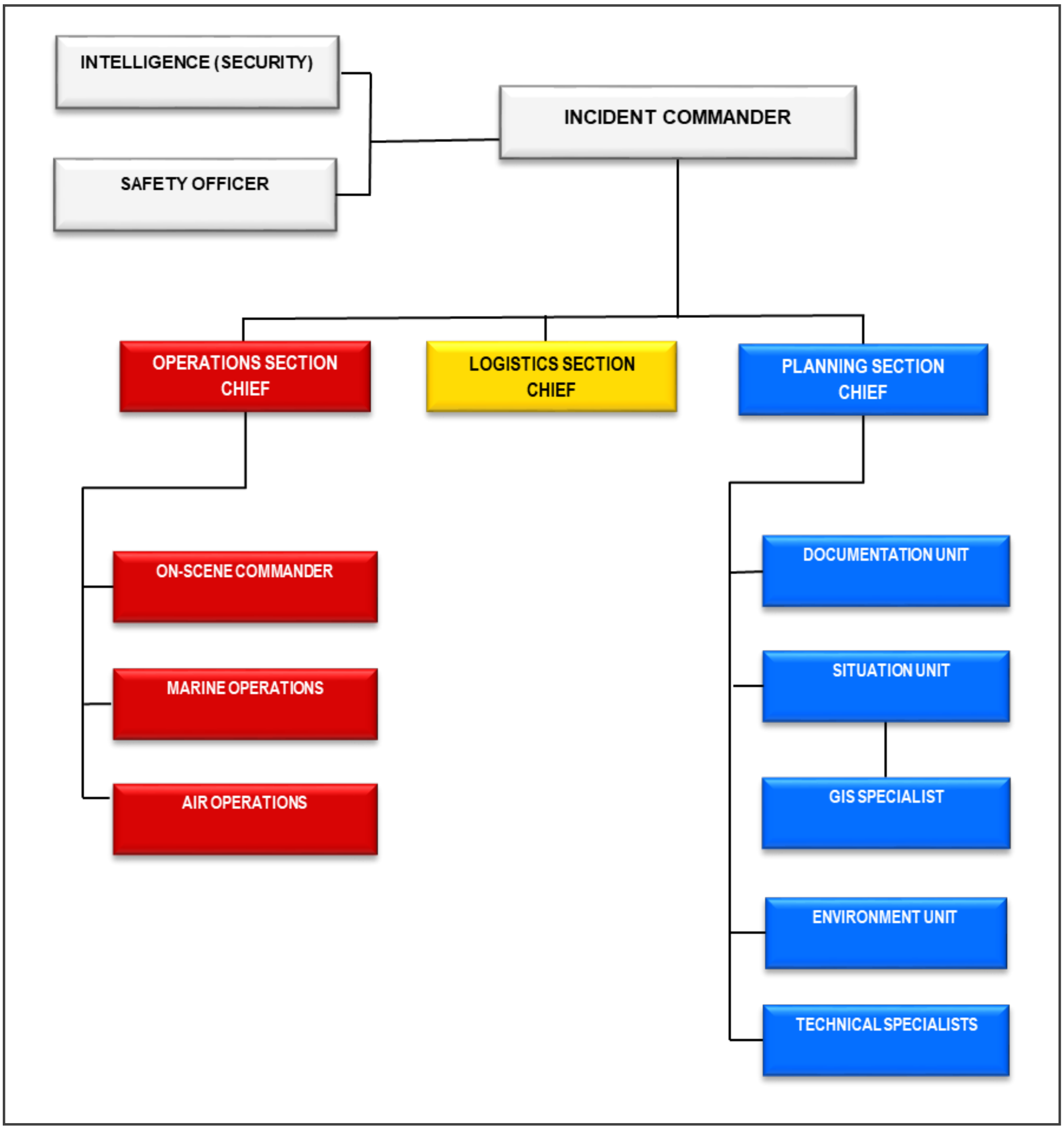
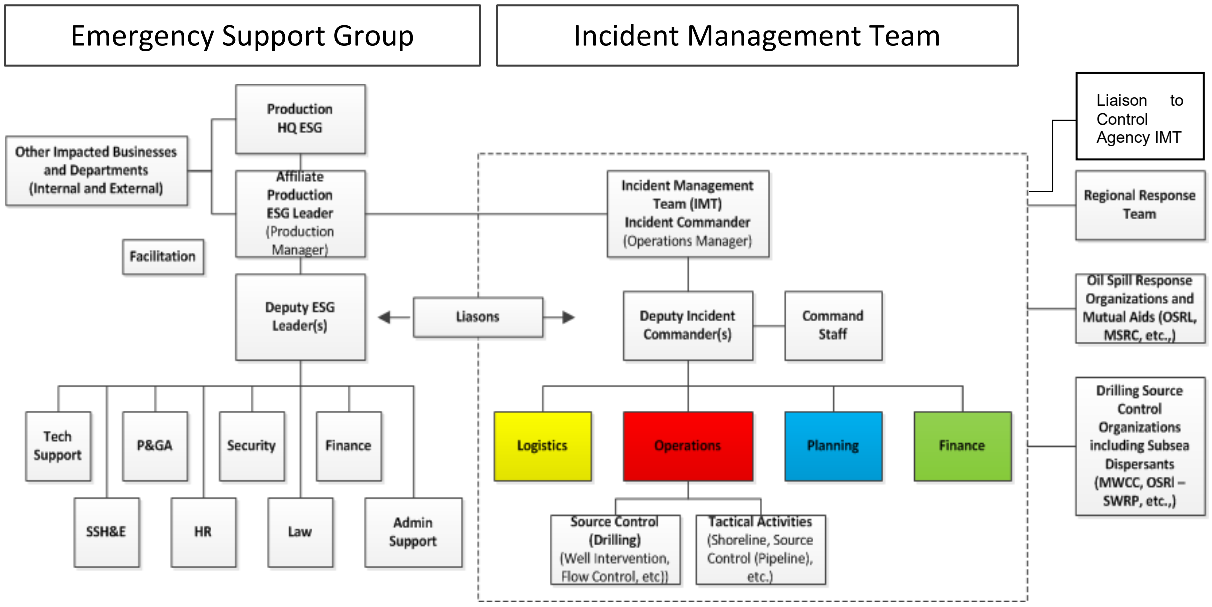


Figure 4-1 Level one – IMT for Localised Response Activities and Impacts (Offshore Incident Management Team)



(Note: Source control and operational divisions to be added/retired as required by incident objectives).

Figure 4-2 Level Two/Three – Esso IMT for Expanded Multi-Jurisdictional Impacts

Once the IMT is established, the following checklists are to be used by the functional areas of the IMT to assist each area to execute tasks in support of spill response strategies:

Spill Classification	Relevant Section
Level Two/Three Spills: State water & predicted shoreline impacts.	Section 4.1
Level Two/Three Spills: Commonwealth water impacts & no predicted State water or shoreline impacts.	Section 4.2
Level One Spills: localised	Section 4.3

4.1 Level Two and Three Spills – State Water and Shoreline Impacts.

In Victoria, DTP will assume responsibility for marine pollution incidents in coastal waters, up to 3 nautical miles from shore. Esso, as the petroleum titleholder, is the control agency for marine pollution incidents in Commonwealth waters resulting from an offshore petroleum activity. In the event of a marine pollution incident originating in Commonwealth waters that impacts or threatens State waters, DTP assumes jurisdictional control for such incidents within coastal waters from a State consequence management perspective. Esso will work with DTP to ensure an adequate response, including provision of personnel, equipment and other response resources.

DTP's role of control agency will not extend to response operations in Commonwealth waters including those directly associated with source control or relief well drilling; management of these operations will be performed by Esso. Emergency Management Liaison Officers (EMLOs) may be required between DTP's and Esso's Incident Management Team (IMT).

In the event of a cross-jurisdictional marine pollution incident, the Esso and DTP will work collaboratively, sharing response resources and providing qualified personnel to the DTP IMT. To facilitate effective coordination between the two control agencies and their respective IMTs, a Joint Strategic Coordination Committee (JSCC) will be established. The control and coordination arrangements for cross-jurisdictional maritime emergencies is outlined in Figure 4-3.

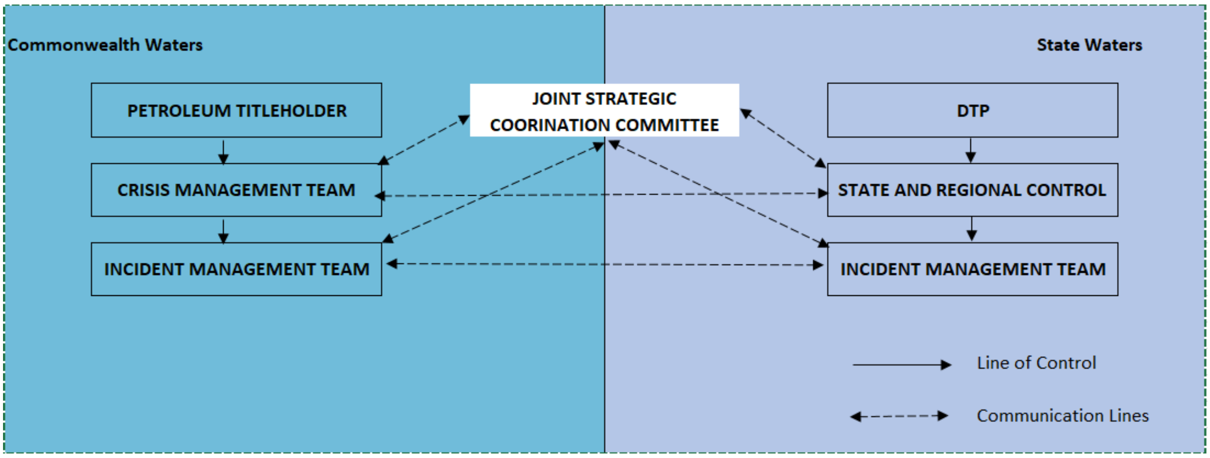


Figure 4-3 Joint Strategic Coordination Committee arrangements

The role of the JSCC is to ensure appropriate coordination between the respective IMTs established by multiple control agencies. The key functions of the JSCC include:

- Ensuring key objectives set by multiple IMTs in relation to the marine pollution incident are consistent and focused on achieving an effective coordinated response.
- Resolving competing priorities between multiple IMTs.
- Resolving competing requests for resources between the multiple IMTs, including those managed by Australian Maritime Safety Authority (AMSA), such as national stockpile equipment, dispersant aircraft and the National Response Team.
- Resolution of significant strategic issues as they arise during the incident response.
- Ensuring that there is a shared understanding of the incident situation and its meaning amongst all key stakeholders.
- Ensuring there is agreement on how information is communicated to the public, particularly those issues that have actual or perceived public health implications.
- Ensuring adequate coordination and consistency is achieved in relation to access and interpretation of intelligence, information and spill modelling to promote a common operating picture.

The JSCC is a committee, not a team operating from a specified location. The JSCC will be administered by DTP and the inaugural JSCC meeting will be convened by the State Controller Maritime Emergencies (SCME) once both the titleholder and DTP formally assume the role of control agency in respective jurisdictions.

The JSCC will be jointly chaired by the SCME and Esso's nominated senior representative, who will determine whom will sit in the committee for a coordinated response. As the relevant jurisdictional authority in Commonwealth waters, NOPSEMA may opt to participate in the JSCC as they see fit.

While the above arrangements described are specific to Victoria, Esso will work with other NSW or Tasmania State government IMT's in a similar manner should their State waters or shorelines be impacted.

For further information on Tasmanian cross jurisdiction arrangements, refer to EPA Tasmania - Offshore Petroleum Industry Guidance Note

Table 4-1 Incident Management Team Tasking

Incident Management Team Tasking		
Establish an Incident Management Team that oversees the implementation of oil spill response measures – Unity of Command Model with DTP		
Tactic: Establish and staff a full Esso IMT		Completed?
IC / ESG Lead	Nominate Liaison Officers for Control Agency IMT Nominate senior company representative to participate in JSCC	☐ ☐
PSC Day One	Establish full Esso IMT • Call out IC/OSC/LSC/PSC/Situation & Enviro Units. • Staff each function with teams – actual and virtual.	☐
PSC Day two	• Review team make up for current, and future operational period. • Ensure that functional areas are aligned with the needs of the response.	☐
Tactic: Draft and execute an Incident Action Plan		Completed?
IC lead	Commence planning cycle ('stem of P')	☐
PSC Day One	• Complete the initial IAP (ICS 201s); o Establish current operational period aim, objectives, strategy, tactics & resources. o Draft 24, 48 & 72 incident potential worksheet (size up). o Complete NEBA. o Determine the potential shoreline impact. o Assess weather and sea state for the next 48 hours for suitability to conduct marine response and/or aviation response activities. • NEBA outcomes to drive the selection of strategies from Table 4-3 onwards. • Exchange Liaison Officers between Control Agency IMT and Esso IMT. • Use Liaison Officers to inform Control Agency IMT of Esso ICS201 outputs.	☐
EUL Day One / Two	• Undertake an environmental risk assessment of each proposed tactical execution of strategy (below actions – shoreline/marine/aviation operations).	☐
PSC Day Two	• Review the ICS201 from the previous day o Are the aim, objectives, strategies, tactics & resources still current given the current conditions for the operational period? o Review response organisation and staffing needs. o Continue execution of previous day's plan. o Modify the plan. • In consultation with IC, assess readiness to move into the Proactive Planning Phase. • IMT commences proactive planning cycle (Planning 'P')	☐
OSC Day One	• Plan and execute immediate/first strike operations (as per the list below), and include the following: • Shoreline operations o Close off sensitive areas through the implementation of Tactical Response Plans (TRP). o Provide materials and personnel to state response teams to undertake shoreline SCAT surveys. o Provide materials and personnel to state response teams to undertake further shoreline protection.	☐

Incident Management Team Tasking		
	◦ Marine operations – vessel-based dispersant and containment & recovery operations, ◦ Vessels – direct vessel of opportunity fleets. ◦ Equipment – source from Esso, AMOSC, NatPlan and OSRL. ◦ Personnel – source from Esso, AMOSC, AMOSC Core Group, NatPlan CG, ExxonMobil Regional Response Team, OSRL. • Aviation operations – surveillance and dispersant operations. • Operations to follow the relevant section of ExxonMobil Field Response Manual and/or Shoreline Treatment Plans.	
Safety Officer Day One	• Complete Safety Risk Assessment of all operational activities. • Incorporate Safety Risk Assessment into a Safety Plan.	☐
OSC / Source Control Branch Director Day one	• Execution of source control arrangements as required: ◦ Activate Australia Wells Team Tier II/III Emergency Response Plan. ◦ Pipeline response plan. • Activate source control resource contracts/assistance contracts: ◦ SFRT – AMOSC ◦ SWIS – OSRL ◦ Wild Well Control • Activate pipeline repair • Activate marine salvers	☐
LSC Day Two	• Request and stage resources into Gippsland to enable long-term operations to occur: ◦ Integration of Level Two and Level Three resources into the response. • Execute the waste management plan: ◦ Call out the third-party contractor (Cleanaway), ◦ Liaise with EPA for ongoing waste management requirements (temporary storage and transportation). • Equipment mobilisation for temporary storage and decontamination.	☐

Table 4-2 Surveillance Monitoring & Visualisation (SMV) Strategy

Surveillance Monitoring & Visualisation (SMV) Strategy		
Tactic: Satellite tracking buoys will be deployed to monitor the leading edge of the slick and deployed in 24-hour intervals to indicate swept pathways.		Completed?
OSC Day one	• Deploy satellite tracking buoys (STBs) from Longford (via helicopter or vessel). Place on the leading edge of the spill • Tracking Buoy Deployment Instructions	☐
	• Request AMOSC for all available STBs to be contracted to Esso • STBs moved to Longford ASAP	☐
Day two +	• Monitor location of deployed STBs ◦ At last light, deploy STB close to the spill source	☐
• Tactics: Twice daily manned overflights will be undertaken to monitor the spreading, location, and weathering of the slick.		Completed?
OSC Day One	• Commence twice daily aerial overflights to determine size/bearing ◦ Obtain a completed aerial observer's report and pass to the PSC/SITL. ◦ Use crew change helicopter where possible.	☐

Surveillance Monitoring & Visualisation (SMV) Strategy		
	○ If Esso asset unavailable, contact and contract the use of third-party aircraft.	
OSC / PSC/LSC	• Activate Bairnsdale Air Charter for overflight duties • Request aircraft to fly over the Gippsland shoreline, noting the status (closed/open) of the following intermittently open estuaries: ○ Davis Creek - 37°34'43.46"S, 149°44'59.14"E, ○ Bunga Arm - 37°56'50.00"S, 147°48'18.98"E ○ Lake Tyers - 37°51'33.78"S, 148° 5'18.55"E ○ Merrimen Creek - 38°22'56.18"S, 147°11'4.26"E ○ Mueller River - 37°46'44.51"S, 149°19'41.29"E ○ Shipwreck Creek - 37°38'51.45"S, 149°41'58.05"E ○ Sydenham Inlet - 37°46'49.61"S, 149° 1'11.26"E ○ Tamboon Inlet - 37°46'39.31"S, 149° 9'11.11"E ○ Thurra River - 37°46'56.67"S 149°18'45.94"E ○ Yeerung River - 37°47'28.02"S, 148°46'26.67"E • Report this data back to the EUL/PSC	☐
OSC Day two	• Continue twice daily aerial overflight to determine size/bearing ○ Use crew change helicopter where possible). ○ If Esso asset unavailable, contact and contract the use of third-party aircraft. ○ Aircraft over slick 30 mins after first light. • Use the location of deployed satellite tracking buoys as initial extents for aircraft bearing	☐
Tactics: Daily oil spill trajectory modelling will be used to predict the weathering and direction that the oil will spread.		Completed?
PSC Day One; then each day	• Request OSTM runs to verify data gained through manual means via AMOSC twice daily. The request should include: ○ 12/24/36/48/60/72 hour outlook deterministic trajectory modelling. ○ Shoreline loadings (1, 10 and 100 gm p/sqm) – time frames, volumes and locations. ○ Request via initial phone call and completion of Oil Spill Trajectory Modelling request form . ○ Data to be relayed back to the Situation Unit. ○ Via AMOSC, request the Technical Officer to be deployed to the Esso IMT to provide direct support to the Situation Unit. • For facility coordinates, refer to Gippsland platform location coordinates	☐
Tactics: Set a twice-daily watch to confirm the extent and spreading of the spill from the assets.		Completed?
OSC Day One; then each day	• If there is a spill from a manned asset, set a two-hourly watch to confirm the bearing/size. • Have observers take photographs or video. Where possible, include vessels or other objects in photos to provide scale.	☐
Tactics: Establish the Esso Common Operating Picture in the Esso IMT.		Completed?
OSC / SITL Day one, then for the duration of the spill	• Establish Esso's Common Operating Picture • Commence data capture and graphical display. • Key data to be displayed include: ○ Spill location, ○ Spill extent, direction and trajectory, ○ Environmental sensitives , ○ Bass Strait oil & gas facilities, ○ Location of the staging area and forward operating base ○ Esso-controlled contracted resources – aircraft and vessels, and ○ Third-party-controlled potential resources of opportunity – aircraft and vessels.	☐

Surveillance Monitoring & Visualisation (SMV) Strategy		
Tactics: OSMP as triggered.		Completed?
	Activate the various Operational Monitoring Programmes contained within the OSMP: o O1 – O5 as per triggers in OSMP	☐
For Level Three Spills only		
Tactics: Obtain satellite imagery of the spill location.		Completed?
PSC/ SITL	• Request satellite imaging of spill o Refer to ExxonMobil Production Geospatial Emergency Response Service) • Alternative options: o Request satellite imagery via AMOSC. o Request satellite imagery via OSRL – Agreement in place with Radiant Solutions	☐

Table 4-3 Shoreline Protection and Clean up Strategy

Shoreline Protection and Clean up Strategy		
Note: Implementation is dependent on NEBA and oil trajectory.		
Tactic: Inform and agree with Control Agency IMT tactical execution of shoreline planning.		Completed?
PSC/Esso LO Day one, then each day	• Inform DTP/ Control Agency IMT of Esso's intention to undertake planning for shoreline impacts. • Using data from SMV, establish shoreline planning: o Shoreline extents. o Nearest potential Incident Command Points. o Shoreline incident control structure (sectors, segments & divisions). o Draft a sector command structure. o Shoreline access points - people and vehicles. • Share this data with DTP Control Agency IMT for implementation.	☐
Tactics: Commence pre-impact surveys and pre-impact shoreline cleaning.		Completed?
OSC Day 1	• Commence pre-impact surveys o Shoreline surveys by foot – AMOSC and Esso personnel. o Shoreline surveys by air – UAV / contracted platforms.	☐
OSC Day 2	• Implement operations o Commence shoreline pre-cleaning for areas at immediate risk (first light of day 2).	☐
Tactics: Implement Shoreline TRP's to reduce oil impact on sensitive receptors.		Completed?
PSC Day one	• Based on trajectory, agree with Control Agency IMT regarding the shoreline TRPs to be implemented	☐
LSC Day One	• Esso to tally equipment and personnel required for the selected TRPs o Mobilise equipment from (i) Esso stockpiles, (ii) AMOSC Geelong stockpile & (iii) Gippsland Ports/State equipment cache.	☐

Shoreline Protection and Clean up Strategy		
	○ Request personnel from Esso CG and operational workforces; AMOSC Staff/Core Group & Gippsland Ports. • Decide upon ICP's and shoreline staging areas (east and west extents) for equipment. • Commence the mobilisation of equipment and personnel to the staging area (Lakes Entrance – Bullock Island or BBMT).	
OSC Day One,	• Liaise with Gippsland Ports (on ground 1st strike agency) to commence execution of TRPs. • Commence TRP implementation (based on the agreement with Control Agency IMT/Gippsland Ports).	☐
Tactics: Mass mobilisation of equipment, personnel and support for large-scale shoreline operations.		Completed?
LSC Day 1	• Activate supply and service contracts for ground support; • Establish equipment staging areas, • Use a third-party to identify accommodation providers (hotels, motels, caravan parks, and campsites), • Select ground transport providers (bus charter), • Use a third-party to identify remote camp options including: ○ Locations ○ Services ○ Catering ○ Laundry ○ Water treatment options	☐
LSC Day 1	• Activate specialised labour and OSR equipment support ○ Request AMOSC core group projections. ○ Request AMOSC immediate deployment of availed CG to lead shoreline clean up teams (<24 hours). ○ Include PPE, shoreline consumables, and other shoreline kits. ○ Request OSRL shoreline team leaders (operations).	☐

Table 4-4 Marine Dispersant, and Containment & Recovery Operations

Marine Dispersant, and Containment & Recovery Operations		
Note: Dependant on NEBA and oil trajectory.		
Tactic: Establish strike teams able to undertake containment and recovery, and/or dispersant operations.		Completed?
LSC Day One	• Establish BBMT as initial Marine FOB. • Secure four vessels for marine operations – if not engaged in other safety critical mission. • Direct vessels to BBMT to load out equipment. • Direct AMOSC to shift C&R equipment from Geelong to BBMT: ○ 6 x offshore boom reels. ○ 2 x offshore skimmer unit. • If vessel tanks are <500 m3 arrange temporary storage units. • Move BBMT offshore vessel based dispersant systems to wharf edge: ○ 2 x afedo dispersant spray systems. ○ 20 m^3 dispersant (10 per vessel). • Request available Esso Core group recall for duty – vessel-based operations from day two. • Load out vessel for operations.	☐
OSC	• Prepare ICS204 for vessel-based C&R and dispersant operations: ○ Refer to Appendix A draft ICS204 for operations.	☐

Marine Dispersant, and Containment & Recovery Operations		
Day One		
OSC Day Two	• Brief teams to the two separate ICS204. • Direct strike teams (each strike team comprises a pair of vessels) to area of operations: • For dispersant operations, field test must be conducted prior to operational spraying, with results reported to the IMT. • Report back of OSMP O2.2 to validate dispersant effectiveness. • PSC to confirm based on the field dispersant testing move to large scale operational spraying. • Volume of dispersant used to be reported to SITL	☐
Tactic: Establish Marine Forward Operating Base for ongoing large-scale marine operations.		Completed?

LSC
 	
Day Two
	• Based on shoreline impacts, plan for either/or BBMT and Lakes Entrance as marine FOB for ongoing C&R operations:
	  ○ Offshore C&R operations (large vessel operations – wharf considerations - under keel clearance, width, vessel availability).
	  ○ Nearshore/shoreline vessel support operations.
	• Demarcate in each location:
	  ○ OSR Equipment receipting and laydown areas.
	  ○ Office and briefing space.
	  ○ Temporary waste storage area (coming off vessel, after shift).
		☐

Tactics: Request and contract extended offshore response support – escalated resourcing.		Completed?

LSC
 	
Day two
	• Contract additional vessels for C&R:
	  ○ Nearshore/shoreline needs – marine surveyed vessels.
	  ○ Coastal/offshore needs – marine surveyed.
	• Shift all Esso OSR equipment to BBMT/Lakes Entrance:
	  ○ Boom reels.
	  ○ Skimmer units.
	  ○ Temp storage.
	  ○ Dispersant spray sets.
	• Operations and Planning to advise how many strike teams are required. Refer to applicable Quick Reference Guide in Appendix D for guidance on resource requirements for worst case scenarios
	• Request and shift AMOSC nearshore and offshore C&R equipment, and all shoreline equipment to BBMT/Lakes Entrance:
	  ○ Offshore booms reels.
	  ○ Offshore skimmer packages (in addition to TRP requirements)
	  ○ Nearshore/shoreline booming equipment.
	  ○ Nearshore/shoreline skimming packages.
	  ○ Shoreline surveillance equipment – drone, unmanned aerial vehicle.
		☐

Table 4-5 Aviation Dispersant Operations

Aviation Dispersant Operations		
Note: dependant on NEBA, oil type and oil trajectory		
Tactic: Mobilise tier two aviation dispersant operations and dispersant resupply.		Completed?
LSC Day One	• Source domestic dispersant spraying aircraft via AMOSC (AMSA Fixed Wing Aerial Dispersant) NatPlan link: • Aircraft to move to Bairnsdale as nominated airfield. • Request re-location of dispersant stockpiles to Bairnsdale from Esso BBMT (10 m^3). • Request AMOSC Geelong to move all available Corexit 9500a and Slickgone NS to Bairnsdale airfield.	☐

OSC/Aviation Branch Director
 	
Day One
	• Complete actions per checklists in the *Aerial Dispersant Operations Plan for Oil Spills in Bass Strait*
	  ○ 1st spraying operation – Victoria-based aircraft to fly to Bairnsdale as the nominated airfield
	  ○ Secondary overhead coverage aircraft to be provided by third party contractor.
	  ○ 2nd and subsequent operations to be undertaken from Bairnsdale Airport.
	  ○ 2nd and 3rd aircraft arriving during day two of operation.
	• Establish communications links with AMSA air base manager and dispersant loading operator.
	• Volume of dispersant used to be reported to SITL
		☐

OSC/Aviation Branch Director
 	
Day One
	• Prepare and brief on ICS204 for aerial dispersant operations:
	  ○ Refer to attached draft ICS204 for operations.
	  ○ Field test spray to be conducted prior to operational spraying, with results reported to the IMT.
	  ○ Field test spray to be reported via visual efficacy results from overhead aircraft and on-scene vessels.
		☐

PSC /EUL	- Ensure ongoing OSMP deployment of O2.2	☐

OSC/Aviation Branch Director
 	
Day Two
	• Prepare and brief on ICS204 for aerial dispersant operations with additional aircraft.
	• Update *Aerial Dispersant Operations Plan* with additional aircraft:
	  ○ Refer to attached drafted ICS204 for operations
	  ○ Field test spray to be conducted prior to operational spraying, with positive results reported to the IMT.
	• Field test spray to be reported via visual efficacy results from overhead aircraft and on-scene vessels.
	• Mount on-going operations of dispersant based
	• Volume of dispersant used to be reported to SITL
		☐

For level three crude oil spills only		
Tactic: Consider tier three aviation dispersant resupply		
LSC Day Two	• Based on dispersant dosage rates per day, predict future ten day dispersant needs. If AMOSC and Esso forward stockpiles are <50 m^3, request dispersant via OSRL: • Request OSRL activation of Global Dispersant Stockpiles: • Develop mobilisation plan with OSRL to shift dispersant to Australia utilising freight aircraft operating from Singapore.	☐

Table 4-6 Oiled Wildlife Response Strategy

Oiled Wildlife Response Strategy		
Note: Dependant on NEBA and oil trajectory		
Tactic: Through the DTP/ Control Agency IMT, liaise with DEECA and aid their Concept of Operations for *Oiled Wildlife Response*.		Completed?
PSC/EUL Day 1	• Based on the NEBA, fates and trajectory modelling, ascertain likely wildlife impacts – provide this data to DTP/ Control Agency IMT. • Send Liaison Officer to Control Agency IMT. • Propose tactics to Control Agency IMT that may reduce wildlife impacts. Refer to Area Response Plan or Species Response Plans for guidance.	☐
OSC Day 1	• Establish Industry OWR coordinator (from AMOSC) to oversee Esso OWR activity.	☐
LSC Day 1	• As requested, or directed by DELWP and based on the advice of the OWR Coordinator, stand up AMOSC OWR resources: ○ Facility support contract ○ Equipment and clean-up resources from Geelong ○ Equipment and clean-up resources from Perth ○ AMOSC OWR support team • Establish availability of ExxonMobil RRT personnel trained in OWR. • Coordinate ground transport, accommodation, and other support needs for industry response personnel.	☐
LSC Day 2	• Deploy requested OWR resources to the DELWP OWR ICP/field facility.	☐
OSC/Industry OWR coordinator Day 2	• Execute Esso OWR response operations as required or directed by Control Agency IMT.	☐

4.2 Level Two and Three Spills – Commonwealth Waters, No Predicted Shoreline Impacts

Table 4-7 Incident Management Team

<table>
<tr><th colspan="3">Level two and three spills - Commonwealth Waters, No Predicted Shoreline Impacts
Incident Management Team</th></tr>
<tr><td colspan="2">Tactic: Establish and staff a full Esso IMT that oversees the implementation of oil spill response measures.</td><td>Completed?</td></tr>
<tr><td>IC
Day One</td><td>• Establish Esso IMT:
○ Call out IC/OSC/LSC/PSC/Situation and Environmental Unit.
○ Staff each function with teams – actual and virtual.</td><td>☐</td></tr>
<tr><td>IC
Day two</td><td>• Review team make up for current, and future operational period.
• Assess if the functional areas aligned with the needs of the response.</td><td>☐</td></tr>
<tr><td colspan="2">Tactic: Draft and execute an incident action plan</td><td>Completed?</td></tr>
<tr><td>IC lead</td><td>• Commence planning cycle (‘stem of P’).</td><td>☐</td></tr>
<tr><td>PSC
Day One</td><td>• Complete the initial IAP (ICS 201’s):
○ Establish current operational period aim, objectives, strategy, tactics and resources
○ Draft 24, 48 and 72 incident potential worksheet (size up)
○ Complete NEBA
○ Confirm the low potential for shoreline impact, or shoreline impact for monitoring only (>10gm/sqm.)
• Assess weather and sea state for the next 48 hour for suitability to conduct marine response and/or aviation response activities.
• Exchange Liaison Officers between Control Agency IMT, AMSA and Esso.
• Use Liaison Officers to inform Control Agency IMT of Esso ICS201 outputs and SitReps.
• Undertake risk assessment of each proposed tactical execution of strategy (below actions – marine/aviation operations).</td><td>☐</td></tr>
<tr><td>PSC
Day Two</td><td>• Review the ICS201 from the previous day. Assess :
○ The aim, objectives, strategies, tactics and resources suitability against the current conditions for the operational period.
○ Review response organization and staffing needs.
○ Continue execution of previous day’s plan
○ If needed, modify the plan.
• In consultation with IC, assess readiness to move into Proactive Planning Phase.
• IMT commences planning cycle (planning ‘p’).</td><td>☐</td></tr>
<tr><td>OSC
Day Two</td><td>• Plan and execute immediate/first strike operations (as per following checklist). Include:
• Marine operations – dispersant, containment and recovery.
○ Vessels – Vessels of Opportunity.
○ Equipment – Esso, AMOSC, NatPlan and OSRL.
○ Personnel – Esso, AMOSC, AMOSC CG, NatPlan CG, Esso RRT, OSRL.
• Aviation operations – surveillance, and dispersant operations
○ Aircraft.</td><td>☐</td></tr>
<tr><td>OSC/SC Branch Manager</td><td>• As needed execution Source Control arrangements:
○ Activate Australia Wells Team Tier II/III Emergency Response Plan.
○ Pipeline Emergency Response Plan.</td><td>☐</td></tr>
</table>

Level two and three spills - Commonwealth Waters, No Predicted Shoreline Impacts Incident Management Team		
Day one	○ Containment contracts/assistance contracts: ○ Subsea first response toolkit– AMOSC, Oceaneering and AdEnergy ○ Subsea well intervention service - OSRL ○ Wild Well Control. • Activate pipeline repair. • Activate marine salvers.	
LSC Day Two	• Request and stage resources into Gippsland to enable long term operations to occur: ○ Integration of tier two and tier three resources into the response. • Execute waste management plan: ○ Call out third party contractor (Cleanaway) ○ Estimate volumes of liquid waste consistent with large scale containment and recovery. • Equipment mobilization – temporary storage and decontamination. • Supporting resources for response personnel.	☐

Table 4-8 Surveillance Monitoring and Visualisation Strategy

Level two and three spills - Commonwealth Waters, No Predicted Shoreline Impacts Surveillance Monitoring and Visualisation Strategy		
Tactic: satellite tracking buoys will be deployed to monitor the leading edge of the slick; and deployed in 24-hour intervals to indicate swept pathways.		Completed?
OSC Day one	• Deploy STB from Longford (helicopter or vessel) – place on leading edge of spill. • Tracking Buoy Deployment Instructions	☐
	• Request AMOSC all available STB's to be contracted to Esso: STBs move to Longford as soon as possible. At last light, deploy STB from the spill source.	☐
Day two +	• Monitor location of deployed STBs: At last light, deploy STB from the spill source.	☐
Tactics: twice daily manned overflights will be undertaken to monitor the spreading, location, and weathering of the slick.		Completed?
OSC Day One	• Commence twice daily aerial overflights to determine size/bearing: Divert aircraft to track spill (or use of scheduled crew change helicopter routing). If Esso asset unavailable, contact and contract the use of third-party aircraft.	☐
OSC Day two	• Continue twice daily aerial overflight to determine size/bearing: Divert vessel/aircraft to track spill (or use of scheduled crew change helicopter routing). If Esso asset unavailable, contact and contract the use of third-party aircraft. Aircraft over slick 30 mins after first light	☐

Level two and three spills - Commonwealth Waters, No Predicted Shoreline Impacts Surveillance Monitoring and Visualisation Strategy		
	Use location of deployed satellite tracking buoys as initial extents for aircraft bearing.	
Tactics: daily oil spill trajectory modelling will be used to predict the weathering and direction that the oil will spread.		Completed?
PSC Day One; then each day	• Request through AMOSC twice daily OSTM runs to verify data gained through manual means, request to include: 12/24/36/48/60/72-hour outlook deterministic trajectory modelling. Potential for shoreline or state water contact • Data to be relayed back to the SITU. • Request through AMOSC for OSTM third party be deployed into the Esso IMT to provide direct support to the SITU. • Monitor movement of tracking buoys. Fastwave Dashboard - User guide	☐
Tactics: Set a twice daily watch to confirm the extent and spreading of the spill from the assets.		
OSC Day One; then each day	• If spill from a manned asset, set two hourly watch to confirm bearing/size.	☐
Tactics: OSMP as triggered		Completed?
	Activate the various Operational Monitoring Programmes contained within the OSMP: • O1 – O5 as per triggers in OSMP	☐
Tactics: Establish the Esso Common Operating Picture in the Esso IMT		Completed?
OSC/SITL Day one, then for the duration of the spill	• Establish Esso's CoP. • Commence data capture and graphical display. • Key data to be displayed includes: Spill location. Spill extent, direction and trajectory. Environmental sensitives. Bass Strait oil and gas facilities. Passing ships. Esso controlled contracted resources – aircraft and vessels. Third party controlled potential resources of opportunity – aircraft and vessels.	☐
For Level Three Spills only		
Tactics: Request satellite imagery of the spill location.		Completed?
PSC/ SITL	• Request satellite imaging of spill Refer ExxonMobil Production Geospatial Emergency Response Service Alternative options: • Request satellite imagery via AMOSC. • Request satellite imagery via OSRL – Agreement in place with Radiant Solutions.	☐

Table 4-9 Marine Dispersant, and Containment & Recovery Operations

Level two and three spills - Commonwealth Waters, No Predicted Shoreline Impacts Marine Dispersant, and Containment & Recovery Operations		
Note: This strategy is dependent on NEBA outcomes and oil trajectory		
Tactic: Establish strike teams able to undertake containment and recovery, and/or dispersant operations.		Completed?
LSC Day One	• Establish BBMT as initial Marine FOB. • Secure four vessels for marine operations – if not engaged in other safety critical mission. • Direct vessels to BBMT to load out equipment. • Direct AMOSC to shift C&R equipment from Geelong to BBMT: 6 x offshore boom reels. 2 x offshore skimmer unit. If vessel tanks are <500 m3 arrange temporary storage units. • Move BBMT offshore vessel based dispersant systems to wharf edge: 2 x afedo dispersant spray systems. 30 m3 dispersant (15 per vessel). • Request available Esso Core group recall for duty – vessel-based operations from day two. • Load out vessel for operations.	☐
OSC Day One	• Prepare ICS204 for C&R and dispersant operations: Refer to draft ICS204 for operations Appendix A.	☐
OSC Day Two	• Brief teams on the two separate ICS204. • Direct strike teams (each strike team comprises a pair of vessels) to area of operations: For dispersant operations, field test must be conducted prior to operational spraying, with positive results reported to the IMT. PSC to confirm based on the field dispersant testing move to large scale operational spraying.	☐
Tactic: Establish Marine FOBs for ongoing large-scale marine operations.		Completed?
LSC Day Two	• Based on shoreline impacts, plan for either/or BBMT and Lakes Entrance as marine FOB for ongoing C&R operations: Offshore C&R operations (large vessel operations – wharf considerations - under keel clearance, width, tug availability). Nearshore/shoreline vessel support operations. • Demarcate in each location: OSR Equipment receipting and laydown areas. Office and briefing space. Temporary storage of waste management (coming off of vessel after shift).	☐
Tactics: Request and contract level three offshore response support – escalated resourcing.		Completed?
LSC	• Contract additional vessels for C&R: Nearshore/shoreline need – marine surveyed vessels.	☐

Level two and three spills - Commonwealth Waters, No Predicted Shoreline Impacts Marine Dispersant, and Containment & Recovery Operations		
Day two	Coastal/offshore need – marine surveyed. • Shift all Esso OSR equipment to BBMT/Lakes Entrance: Boom reels. Skimmer units. Temp storage. Dispersant spray sets. • Request and shift AMOSC nearshore and offshore C&R equipment, and all shoreline equipment to BBMT/Lakes Entrance: Offshore booms reels. Offshore skimmer packages. Shoreline surveillance equipment – drone, Unmanned aerial vehicles.	

Table 4-10 Aviation Dispersant Operations

Level two and three spills - Commonwealth Waters, No Predicted Shoreline Impacts Aviation Dispersant Operations		
Note: This strategy is dependent on NEBA outcomes and oil trajectory.		
Tactic: Mobilise tier two aviation dispersant operations and dispersant resupply.		Completed?
LSC Day One	• Source domestic dispersant spraying aircraft Via AMOSC (AMSA Fixed Wing Aerial Dispersant) NatPlan link: Victorian based aircraft move to Bairnsdale as nominated airfield. • Request re-location of dispersant stockpiles to Bairnsdale from Esso BBMT (10 m^3). • Request AMOSC Geelong to move Corexit 9500a and Slickgone NS to Bairnsdale airfield.	☐
OSC/Aviation Branch Director Day One	• Complete actions per checklists in the *Aerial Dispersant Operations Plan for Oil Spills in Bass Strait*: o 1st spraying operation – Victoria-based aircraft to fly to Bairnsdale as the nominated airfield. o Secondary overhead coverage aircraft to be provided by third party contractor. o 2nd and subsequent operations to be undertaken from Bairnsdale Airport. o 2nd and 3rd aircraft arriving during day two of operation. o Volume of dispersant used to be reported to SITL • Establish communications links with AMSA air base manager and dispersant loading operator.	☐
OSC/Aviation Branch Director Day One	• Prepare and brief on ICS204 for aerial dispersant operations: Refer to draft ICS204 for operations- Appendix A Field test spray to be conducted prior to operational spraying, with positive results reported to the IMT. Field test spray to be reported via visual efficacy results from overhead aircraft and on-scene vessels.	☐
PSC/EUL	• Ensure ongoing OSMP deployment of O2.2	
OSC/Aviation Branch Director	• Prepare and brief on ICS204 for aerial dispersant operations with additional aircraft. • Update *Aerial Dispersant Operations Plan* with additional aircraft:	☐

Level two and three spills - Commonwealth Waters, No Predicted Shoreline Impacts Aviation Dispersant Operations		
Day Two	Refer to attached draft ICS204 for operations Field test spray to be conducted prior to operational spraying, with positive results reported to the IMT. • Field test spray to be reported via visual efficacy results from overhead aircraft and on-scene vessels. • Mount ongoing operations.	
Tactic: Consider the mobilisation of tier three dispersant resupply		Completed?
LSC Day Two	• Calculate dispersant 'burn rate' and if it exceeds Australian national stockpiles, request OSRL activation of Global Dispersant Stockpiles. Refer to Quick Reference Guide in Appendix D for WCDS resource requirements. • Develop mobilization plan with OSRL and Chapman Freeborn to shift dispersant to Australia – freight aircraft operating from Singapore.	☐

Table 4-11 Oiled Wildlife Response Strategy

Level two and three spills - Commonwealth Waters, No Predicted Shoreline Impacts Oiled Wildlife Response Strategy		
Note: This strategy is dependent on NEBA outcomes and direction with the .		
Tactic: Through the DTP/Control Agency IMT, engage with DEECA and provide assistance to their Concept of Operations for *Oiled Wildlife Response*.		Completed?
PSC/EUL Day 1	• Based on the NEBA, fates and trajectory modelling, ascertain likely wildlife impacts – provide this data to DEECA and DTP. Refer to Area Response Plan and Species Response Plan for guidance. • Send Liaison Officer Control Agency IMT. • Advise ExxonMobil RRT Coordinator of potential resource needs. • Determine likely tactics to reduce wildlife impacts: Hazing Trans-location Other OSR tactics.	☐
OSC Day 1	• Establish Industry OWR coordinator (from AMOSC) to oversee Esso OWR activity.	☐
LSC Day 1	• As requested, or directed by DELWP and on the basis of advice of the OWR Coordinator, stand up AMOSC OWR resources: Facility support contract. Equipment and clean-up resources from Geelong. Equipment and clean-up resources from Perth. AMOSC OWR support team.	☐
LSC Day 2	• Deploy requested OWR resources to the DELWP OWR ICP/field facility.	☐
OSC/Industry OWR coordinator	• Execute Esso OWR response operations as required or directed by DELWP.	☐

Level two and three spills - Commonwealth Waters, No Predicted Shoreline Impacts Oiled Wildlife Response Strategy		
Day 2		

4.3 Level One Spills – Commonwealth Waters, Localised Impacts Only

Table 4-12 Incident Management Team

Level one spills - Commonwealth Waters, Localised Impacts Only Incident Management Team		
Tactic: Establish and staff the Esso IMT that oversees the implementation of oil spill response measures		Completed?
IC Day One	• Establish IMT: Identify IC/OSC/ PSC and Environmental Units.	☐
IC Day two	• Review team make up for current, and future operational period. • Are the functional areas aligned with the needs of the response?	☐
Tactic: Draft and execute an Incident Action Plan		Completed?
IC lead	• Commence planning cycle ('stem of P').	☐
PSC Day One	• Complete the initial IAP (ICS 201 sheet): Establish current operational period aim, objectives, strategy, tactics and resources. Draft 24- and 48-hours incident potential worksheet (size up). Complete NEBA. Confirm the potential for sensitivity impacts. Confirm feasibility of 1st strike marine response for C&R or Dispersant operations. Confirm feasibility of 1st strike aviation response. • Inform DTP of Esso intent – provide ICS201 and SitRep. • Undertake risk assessment of any proposed tactical execution of strategy (below actions – marine/aviation operations).	☐
PSC Day Two	• IMT continues planning cycle (stem of the planning 'p'). • Review the ICS201 from the previous day: Confirm suitability of the aim, objectives, strategies, tactics and resources for the operational period? Review the appropriateness of the spill response level. Continue execution of previous day's plan and modify as needed.	☐
OSC Day Two	• Plan and execute immediate/first strike operations (as per following checklist) as determined appropriate: • Marine operations – dispersant and containment and recovery, Vessels - Vessels of Opportunity, Equipment – Esso, AMOSC, Personnel – Esso/Esso CG, AMOSC. • Aviation operations – surveillance operations: Aircraft.	☐

Level one spills - Commonwealth Waters, Localised Impacts Only Incident Management Team		
OSC/SC Branch Manager Day one	• As needed execution Source Control arrangements: Activate Australia Wells Team Tier II/III Emergency Response Plan. • Containment contracts/assistance contracts. • Activate pipeline repair. • Activate marine salvers.	☐
LSC Day Two	• Monitor asset staging: Confirm that business as usual locations and assets are adequate for the response.	☐

Table 4-13 Surveillance Monitoring and Visualisation Strategy

Level one spills - Commonwealth Waters, Localised Impacts Only Surveillance Monitoring and Visualisation Strategy		
Tactics: twice daily manned overflights will be undertaken to monitor the spreading, location, and weathering of the slick.		Completed?
OSC Day One	• Commence twice daily aerial overflights to determine size/bearing: Divert aircraft to track spill (or use of scheduled crew change helicopter routing). If Esso asset unavailable, contact and contract the use of third-party aircraft.	☐
OSC Day two	• Continue twice daily aerial overflight to determine size/bearing: Divert vessel/aircraft to track spill (or use of scheduled crew change helicopter routing). If Esso asset unavailable, contact and contract the use of third-party aircraft.	☐
Tactics: daily oil spill vectoring and weathering analysis to predict the direction that the oil will spread, and its degradation.		Completed?
PSC Day One; then each day	• EUL to undertake vectoring (manual trajectory) and weathering: 12/24-hour outlook. Weathering based on the ADIOS2 computer programme. Data to be relayed back to the SITU. • Should analysis show state water/shoreline impacts, request of AMOSC OSTM through third party.	☐
Tactics: Set a twice daily watch to confirm the extent and spreading of the spill from the assets.		Completed?
OSC Day One; then each day	• If spill from a manned asset, set two hourly watch to confirm bearing/size.	☐
Tactics: OSMP as triggered		Completed?
OSC / EUL	• Activate the various Operational Monitoring Programmes contained within the OSMP.	☐

Level one spills - Commonwealth Waters, Localised Impacts Only Surveillance Monitoring and Visualisation Strategy		
Day One; then each day		
Tactics: Establish the Esso Common Operating Picture in the Esso IMT		Completed?
OSC/SITL Day one, then for the duration of the spill	• Establish Esso's COP. • Commence data capture and graphical display. • Key data to be displayed includes: Spill location. Spill extent, direction and trajectory. Environmental sensitives. Bass Strait oil and gas facilities. Passing ships. Esso controlled contracted resources – aircraft and vessels. Third party controlled potential resources of opportunity – aircraft and vessels.	☐

Table 4-14 Marine Dispersant, and Containment & Recovery Operations

Level one spills - Commonwealth Waters, Localised Impacts Only Marine Dispersant, and Containment & Recovery Operations		
Note: This strategy is dependent on NEBA outcomes and oil trajectory		
Tactic: Establish one x strike team to undertake containment and recovery, and/or dispersant operations.		Completed?
LSC Day One	• Establish BBMT/Lakes Entrance (Bullock Island) as initial Marine FOB. • Secure two vessels for marine operations – if not engaged in other safety critical mission. • Direct vessels to BBMT to load out equipment. • Direct AMOSC C&R offshore boom to BBMT wharf edge and load out: 3 x offshore boom reels 1 x offshore skimmer unit If vessel tanks are <500 m3 arrange for temporary storage units. • Move BBMT offshore vessel based dispersant systems to wharf edge: 1 x afedo spray system. 10 m^3 dispersant. • Mobilise satellite track buoy to platform and/or vessel • Request available Esso Core group recall for duty – vessel-based operations from day two. • Load out vessel for operations.	☐
OSC Day One	• Prepare ICS204 for C&R and dispersant operations: Refer to draft ICS204 for operations - Appendix A	☐
OSC Day Two	• Brief teams to the two separate ICS204. • Direct strike teams to area of operations: For dispersant operations, field test must be conducted prior to operational spraying, with positive results reported to the IMT. PSC to confirm based on the field dispersant testing move to large scale operational spraying.	☐

Table 4-15 Oiled Wildlife Response

<table>
<tr><th colspan="3">Level one spills - Commonwealth Waters, Localised Impacts Only
Oiled Wildlife Response</th></tr>
<tr><td colspan="3">Note: This strategy is dependent on NEBA outcomes and oil trajectory.</td></tr>
<tr><td colspan="2">Tactic: Through the DTP, engage with DEECA and provide support to their Concept of Operations for Oiled Wildlife Response.</td><td>Completed?</td></tr>
<tr><td>PSC/EUL

Day 1</td><td>• Based on the NEBA, fates and trajectory vectoring, ascertain likely wildlife impacts – provide this data to DEECA and DTP.
• Refer to Area Response Plan and/or Species Response Plans to determine likely tactics to reduce wildlife impacts:
Hazing
Trans-location
Other OSR tactics.</td><td>☐</td></tr>
<tr><td>LSC

Day 1</td><td>• As requested, or directed by DELWP and based on advice of the OWR Coordinator, stand up AMOSC OWR resources:
Facility support contract.
Equipment and clean-up resources from Geelong.
Equipment and clean-up resources from Perth.
AMOSC OWR support team.</td><td>☐</td></tr>
<tr><td>OSC/Industry OWR coordinator

Day 2</td><td>• Execute Esso OWR response operations as required or directed by DELWP.</td><td>☐</td></tr>
</table>

5 Ongoing Incident Management Activities 48 hours +

Note: From this point forward, IMT members are to utilise their Incident Management handbooks and IMT role descriptions to guide their daily activities, with this OPEP informing the subject matter expertise.

By following the checklists in section three and four, an appropriately sized and resourced IMT will have been set up, with operational resources deployed and pre-moved to execute confirmed and likely time-sensitive response strategies.

Sections of the OPEP continue to be colour coded to provide section-specific guidance to command, planning, operations, and logistics sections/areas.

Spill response operations are to continue during each operational period to put in place desired environmental outcomes until termination criteria can be applied to the tactical implementation of each spill response strategy.

Esso's Operational Monitoring Programme will inform the application of measures, and the Scientific Monitoring Programme will need to continue parallel to the response operations until such time as its own independent termination criteria have been met.

Once Esso has moved through the first 48 hours of response, laying the foundation for an ongoing response, the IMT and spill response operations will settle on a planning and operations implementation cycle, based on the ICS planning 'p'.

This section describes the (1) process used to evaluate oil spill response strategies by the Environmental Unit of the planning section and the (2) guidelines for the operations section to execute the chosen strategies.

The IMT is expected to go through the planning 'p' on a daily basis, even if the outcome of that process is to validate the current Incident Action Plan as appropriate for multiple operational periods.

5.1 Incident Action Planning Process

Once established, the task of the IMT is to establish situational awareness by gathering information, analysing this data, and applying the appropriate, defensible procedures and processes listed in the OPEP and EP to reduce harm to the environment.

The cornerstone document to guide the response to this end is the production and execution of the 'Incident Action Plan' – the business plan for the response.

In its basic form, an IAP is a simple document that tells responders what they need to do to resolve/mitigate an unplanned incident. It will include an aim, objectives, description of the situation, a worst case 'size up' consequence description, a NEBA, a description of what resources are at risk, and the activities that will be undertaken to resolve the situation/minimise environmental impacts.

For all oil spills, a level one IAP will comprise the completion of the following documents that comprise the Initial IAP:

- Weather report
- ICS201-1 Incident Briefing Map/Sketch
- ICS201-2 Summary of Current Actions
- ICS201-3 Organisation Chart
- ICS201-4 Resource Summary
- Notification Status Report

Additional forms may be used as required. Refer to Incident Management Handbook – IAP Preparation Guidance – Initial IAP Listing.

For level two and level three spills, a more comprehensive IAP is to be developed. This will require significant IMT resources to ensure that the plan is developed properly and that operations are simultaneously undertaken. The content of the IAP will be determined by the Incident Commander in consultation with the Planning Section Chief. Typically required components include

- Weather Report
- Incident Map
- ICS 202 Incident Objectives
- ICS 203 Organisation Assignment List
- ICS 204 Assignment List
- ICS 205 Communications Plan
- ICS 206 Medical Plan
- ICS 207 Organisation Chart

Note: Refer to Incident Management Handbook – IAP Preparation Guidance – Detailed IAP Listing for further guidance.

Note: The IAP must also include two additional pieces of analysis specific to the oil spill response

A description of the ICS 232 – Resources at Risk (derived from the execution of the SMV strategy)

An analysis of the benefits and dis-benefits of executing oil spill response strategies – the NEBA (derived from the execution of the SMV strategy).

The typical daily work pattern for the production of the IAP is as follows:

Time	Meeting [ICS 230]	Attendance
ASAP (<4hours)	• Initial Incident Brief • Initial incident IC/UC meeting	• IC Command Staff reps; General Staff reps • Handover meeting/brief
0800	• Objectives Meeting • Review/ identify objectives for the next operational period.	• Esso IC; Command Staff reps; General Staff reps
1000	• Command & General Staff Meeting • IC/UC gives direction to Command & General staff including incident objectives and priorities.	• Incident Commander • Public Information Officer • Liaison Officer • Safety Officer • Legal • Security / Intelligence Officer • Operations Section Chief • Planning Section Chief • Logistics Section Chief • Finance Section Chief • Documentation Unit Lead • Situation Unit Lead
1100	• Strategic stakeholder briefing • Brief OPICC/NOPSEMA/States	• Esso ESG Leader • Esso Incident Commander • Liaison Officer • OPICC • NOPSEMA • DTP
1300	• Tactics Meeting • Develop/Review primary and alternate strategies to meet Incident Objectives for the next Operational Period.	• Operations Section Chief • Planning Section Chief • Logistics Section Chief • Finance Section Chief • Resource Unit Lead • Documentation Unit Lead • Situation Unit Lead • Env. Unit Lead • Safety Officer • Documentation Unit Lead

Time	Meeting [ICS 230]	Attendance
1500	• Planning Meeting • Review status and finalize strategies and assignments to meet Incident Objectives for the next Operational Period.	• Esso Incident Commander • Agency Representative • Public Information Officer • Liaison Officer • Security/Intelligence Officer • Legal Officer • Operations Section Chief • Planning Section Chief • Logistics Section Chief • Finance Section Chief • Resource Unit Lead • Documentation Unit Lead • Situation Unit Lead • Env. Unit Lead • Safety Officer • Documentation Unit Lead
1700	• Operations Brief • Present IAP and assignments to the Supervisors / Leaders for the next Operational Period.	• Esso Incident Commander • Operations Field leadership • Safety Officer • Public Information Officer • Liaison Officer • Security Officer • Legal Officer • Section Chiefs • Documentation Unit Lead • Resource Unit Lead • Situation Unit Lead • Environment Unit Lead

This cycle is represented in the planning ‘p’ below, Figure 5-1, with key written outputs noted by the arrows.

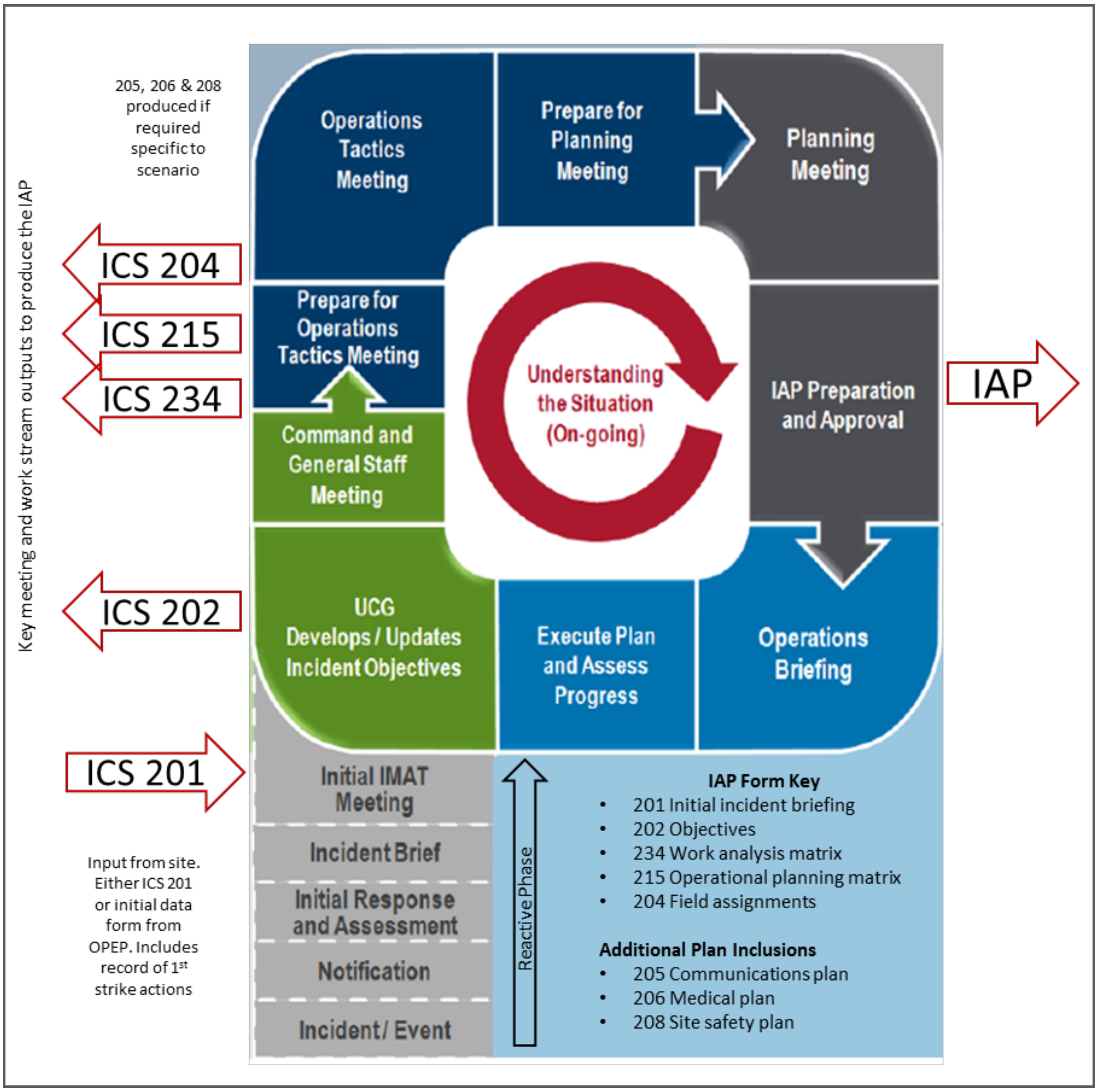


Figure 5-1 Incident Planning

5.2 Selection of Response Strategies – Net Environmental Benefit Analysis

Activity specific protection priorities and selection of response options are summarised in Appendix D – Quick Reference Information.

A 'preparedness NEBA' (which is essentially a draft of Step 1 & 2 of the NEBA Process described in Volume 3, Table 2-4) can be referenced in the event of an incident and used as a template during the response.

A summary of potential applicable response options for different types of hydrocarbon spills has also been provided below.

In the event of an incident, it will be necessary to check the priorities defined in the Quick Reference Guides (Appendix D) are current and supported by stakeholders, and check the response strategies are indeed feasible given the specifics of the situation.

Key:

P	Proposed	The tactic will be deployed where safe to do so and where the NEBA indicates the strategy will result in net environmental benefit, and if the response or the spill is likely to impact State waters, the response will be approved by the State Authority.
V	Viable	The tactic will be considered as a viable option, but deployment may not be warranted because of the size of spill, conditions, and other factors at the time of the spill.
NR	Not recommended	The tactic may be viable but is not recommended either due to safety considerations or impacts of the tactic itself.
NV	Not viable	The potential to deploy the tactic effectively is limited.
NP	Not practical	The tactic cannot be implemented for the resource type; e.g., resource type is inaccessible.
NA	Not applicable	The resource type does not warrant this response.

NEBA Summary - Diesel Spill

Offshore receptor	Exclusion zone	Hazing to deter wildlife	Monitoring and natural dispersion	Marine-based containment and recovery	Protection deflection	Chemical treatment, e.g., dispersant application (surface)
1. Open marine environment	P	V	P	NV	NR	NR
2. Seabed	NA	NA	P	NV	NA	NR
3. Subtidal rocky reefs	V	NA	P	NV	NA	NR
4. Estuaries	V	V	P	NV	P	NR
5. Shipwrecks	V	NA	P	NV	NA	NR
6. Fisheries: Southern shark and scalefish	P	NA	P	NV	NR	NR
7. Fisheries: Southeast fishery	P	NA	P	NV	NR	NR
8. Fisheries: Southern scallop	P	NA	P	NV	NR	NR
9. Fisheries: Southern rock lobster	P	NA	P	NV	NR	NR
10. Fisheries: Abalone	NA	NA	P	NV	NR	NR
11. Shoreline	P	P	P	NR	P	NR

NEBA Summary - Light Crude Spill

Offshore resource type	Exclusion zone	Hazing to deter wildlife	Monitoring and natural dispersion	Marine-based containment and recovery	Protection deflection	Chemical treatment, e.g., dispersant application (surface)
1. Open marine environment	P	V	P	V	V	V
2. Seabed	NA	NA	P	NA	NA	NA
3. Subtidal rocky reefs	P	NA	P	V	NR	NR
4. Estuaries	V	V	P	NA	P	NR
5. Shipwrecks	P	NA	P	V	NR	NA
6-10. Fisheries	P	NA	P	V	NA	P except in shallow water over sessile aquaculture.
11. Shoreline	P	P	P	V	V	NR

NEBA Summary - Condensate Spill

Offshore resource type	Exclusion zone	Hazing to deter wildlife	Monitoring and natural dispersion	Marine-based containment and recovery	Protection deflection	Chemical treatment, e.g., dispersant application (surface)
1. Open marine environment	P	V	P	NR	NR	NR
2. Seabed	NA	NA	P	NA	NA	NA
3. Subtidal rocky reefs	P	NA	P	NR	NR	NR
4. Estuaries	P	V	P	NR	NR	NR
5. Shipwrecks	P	NA	P	NR	NR	NR
6-10. Fisheries	P	NA	P	V	NA	NR
Shoreline impacts	P	P	P	V	V	V

NEBA Summary – Waxy Crude Spill

Offshore Resource Type	Exclusion zone	Hazing to deter wildlife	Monitoring and natural dispersion	Physical / mechanical agitation	Marine-based Containment and recovery	Protection deflection	Chemical treatment, e.g. Dispersant application	In situ burning
1. Open marine environment.	P	V	P	V	V	V	P	V
2. Seabed	NA	NA	P	NA	NA	NA	NA	NA
3. Subtidal rocky reefs	P	NA	P	NR	V	NR	NR	NR
4. Estuaries	V	V	P	NR	V	P	NR	NR
5. Shipwrecks.	P	NA	P	NA	V	NR	NR	NR
6-10. Fisheries	P	NA	P	V	V	NA	P except in shallow water over sessile aquaculture.	V

Where shoreline impacts are predicted, a response-specific NEBA will be undertaken, in conjunction with DTP, to determine and agree on the appropriate response strategies.

A simple grouping of these tactics by location / hydrocarbon type:

Location	Loss of diesel, lubricating, condensate or mechanical oils	Crude oil releases
All locations	• Surveillance, monitoring, and visualisation • Exclusion zones, considering health and safety and environment risks are determined in consultation with the control agency. • Oiled wildlife response	
Spill site	• Source control (BOP intervention, relief well drilling, pipeline engineering efforts)	
Offshore environment (Commonwealth waters)	• Mechanical dispersion	• Chemical dispersant • Containment and recovery
Offshore and nearshore environments (Commonwealth and coastal waters)		• Containment and recovery
Coastlines and islands	• Protection deflection • Containment and recovery • Shoreline response – assessment and clean-up • Oiled wildlife response	

Each tactic will be applied in a manner as determined by a dynamic planning process, adapted at the time to the current weather and sea conditions.

NEBA instructions:

For all spills, a spill-specific NEBA needs to be developed as outlined in Figure 5-2 and summarised as follows:

a. Select the appropriate NEBA worksheets from http://ishareteam1.na.xom.com/sites/EMPC0263/EPP/Environment%20Plans/6_NEBA.xlsx by oil type.

b. Refer to OSRA[2] maps and cull non-relevant Resource Types according to the areas of the environment that are predicted to be impacted.

c. Review the protection priority of the remaining resources (using relevant sections of EP Volume 2 Section (Loss of Containment / Loss of Well Control). Also refer to Quick Reference Information for specific activities OPEP- Appendix D.

d. Review and expand on each of the benefits and disbenefits within the NEBA worksheet according to incident-specific details and further response considerations.

e. Assess the effectiveness of the response strategies in protecting the resources at risk.

f. Summarise the preferred strategy into the Incident Action Plan.

[2] The Oil Spill Response Atlas (OSRA) is a national database and decision support system in a computerised GIS format. It is designed to provide comprehensive information about Australia's coastal resources and spill response logistics. OSRA includes information on: shoreline geomorphology, marine habitats, environmental resources, cultural and heritage sites, commercial resources, logistics and infrastructure information to support spill response. OSRA is accessed through AMSA in emergency situations.

Detailed information on priorities for protection, potential impacts, and preferred response strategies will be used in conjunction with incident-specific trajectory modelling and real-time conditions to determine the most appropriate incident-specific response.

Using the outputs of the NEBA as a feed into the planning 'P' process, the IMT will then draft/validate tactical plans for specific areas and execute those plans.

A link to the NEBA tool can be found here:

NEBA Tool

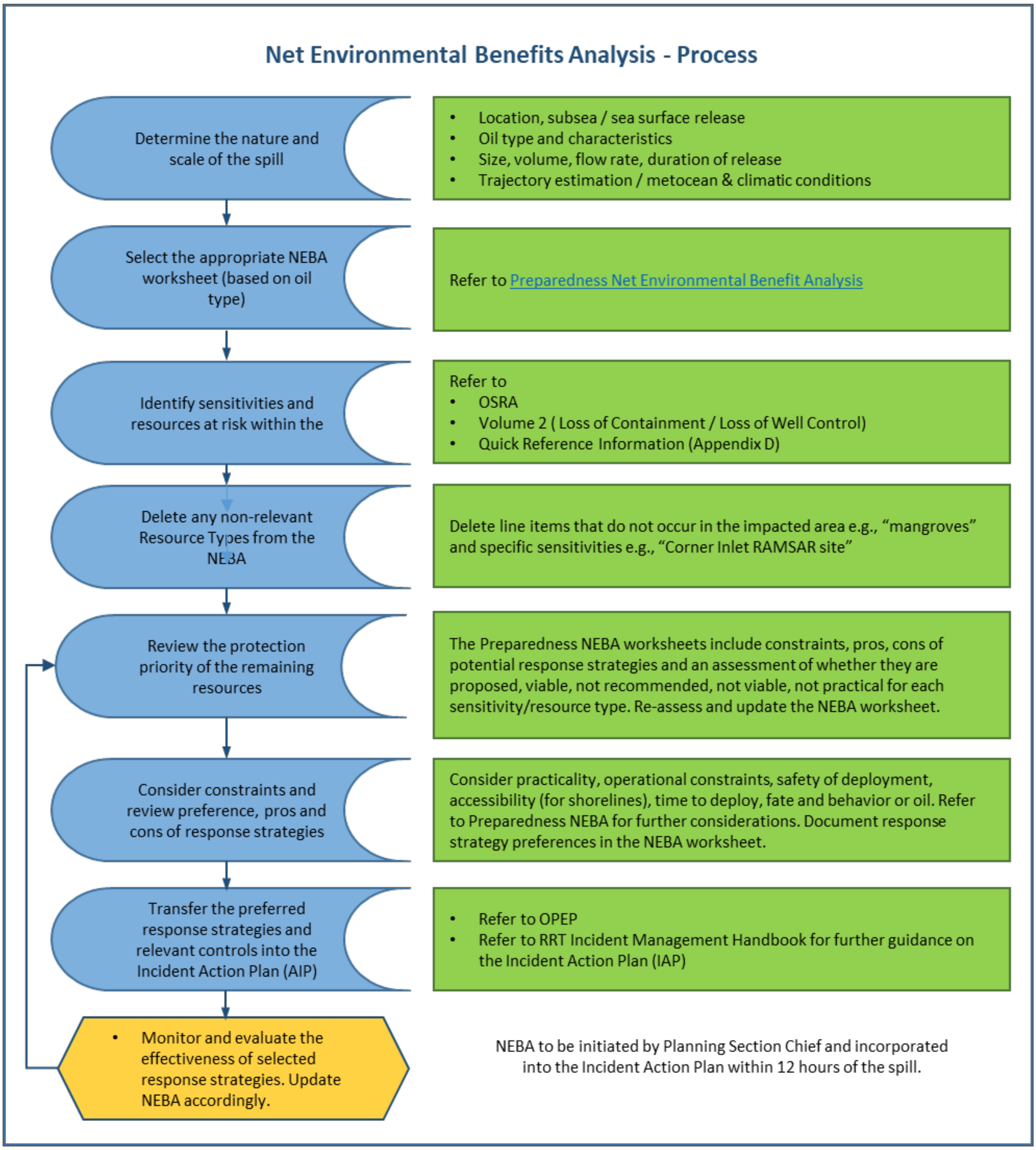


Figure 5-2 NEBA Process Flowchart

5.3 Cone of Response

For all offshore spills, Esso will utilise a 'cone of response' approach to spill response operations. This means proportioning resources to the spill response strategies that have a bulk removal/treatment affect closest to the source of the spill. The 'cone' is visually depicted below:

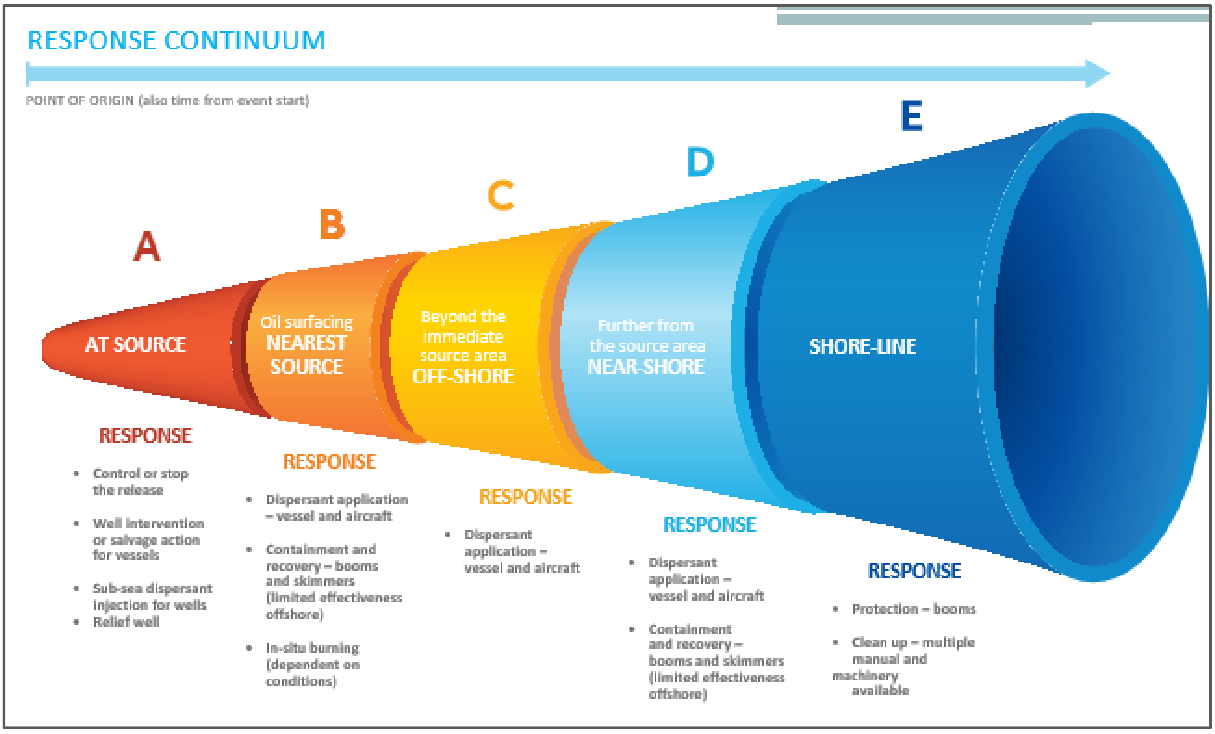


Figure 5-3 Cone of Response

For spills in near-shore waters or where shoreline impacts are imminent (<48 hours), the cone will be modified – Esso's efforts will focus on minimising impacts to sensitives, particularly the shoreline, while also prioritising control of the source of the spill. Once shoreline protective/response measures are in place, efforts will revert back other areas of the 'cone'.

The 'cone' directs response resources to where maximum effectiveness will occur. Using this methodology, each tactic or strategy is executed cogniscent of the volume of remaining oil to be treated from the previous strategy.

In practical terms this means that Esso will, in priority order:

1. Capitalise on window of opportunity for dispersant application with appropriate type and quantity of dispersant to reduce bulk surface and shoreline loading; and then
2. Utilise offshore and nearshore containment & recovery strike teams to recover oil not dispersed, so as to reduce bulk surface and shoreline loadings; and then
3. In coordination with control agency, execution of shoreline protection measures, to reduce volumes of remaining oil from reaching and impacting shore-based sensitivities.

The following is a description of each oil spill response strategy that Esso will put in place where applicable to the incident:

5.4 Source Control

Strategy Description:

Well intervention, subsea infrastructure repairs, pipeline repair and vessel salvage will be used as appropriate to the source of the spill to control and cease the uncontrolled flow of hydrocarbons into the environment.

Relevant environmental performance outcomes and standards are provided in Appendix C.

Source Control	
Response Objective	To prevent further uncontrolled release of hydrocarbons into the marine environment.
Critical Outputs	Wells/drilling: All source control operations will be done in accordance with the Esso Gippsland Well Kill Contingency Plan (for source control using the Well Kill Skid) and the Drilling Emergency Preparedness and Response Manual (where required) relevant to that particular well and the source control options within that plan. Depending on the circumstances, the plans outlines the following options that will be followed: • Blowout preventer intervention • Seabed debris clearance • Rig for relief well drilling. Pipeline/subsea infrastructure: All pipeline/subsea infrastructure will be done in accordance with [Pipeline Management Plan]. Pipeline repairs include the use of ROVs with cutting or working tools, valve interventions, and pipeline de-pressurisation. Vessel salvage: Esso will provide support to AMSA or Marine Safety Victoria to ensure appropriate salvage operations.
Planning Section Instructions	As per individual source control plan/incident action plan.
Operations Section Instructions	
Logistics Section Instructions	

5.5 Surveillance and Monitoring

Strategy Description:

Using field observations and modelling, the IMT will assess the incoming data to plan and tailor spill response operations to the scenario of the day. This process will continue for the duration of the response.

Relevant environmental performance outcomes and standards are provided in Appendix C.

Surveillance and Monitoring	
Response Objective	To gather information and validate planning assumptions to adjust response plans as appropriate to the scenario. To quantitatively assess the extent, severity, persistence, and recovery environmental values and sensitivities affected by the spill.
Critical Outputs	Level One Spills: • Aerial Surveillance • Oil Spill Trajectory Monitoring (Vectoring + ADIOS). Level Two Spills (in addition to the above) • Twice daily Oil Spill Trajectory Modelling. • Continuous monitoring from Oil Spill Tracking Buoys. • Surveillance from: Production assets – 4 hourly watch Aircraft – 2 x daily overflights Vessels – Opportunistically to sense check aerial observations. • Shoreline surveys (pre-emptive and post impact). • Operational and Scientific Monitoring programmes. Level Three Spills (in addition to the above) • Satellite photography runs as requested by the SITU.

Surveillance and Monitoring	
Planning Section Instructions	The Planning Section – Environment and Situational units in particular – needs to receive and interpret field/modelling data to inform • The Net Environmental Benefit Assessment. • The list of Resources at Risk from the spill. • The development of the ICS 201 and IAP (for level two and three spills). Critical Daily Tasking: • Drive the planning process (refer to IMH schedules and timings). • Liaise with OSC to ensure field activities are in place to gather field data. • Liaise with LSC to activate and then receive the OSTM. • Establish and activate the OSMP with data reporting back to the SITU. • Gather data, establish, and keep up to date Status Boards and CoP GIS (refer to IMH Section 6). The Planning Section will ensure that the SMV strategy is scaled up or down to provide sufficient information for the IMT to plan and execute appropriate oil spill response activities. All data gathered through remote means are to be captured and displayed in the Common Operating Picture (Esso GIS) so that all members of the IMT have situational awareness. For level two or three spills, the Planning Section includes coordination of SCAT teams on shorelines, feeding data directly into the SITU.
Operations Section Instructions	The Operations Section is to task assets (marine and aviation divisions; shoreline) to gather data that can be used by the Planning Section to inform the development of the IAP and the operational response. This is done as a part of the execution of the IAP developed the previous day. Critical Daily Tasking: • Execute the IAP for the current Operational period. • Liaise with the PSC to ensure that field tasking (ICS 204) is drafted and used for SMV proposes. • All Spills:

Surveillance and Monitoring	
	• Direct aviation assets to complete aerial surveillance consistent with aerial observer guides and standard operating procedures. Spill Level Two and Above • Deploy satellite tracking buoys (Longford and third party). • Direct dedicated aviation assets to undertake surveillance with trained aerial observers. • Direct marine assets to undertake surveillance. • Set watch from manned platforms (4-hour report back). • Deploy vessel for OSMP activities.
Logistics Section Instructions	The Logistics Section is to activate contracts and provide ongoing services and supply (from in-house resources or from third parties) in support of the execution of this strategy. Critical Daily Tasking: All Spills: • Business-As-Usual assets to be redeployed as per operational requirements – Dispersant spraying strike team. • Shift dispersant to BBMT as per 1st strike checklist. Activate contract with AMOSC and request dispersant. Spill Levels Two and Three • Maintain Air Operations base at Bairnsdale • Activate contracts with third-party aircraft providers. • Marine Operations Base at BBMT or Lakes Entrance. • Activate contract with AMOSC, request aerial observers for daily sorties, satellite tracking buoys to Longford, and twice-daily OSTM. Spill Level Three Only • Activate contract with AMOSC/internal for the provision of Satellite photography services.
Termination Criteria	Detectable oils are below the thresholds outlined in the OSMP

5.6 Dispersant Operations

Strategy Description:

Dispersant will be applied to ongoing crude oil spills using, aircraft and/or vessel.

Relevant environmental performance outcomes and standards are provided in Appendix C.

Dispersant Operations	
Response Objective	To reduce consequences to surface and shoreline values and sensitivities. To increase the bioavailability of oil for microbial breakdown.
Critical Outputs	Level One Spills: Based from BBMT; one vessel-based dispersant strike team. Daily dispersant spray capacity will be based on amount spilled. Levels Two and Three Spills (surface) Based from BBMT; two vessel-based dispersant strike teams Based from Bairnsdale Airfield; up to three air tractor aircraft (AT502 & AT802) flying multiple daily sorties to spray oil located in Commonwealth waters. Surge Resources – Dependent on observations of dispersant effectiveness and additional need determined by the IMT at the time For dispersant operations that project the exhaustion of Australia's dispersant supplies, global dispersant stockpiles from Singapore, may be air freighted to Australia and shifted to the operating airfields Based on the WCDS daily dispersant maximum spray requirements is calculated to be no greater than 42 m^3 per day.
Planning Section Instructions	The Planning Section – Environment Unit in particular – needs to assess on a daily basis that dispersant use will demonstrably achieve net positive outcomes. Chemical dispersants are not recommended for diesel or Group 1 oil spills. Demonstrable positive outcomes include reduction in large-scale shoreline loadings, particularly on remote coastlines such as the Bass Strait Islands, the wilderness areas of far-east Gippsland, Corner Inlet, and surrounding estuaries, and sensitivity specific positive impacts as demonstrated by the daily NEBA. Dispersants are only to be used in Commonwealth waters, where water depths (>10M) and currents will encourage mixing and dispersion. Dispersants are <u>not</u> to be used in State waters without approval of the Control Agency IMT. The state must be notified if dispersants used offshore have the potential to enter state waters. Critical Daily Tasking: • Develop incident specific dispersant operations plans based on the *Aerial Dispersant Operations Plan for Oil Spills in Bass Strait* plan (controlled copy available on AMOSC website).

Dispersant Operations	
	• Establish through a daily Net Environmental Benefit Assessment the ongoing benefit of dispersant spraying. • Ensure that operational and scientific monitoring programmes are in place, with data being collated and sent back to the EUL and SITU • Ensure daily dispersant operations are recorded (types, volumes, and locations). • Predict future dispersant 'consumption/burn rates' across all delivery means. • Assist operations to draft daily ICS 204 operations orders used by the aviation branch and complete the AMSA/AMOSC JSOP for the deployment of the FWADC. • The Planning Section needs to continuously monitor dispersant operations and scale them up or down to the number of daily sorties required to provide 100% spray coverage of slightly weathered (24 hours) crude oil. Dispersant selection will preference: • Dispersants listed on the AMSA Oil Spill Control Agents Register. • Those with highest efficacy testing against Esso Bass Strait crudes. Refer to 2019 Esso Dispersant Testing Report for details of laboratory analysis of a range of dispersants on Gippsland crude oils. A summary of the results is provided in Table E-1 in Appendix E. All data gathered through the OSMP in relation to dispersant operations are to be captured and displayed in the Common Operating Picture (Esso GIS) so that all members of the IMT have situational awareness.
Operations Section Instructions	The Operations Section, Marine, Aviation, and Source Control Branch Directors will task assets under their command to undertake daily dispersant operations as a part of the execution of the IAP developed the previous day. • Aviation operations will be split between: • Bairnsdale (AMSA/NatPlan-provided small air tractor aircraft and attack aircraft) • Longford Heliport. • Operational planning needs to assert control around the two distinct aircraft types. Safety planning to include separate, dedicated search and rescue (SAR) capability. Operational planning for aerial surface application will be based on the *Aerial Dispersant Operations Plan for Oil Spills in Bass Strait* and the completion of the AMSA / AMOSC FWADC JSOP available at www.amosc.com.au. Vessel spraying operations will come out of BBMT/Lakes Entrance on 3-4 day swings, dependent on deck space for dispersant and waste. Resupply will occur at these locations. Critical Daily Tasking: All Spills: • Execute the IAP for the current operational period. • Liaise with the PSC to ensure that field tasking (ICS 204) is drafted and used for dispersant operations. – Maintain records of dispersant application including quantities, types, and locations of spraying. Refer Appendix A for draft ICS 204. • Direct-vessel-based dispersant operations. • Spill Levels Two and Above (in addition to the above):

Dispersant Operations	
	• Operations are to be directed to the thickest part of the slick, to fresh oil. • De-confliction of aerial and vessel-based dispersant spraying – SimOps planning needs to be part of the daily tasking. • Vessel assigned for the OSMP water sampling/monitoring activities.
Logistics Section Instructions	The Logistics Section is to activate contracts and provide ongoing services and supply (Esso resources and/or from third parties) in support of the execution of this strategy. This is focused on aerial operations from Essendon and Bairnsdale and vessels from BBMT and Lakes Entrance. For level two and three spills, the key tasks are to Ensure correct activation with AMOSC of the AMSA fixed wing aerial dispersant spraying contract – aircraft is to move to Bairnsdale airfield for ongoing operations Ensure internal (Esso-owned stockpiles) dispersants are moved to the aerial and marine operational points Ensure AMOSC and NatPlan stockpiles of dispersant are moved to aerial and marine operational points If needed, ensure activation of OSRL for large dispersant aircraft and transfer by air of additional dispersant to Australia. Critical Daily Tasking: • Monitoring dispersant rate of use. • Sustaining marine/aviation operations with contractors and third parties to ensure that operations can continue: • Operational bases, • Services and supply for operations. • Anticipate future needs of the operations
Termination Criteria	Dispersant operations will cease based on any of the below triggers: • NEBA determines that dispersant operations no longer provide demonstrable environmental benefits. • Oil is too weathered for effective operations.

5.7 At-Sea Containment and Recovery (Vessel Based)

Strategy Description:

Using containment boom and skimmers, strike teams will corral fresh oil and then mechanically recover it into vessel tanks and temporary storage.

Relevant environmental performance outcomes and standards are provided in Appendix C.

At-Sea Containment and Recovery (Vessel Based)	
Response Objective	To recover spilt oil before shoreline or other sensitivity contact. To remove bulk floating oil and improve water quality.
Critical Outputs	For Level One Spills (subject to NEBA): • Using a pair of large vessels, offshore booms will be towed in the optimal configuration to concentrate and collect floating oil. Alternatively, single vessel high speed booming systems may be used. • The optimal mechanical skimmer for the type and condition of oil will be used to recover as much oil as possible from the pocket of the boom. • Refer to the *ExxonMobil Oil Spill Response Handbook* s. 5 for more information on booming configurations. For level two and above spills (subject to NEBA): • Based from BBMT and Lakes Entrance, up to six strike teams (each comprising two vessels) may be needed considering the volume of oil required to be collected via this method. Each will use the configurations noted above. In ideal conditions, ‘advanced’ booming techniques will be used to concentrate oil using two pairs of vessels per strike team. • Vessels of opportunity from fishing and offshore service fleets will be sourced from around southern Australia. • Equipment and trained personnel will come from Esso, AMOSC, AMOSC Mutual Aid and Australian National Plan (government) stockpiles. These will be cascaded in from stockpiles across Australia. • Daily calculated volumes of oil to be contained and recovered through this method will be between 150 m^3 and 450 m^3 of oil in total.
Planning Section Instructions	The Planning Section to determine through the NEBA, and surveillance and monitoring inputs, that Containment and Recovery operations should be conducted. In particular, Containment and Recovery operations will be used to reduce shoreline loadings, particularly on remote coastlines such as the Bass Strait Islands, the wilderness areas of far-east Gippsland, Corner Inlet, and surrounding estuaries, and sensitivity-specific positive impacts as demonstrated by the daily NEBA. Weather conditions in Bass Strait are known to be volatile and challenging, so forward 24-48-hour forecasts (wave and swell height; wind speed) must be within operational limits for this tactic to proceed.

At-Sea Containment and Recovery (Vessel Based)	
	Containment and recovery activities should only be carried out during daylight hours. Critical Daily Tasking: • Establish through a daily Net Environmental Benefit Assessment the ongoing benefit of Containment and Recovery • Ensure that weather conditions are amenable to safe and effective operations • Ensure that the operational and scientific monitoring programme is in place, with data being collated and sent back to the EUL and SITU • Ensure daily Containment and Recovery operations are recorded (location, estimated amount of oil recovered, estimated amount of water recovered) • Assist operations to draft daily ICS 204 operations orders used by the marine division for Containment and Recovery. Refer Appendix A for draft ICS 204 • Seek approval from AMSA to decant separated water to increase waste storage of recovered oil (refer to decanting IPEICA Good Practise Guide #17 http://www.oilspillresponseproject.org/wp-content/uploads/2016/02/JIP-17-Decanting.pdf) and National Plan Guidance NP-GUI016 for further details. • Working with the safety officer, ensure that WHS risks are appropriately identified and managed. • Plan temporary waste reception facilities at BBMT and Lakes Entrance. • Activate long-term waste treatment contracts from temporary waste storage sites. All data gathered through the OSMP in relation to Containment and Recovery operations are to be captured and displayed in the Common Operating Picture (Esso GIS) so that all members of the IMT have situational awareness. The Planning Section needs to continuously monitor Containment and Recovery operations and scale them up or down as needed when compared to the other spill response strategies. As the oil changes over time (weathering) Containment and Recovery will likely become favoured over dispersant operations.
Operations Section Instructions	The Operations Section and Marine Branch Directors will task assets under their command to undertake Containment and Recovery operations as part of the execution of the IAP developed the previous day. Vessels will operate in pairs, focusing on different sections of the thickest part of the slick within the Containment and Recovery zone. Utilise overhead aerial assets to provide real-time direction to the vessel strike teams. Where approved, regular de-canting by strike teams is to be done to maximise the volume of oil recovered from the vessel's waste tanks. Safety planning for this strategy must focus on de-confliction with aerial or vessel based dispersant operations. Operational planning will be based on *ExxonMobil Oil Spill Response Handbook* s. 5.

At-Sea Containment and Recovery (Vessel Based)	
	Critical Daily Tasking: All Spills: • Execute the IAP for the current Operational period. • Liaise with the PSC to ensure that field tasking (ICS 204) is drafted and used for C&R operations. Refer Appendix A for draft ICS 204 • Ensure daily Containment and Recovery operations are recorded (location, estimated amount of oil recovered, estimated amount of water recovered. • Operations are to be directed to continuous parts of the slick to maximise effectiveness. • SimOps planning needs to be a part of the daily tasking. • Vessels assigned for the OSMP water sampling/monitoring activities.
Logistics Section Instructions	The Logistics Section is to activate contracts and provide ongoing services and supply (from Esso resources and/or third parties) in support of the execution of this strategy. This is focused on supporting Containment and Recovery strike team operations from BBMT and Lakes Entrance. Vessels of opportunity are to be sourced and wet chartered through Esso's marine team. Oil spill response equipment is to be sourced from AMOSC, NatPlan sources, and OSRL if required. Logistics is to use the technical advice of AMOSC LO/OSRL LO as to the best equipment selection for the operation at the time. Factors to be considered include • Known and anticipated weather conditions. • Weathering of oil. • Anticipated volumes of oil. • Length of operation/swing. Only large/heavy offshore booms are to be ordered from providers (i.e. 1.5 metres in height or greater), or advanced booming single vessel systems (i.e. NOFI Current buster 2/4/6/8/ or SpeedSweep Systems) with skimmer selection focusing on high capacity, high volume oil removal (i.e. greater than 30 m^3 per hour pumping capacity). For Level One Spills: • Utilise the chartered Esso vessels to load out equipment from BBMT with Esso OSR trained personnel. • Contract AMOSC personnel and AMOSC CG personnel if needed.

At-Sea Containment and Recovery (Vessel Based)	
	For Levels Two and Three: • Request additional skimming equipment, booms, and temporary storage from AMOSC to match the need, as directed by the planning section – quantities and types of equipment. • Request AMOSC personnel and AMOSC CG in numbers suitable for equipment deployment. • Contract offshore surveyed vessels suitable for strike team duties – deck size and bollard 'pull'. • Ensure that temporary storage facilities at BBMT and Lakes Entrance are in place to receive the volume of waste that will be offloaded from the strike teams. • Ensure that waste contractors are in place to remove the temporary waste from BBMT and Lakes Entrance to final waste storage/disposal sites or processing. Critical Daily Tasking: • Sustain the activities for the duration of the spill with contractors and third parties to ensure that operations can continue Marine Bases. Services and supply for operations – vessel consumables, goods, and resupply. • Track vessels for compliance with Esso marine requirements. • Track volumes of oil recovered by strike teams and anticipate temporary storage requirements at marine bases.
Termination Criteria	Containment and Recovery operations will cease based on any of the below triggers: • NEBA determines that Containment and Recovery operations no longer provide demonstrable environmental benefits. • OSMP triggers are met. • Oil is too thin for effective booming and containment to take place • Weather/sea conditions make Containment and Recovery operations unsafe or ineffective.

5.8 Protection of Sensitive Shoreline Resources

Strategy Description:

Booms will be used to protect shoreline resources and to corral oil for skimming.

Relevant environmental performance outcomes and standards are provided in Appendix C.

Protection of Sensitive Shoreline Resources	
Response Objective	To recover spilt oil before shoreline or other sensitivity contact. To remove bulk floating oil and improve water quality.

Critical Outputs	For All Spills
	• Modelling predicts shoreline impacts over time
	• Where shoreline impact is predicted a Tactical Response Plan (TRP) will be implemented
	• TRPs consist of detailed response information and resources required including the equipment and personnel to carry out identified taskings related to the protection of specific sensitivities
	• Taskings within the TRPs include:
	  o SCAT
	  o Pre-cleaning of shoreline
	  o Protection and deflection booming
	  o Containment and recovery
	• Primary TRP sites identify sensitivities permanently exposed which will require a definitive response. The TRP identifies specific tasks aimed at minimising environmental impact.
	• Secondary TRP sites identify sites at which exposure is seasonal or irregular and require confirmation of a requirement prior to response. The TRP identifies sensitivities, site information, likely response strategies, and resources required that would require validation based on conditions at time of event
	• Secondary TRP sites that do not require a response would allow additional resources to be directed towards other response activities

Protection of Sensitive Shoreline Resources

Planning Section Instructions

The Planning Section EUL to provide advice about whether there are any specific sections of coastline with high-value sensitivities – in these areas, specific tactical planning should be put in place.

All planning for protection of coastlines is to be done in conjunction with the Control Agency IMT.

The following locations have pre-drafted TRPs which should be used to guide response planning.

Primary Sites

SITE NAME	Site Type	Latitude	Longitude
VICTORIA			
Corner Inlet	Inlet	38°47'49.23"S	146°30'3.86"E
Lakes Entrance	Inlet	37°53'26.16"S	147°58'23.12"E
Snowy River (Marlo)	River mouth	37°48'12.25"S	148°32'56.62"E
Wingan Inlet	Inlet	37°44'56.97"S	149°30'48.22"E
Betka River	River mouth	37°35'6.32"S	149°44'21.58"E
Mallacoota	Inlet	37°33'47.59"S	149°45'53.47"E
NEW SOUTH WALES			
Wonboyn River	River/Lake	37°14'57.55"S	149°57'59.54"E
Bittangabee Bay	Inlet	37°12'54.16"S	150° 0'57.51"E
Towamba River	River mouth	37° 6'44.56"S	149°54'45.62"E
Nullica River	River mouth	37° 5'26.91"S	149°52'20.21"E
FLINDERS ISLAND			
North East River	River mouth	39°43'51.81"S	147°57'38.73"E
Samphire River	river mouth	40°13'10.56"S	148°11'47.93"E

Protection of Sensitive Shoreline Resources

Secondary sites

SITE NAME	Site Type	Latitude	Longitude
VICTORIA			
Merriman Creek (Seaspray)	River mouth	38°22'56.18"S	147°11'4.26"E
Lake Bunga	Inlet	37°56'50.00"S	147°48'18.98"E
Lake Tyers	Inlet	37°51'33.78"S	148° 5'18.55"E
Yeerung River	River mouth	37°47'28.02"S	148°46'26.67"E
Sydenham Inlet (Bemm River)	River mouth	37°46'49.61"S	149° 1'11.26"E
SITE NAME	Site Type	Latitude	Longitude
Tamboon Inlet (Cann River)	Inlet	37°46'39.31"S	149° 9'11.11"E
Thurra River	River mouth	37°46'56.67"S	149°18'45.94"E
Mueller River	River mouth	37°46'44.51"S	149°19'41.29"E
Shipwreck Creek	River mouth	37°38'51.45"S	149°41'58.05"E
Davis Creek	River mouth	37°34'43.46"S	149°44'59.14"E
NEW SOUTH WALES			
Saltwater & Woodburn Creek	Woodburn Creek	37°10'15.46"S	150° 0'17.18"E
	Saltwater Creek	37°10'8.25"S	150° 0'9.11"E
Fisheries Creek	Creek	37° 6'38.72"S	149°55'47.31"E
Boydtown Creek	River mouth	37° 6'9.86"S	149°52'51.59"E

Protection of Sensitive Shoreline Resources

SITE NAME	Site Type	Latitude	Longitude
FLINDERS ISLAND			
Foochow Inlet	Inlet	39°53'53.77"S	148° 7'20.71"E
Melrose Road Inlet	Inlet	39°55'34.85"S	148° 9'18.30"E
Patriarch Inlet	Inlet	39°56'45.22"S	148°11'0.45"E
Cameron Inlet	Inlet	40° 4'14.54"S	148°17'10.36"E
Reddins Creek	Creek mouth	40°15'44.19"S	148° 9'5.00"E
Cronleys Creek	Creek mouth	40°14'54.22"S	148° 3'32.09"E
Fotheringate Creek	Creek mouth	40°12'51.95"S	148° 2'15.05"E
Nalinga Creek	Creek mouth	40° 8'10.47"S	148° 1'1.70"E
Pats River	River mouth	40° 5'51.62"S	147°59'40.77"E
Arthur Bay Conservation Area	Bay	40° 5'12.38"S	147°58'1.53"E
Lughrata Salt Marsh	Marsh entrance	39°54'31.82"S	147°52'30.33"E
Mines Creek	Creek mouth	39°54'13.00"S	147°51'59.85"E
Boat Harbour Creek	Creek mouth	39°51'3.29"S	147°47'22.15"E
Killiecrankie Creek	Creek mouth	39°50'9.47"S	147°50'23.83"E
Edens Creek	Creek mouth	39°45'40.28"S	147°53'3.65"E

Tertiary site

Protection of Sensitive Shoreline Resources

SITE NAME	Site Type	Latitude	Longitude
VICTORIA			
Gabo Island (Mallacoota)	Island	37°33'44.75"S	149°54'39.07"E

TRPs may need to be drafted in conjunction with the operations section for locations without existing TRPs. Shoreline TRPs and shoreline clean-up more generally should be executed consistent with guidance in the Tactical Response Plan - Shoreline Protection & Clean Up and/or the *ExxonMobil Oil Spill Response Handbook* s.12.

Critical Daily Tasking:

- Establish through a daily Net Environmental Benefit Assessment and SMV the ongoing benefit of shoreline booming.
- Ensure that weather conditions are amenable to safe and effective operations.
- Ensure that an operational and scientific monitoring programme is in place, with data being collated and sent back to the EUL and SITU.
- Ensure daily operations are recorded (location, estimated amount of oil recovered, estimated amount of water recovered).
- Assist operations to draft daily ICS 204 operations orders used by the shoreline and nearshore division for booming.
- Work with the DTPT LO to ensure agreement on the location of specific tactical operations.
- Work with the safety officer to ensure that WHS risks are appropriately identified and managed.
- Plan local temporary waste reception facilities co-located with shoreline recovery.
- Activate long-term waste treatment contracts from temporary waste storage sites.

Operations Section Instructions	The Operations Section and Shoreline Protection Branch Director will need to coordinate with the DTP to ensure that resources under Esso command undertake shoreline protection tactics consistent with the requirements of the DTP.

Protection of Sensitive Shoreline Resources	
	The Shoreline Protection Branch must work closely with the Planning Section to draft and 'truth' tactical response plans. Plan drafting will be prioritized based on time frame of impacts – with soonest and most critical sensitivities being done first. All operations are to be consistent with the IAP developed the previous day. The Shoreline Protection Branch is to divide the tasking between teams that are geographically focused – each with a number of plans to execute. For protection / deflection booming, teams will need to continuously monitor boom for effectiveness and adjust for changes in tide, current, and weather. When booming is used for containment with recovery operations, effective temporary waste storage must also be put in place. Safety planning for this strategy must focus on remote operations, the use of manual handling risks, and potential for exposure to hydrocarbons. Operational planning will be based on Tactical Response Plan - Shoreline Protection & Clean Up and/or the *ExxonMobil Oil Spill Response Handbook* s.12. Critical Daily Tasking: All spills • Execute the IAP for the current operational period. • Liaise with the planning section to ensure that field tasking (ICS 204's) is drafted and used for shoreline protection operations. • Booming operations are to be continuously monitored to ensure ongoing effectiveness. • SimOps planning needs to be part of the daily tasking. Operations must also adhere to good practice decontamination practices, establishing and keeping to hot, warm, and cold zones as well as personnel and equipment washdown facilities. Site setup must follow the practices outlined in the *ExxonMobil Oil Spill Response Handbook*.
Logistics Section Instructions	The Logistics Section is to activate contracts and provide ongoing services and supply (from in-house resources or from third parties) in support of the execution of this strategy.

Protection of Sensitive Shoreline Resources	
	Shoreline protection strike teams may be directed to put in place tactics along any part of the mainland, Bass Strait, or Tasmanian Islands. Logistical support will be required at each of these locations to support spill response – moving operators in and out of these locations and supporting them while they are there. In extreme non-assessable locations, this could require rotary wing aircraft moving personnel and freight and equipment lifts/movement. The logistics section must ensure the correct type and volume of spill response equipment is divided into caches for each of the tactical response plans. This includes • Appropriate lengths of shoreline and shore seal booms, including land and sea anchoring systems. • Smaller portable skimming systems. • Temporary waste storage (on-site) of a volume equivalent to anticipated recovery. Support and services for on ground operators must also be provisioned, including • Shelter • Sustenance • Ablutions • Transport. The Logistics Section is to liaise with DTP on the shoreline needs and then utilise Esso standing support contractors for the provision of these services where there are gaps between what the DTP is able to provide and the need. Logistics is to also use the technical advice of AMOSC LO/OSRL LO as to the best equipment selection for the operation at the time. Factors to be considered include • Known and anticipated weather conditions. • Weathering of oil. • Anticipated volumes of oil. • Duration of operation. The logistics section is to prioritise Esso and AMOSC equipment for deployment for the execution of shoreline protection booming, with NatPlan/DTP/OSRL equipment to be deployed if there is a shortfall.

Protection of Sensitive Shoreline Resources	
	For All Spills: • Tally up the total amount of booms, number of skimmers, and ancillaries required based on the recommended tactical response plans and those that are drafted at the time. These totals are to be tallied, and requests made to Esso, AMOSC and to AMSA for equipment as required. • Tally up the amount of personnel required to implement and monitor the tactical response plans: Source these personnel from the same sources as above – Esso and AMOSC, AMSA (NatPlan), and OSRL – and divide these personnel into appropriate teams. • Source the required transport and accommodation appropriate to the number of responders. Critical Daily Tasking: • Validate the quantities of oil spill equipment and personnel – adjust as needed. • Monitor that transfers, accommodation and provisioning arrangements are fit for the purpose. • Validate that temporary waste management storage capacity at each site is sufficient.
Termination criteria	Oil no longer threatens sensitive receptors. DTP directs that Esso is to demobilise from sites.

5.9 Shoreline Clean-up

Strategy Description:

Shorelines will be (1) assessed using SCAT and (2) shoreline treatment recommendations put in place.

Relevant environmental performance outcomes and standards are provided in Appendix C.

Shoreline Cleanup	
Response Objective	To remove bulk stranded oil from accessible shorelines and speed up natural recovery of habitats.
Critical Outputs	<u>Initial Response</u> - EAPL coordinate with contractors (GHD / AMOSC) and jurisdiction (Vic DTP) to mobilise SCAT teams to conduct shoreline assessment - EAPL mobilise Shoreline Response Planning function - SCAT feedback initiates development of initial Shoreline Treatment Recommendations (STRs) - EAPL/AMOSC/Vic DTP support initial shoreline clean-up operations <u>Planned Phase – Decision Making</u> - EAPL resources support jurisdiction in maintaining ongoing SCAT program and development of STRs - EAPL resources support jurisdiction in development of Shoreline Response Plan (SRP) <u>Planned Phase – Project Implementation</u> - EAPL resources support jurisdiction in implementation of SRP and support operations <u>Response Completion/Termination</u> - EAPL resources continue to support SCAT inspections
Planning Section Instructions	All planning for protection of coastlines is to be done in conjunction with the Control Agency IMT. The Planning Section will oversee two distinct elements of the shoreline response: (1) Gathering data through the SCAT function (using Esso's or the State's collector application) and, (2) Using this data to plan for an extended shoreline clean-up.

Shoreline Cleanup	
	Shoreline surveys will ideally be done in conjunction with jurisdictional control agencies. Shoreline clean-up operations must be performed under the control and coordination of jurisdictions, unless this has been formally devolved to Esso or another group. Data Collection SCAT teams undertaking field surveys need to consistently gather data on shoreline type, oiling description, and clean-up recommendations. This data gathering is a planning, not operations, function, so it becomes a prominent field component of the planning section. Ideally, teams will be multi-disciplinary/multi-agency and include an oil spill operator (for practical clean-up recommendations) combined with an environmental advisor/scientist. SMEs should be consulted for specialist shoreline types or where there are specific sensitivities exist (e.g. indigenous heritage areas). Data will be fed back from these teams to the Esso GIS CoP, allowing (close to) real-time data sharing with the IMT and forward planning for future operations. Critical Daily Tasking: • SCAT teams form up in the morning, head out to the fields, and report back on data collected. • Shoreline Treatment Recommendations to be issued for the section of the shoreline where oiling has occurred. These form the basis of the ICS204 for shoreline clean-up operations. • Where oil is likely to affect the shoreline, SCAT teams should be recommending the pre-cleaning of beaches to reduce future organic waste. Shoreline Clean-up Based on the data collected from the SCAT surveys, work assignments (ICS 204 or similar) to be drafted that guide clean-up teams to execute the shoreline treatment recommendations. Shoreline divisions based on a span of control adequate to manage clean-up teams will need to be agreed on and established with the jurisdictional control agency. Pre-defined shoreline sectors have been developed for the Victorian coastline and should form the basis of planning. The EUL to provide advice on whether there are any specific sections of coastline with high-value sensitivities – in these areas, specific separate shoreline cleaning will be required. Refer to Tactical Response Plan - Shoreline Protection & Clean Up and/or the *ExxonMobil Oil Spill Response Handbook* for further guidance. Critical Daily Tasking: • Establish through a daily Net Environmental Benefit Assessment and SMV the ongoing benefits of shoreline clean-up.

Shoreline Cleanup	
	• Ensure that weather conditions are amenable to safe and effective operations. • Ensure that the operational and scientific monitoring programme is in place, with data being collated and sent back to the EUL and SITU. • Ensure daily operations are recorded (location, estimated amount of oil recovered, estimated amount of water recovered) • Assist operations to draft daily ICS 204 operations orders used by the shoreline clean-up operations. • Work with the DTP LO to ensure agreement on the location of specific tactical operations. • Work with the safety officer to ensure that WHS risks are appropriately identified and managed. • Plan local temporary waste reception facilities co-located with the shoreline clean-up. • Activate long-term waste treatment contracts from temporary waste storage sites.
Operations Section Instructions	Based on the advice received from Esso by DTP, the Operations Section, Shoreline Clean-Up Branch, will work along with DTP to ensure that resources under Esso command undertake shoreline clean-up consistently and under the control of the DTP. With no marine, aviation, or other spill response/source control interventions, the predicted shoreline loadings for all discharge scenarios are provided in Appendix D Quick Reference Information. These volumes will be reduced with spill response measures, but oil is still very likely to be stranded along the coastline in the majority of modelled scenarios. Shoreline divisions based on a span of control adequate to manage these clean-up teams will need to be agreed on and established with the jurisdictional control agency. Esso's resources are likely to work in a blended teams with State resources. Teams to execute the shoreline treatment recommendations developed by the SCAT teams in the planning section. Shorelines within the Potentially Exposed Area are predominantly fine, medium, and coarse-grained beaches, interspersed with rocky headlands. There also exists a number of estuarine systems which shelter much higher sensitivity shorelines. The principle issue for response will be accessing the more isolated portions of coastline (far-east Victoria) and how to manage and stage large work forces working in these areas. Safety planning for this strategy must focus on remote operations, manual handling risks, and potential for exposure to hydrocarbons. Operational planning should be based on the Tactical Response Plan - Shoreline Protection & Clean Up and/or the ExxonMobil Oil Spill Response Field Manual s 12, and the instructions given by the Control Agency. Critical Daily Tasking: All Spills: • Execute the IAP for the current operational period. • Liaise with the planning section to ensure that field tasking (ICS 204's – Shoreline Treatment Recommendations) is drafted and used for shoreline protection operations. • Work closely with the DTP Operations Officer as required to ensure ongoing unity of command. • Shoreline clean-up is continuously monitored to ensure ongoing effectiveness. • SimOps planning needs to be a part of the daily tasking.

Shoreline Cleanup	
	Operations must also adhere to good practice decontamination practices, establishing and keeping to hot, warm, and cold zones, as well as personnel and equipment washdown facilities.
Logistics Section Instructions	Based on the advice received from Esso by DTP, the Logistics Section will work alongside with DTP to ensure that resources are deployed to assist in the shoreline clean-up consistent with the request of the jurisdictional control agency DTP. With no marine, aviation, or other spill response/source control interventions, the predicted shoreline loadings for all discharge scenarios are provided in Appendix D Quick Reference Information. These volumes will be reduced with spill response measures, but oil is still very likely to be stranded along the coastline in the majority of modelled scenarios. Shoreline divisions based on a span of control adequate to manage these clean-up teams will need to be agreed on and established with the jurisdictional control agency. Key support from Esso in this task includes • Activation of labour hire contracts* to provide 50 – 500 personnel available for medium-term (2–4 months) shoreline clean-up tasking. • AMOSC CG personnel to supervise and oversee clean-up teams. • Safety and Security personnel to support response activities • Working with the EPA and Esso's waste management contractor to come up with acceptable bunded temporary storage areas for recovered waste. • Deployment of all AMOSC, mutual aid, and NP temporary storage equipment to points along the coastline as directed by the DTP. • Activation of accommodation, transport, and sustenance. * *Utilise base business contractor or escalate to ExxonMobil Contingent Worker Contractors team to coordinate hire of additional personnel. Critical Daily Tasking: All Spills: • Execute the IAP for the current operational period; • Liaise with the planning/operations section to ensure that support and services for the ICS 204's – Shoreline Treatment Recommendations are delivered. • Work closely with the DTP logistics section to deliver services and supply under a unity of command. • Ensure that recovered waste is efficiently managed. • Develop a forward plan of rotations for shoreline staff engaged in physical labouring activity.
Termination Criteria	• Shoreline operations will cease once pre-spill levels are returned, and/or by direction of the jurisdiction control agency.

5.10 Oiled Wildlife Response

Strategy Description:

Esso will assist the state-led OWR response with equipment and technical personnel as requested.

Relevant environmental performance outcomes and standards are provided in Appendix C.

Oiled Wildlife Response	
Response Objective	Esso assists state government efforts through the timely provision of industry OWR resources.
Critical Outputs	For All Spills: • Esso will activate the OWR resources of AMOSC and OSRL, equipment, personnel, and technical. • These resources will be provided to the Control Agency led IMT for use in reducing the impact of oil on wildlife.
Planning Section Instructions	Allocate an Esso IMT member to act as Liaison Officer to Control Agency IMT. A dedicated Liaison Officer for oiled wildlife response will likely be required. This role may be filled by the AMOSC OWR Coordinator. Details of numbers, type, status and type of fauna impacted by marine pollution to be collated by SITU. Daily ICS 204 work assignments to be developed in consultation with Operations, Logistics and Control Agency IMT. Utilise Area Response Plans and/or Specied Response Plans to assist with incident specific response planning.
Operations Section Instructions	Support OWR activities as directed by Control Agency IMT and per ICS 204 work assignments
Logistics Section Instructions	On request from Control Agency IMT, mobilise OWR equipment from AMOSC and/or OSRL. AMOSC • 2x OWR Containers (Geelong and Fremantle) • 4x OWR Box Kits • OWR Facilities support via DwyerTech contract • OWR Industry Team • AMOSC OWR Coordinator OSRL* • 3x OWR Search and Rescue kits • 1x OWR Intake and Triage kit • 4x Cleaning and Rehabilitation kits

Oiled Wildlife Response	
	• 1x Wildlife Rehabilitation Unit * 50% of the above inventory is available during an incident. Sea Alarm (via OSRL) • 1x Full time availability of one Sea Alarm expert for advice and potential mobilisation to the affected site. • 1x Full time availability of one Sea Alarm expert for advice and response support (based in Brussels). ExxonMobil RRT • RRT OWR Core Team • Third party OWR specialists Equipment owned by State agencies will be requisitioned via the Control Agency IMT under NatPlan arrangements.
Termination Criteria	Resources are no longer required/requested by the State government.

5.11 Waste Management

An oil spill waste management plan AUGO-EV-ELI-011 has been developed which provides guidance on contractor activation, equipment available, waste segregation, storage and disposal options. This document should be referenced to develop an incident specific waste management plan.

Esso holds a number of waste management contracts with third parties that will be called upon in the event of a spill. These parties will be used to:

- Provide a waste subject matter expert to the logistics section of the IMT;
- Work with the EPA to put in place waste management chains from point of collection to final disposal; and
- Ensure that the waste management practises put in place are ethical, legal and follow Australian best practise waste management principles.

Different wastes will be generated from a variety of different sources including:

- Liquid wastes (oil / water) – collected offshore by vessels from the shoreline through booming operations;
- Bulk hard wastes (oils mixed with organic materials, sand, rocks, pebbles, etc.) collected in bulk from shorelines by mechanical and manual means;
- Sundry wastes generated as a result of employing a large temporary workforce including PPE, waste from catering, etc.

Esso's waste management resource capability is described in detail in Section 9.3.1 of Volume 3. Relevant environmental performance outcomes and standards are provided in Appendix C.

6 Concept of Plan

6.1 Purpose

The purpose of the Esso Bass Strait Oil Pollution Emergency Plan (OPEP) is to describe the actions and arrangements Esso Australia has in place to respond to an oil pollution incident from any one of the company's Bass Strait petroleum activities (refer Figure 2-1).

Spills can range from Tier One, small single event releases, to Tier Two-Three, ongoing/large releases. This plan is designed to provide the full range of available response options and plans for all spills, regardless of the Tier level and is therefore, not specific to a particular activity or scenario.

It is designed such that the Incident Management Team and Emergency Response Team have immediate access to the full suite of response action plans (from Tier One to Tier Two-Three) and can select and implement the appropriate plan based on the specific emergency situation.

This OPEP provides the processes and tools to be able to select and apply the viable response options (and therefore eliminate options that are not viable) for the specific spill event.

6.2 Objectives

The objectives of this OPEP are to:

- Define the roles and responsibilities for Esso to assess and then respond to an oil spill;
- Describe the process for deployment of oil spill response strategies that will be used by Esso (and its partners);
- Describe the procedures for mobilising company, industry and national support resources to support these spill response strategies;
- Clearly outline guidance to plan-users on how the above is to be undertaken, consistent with regulatory requirements;
- Integrate Esso's response with relevant government and industry plans:
- National Plan for Maritime Environmental Emergencies (National Plan)[3]
- Victorian Maritime Emergencies (Non-Search & Rescue) Plan (SERP [NSR]) [4]
- NSW State Waters Marine Oil and Chemical Spill Contingency Plan4
- Tasmanian Marine Oil Spill Contingency Plan (TASPLAN) [5]
- The Australian Industry Cooperative Oil Spill Arrangements (AMOSPlan)[6] and
- Describe how Esso will implement its Incident Management System in responding to oil spills; and
- Describe the link for ExxonMobil's global resources and services to be deployed as part of Esso's local response.

6.3 Scope

This OPEP provides oil spill response plans to respond to any spill from Esso's Bass Strait operations and project activities. Project activities which could result in a spill to environment have been identified as:

- Drilling
- Well operations (platforms, both manned and unmanned)
- Workovers of wells
- Workovers of subsea, seabed or platform infrastructure

[3] https://www.amsa.gov.au/forms-and-publications/Publications/national_plan.pdf.

[4] https://www.emv.vic.gov.au/responsibilities/state-emergency-plans/state-maritime-emergencies-non-search-and-rescue-plan

[4] http://www.rms.nsw.gov.au/documents/about/environment/oil-spill-contingency-plan-nsw-state-waters.pdf

[5] http://epa.tas.gov.au/Documents/TasPlan.pdf

[6] http://www.amosc.com.au/amosc.php

- Pipelines running from offshore fields to coastlines, and
- Plug and abandonment activities.

Specifics of the scope of accepted activities is contained in relevant Environment Plans applicable to this OPEP. This OPEP has been prepared to be applicable to the following Environment Plans:

- Jack Up Rig Drilling
- Bass Strait Operations
- West Barracouta Installation, Commissioning and Initial Operations

For vessel activities that enable Esso's petroleum activities, the OPEP includes arrangements for Esso to respond to such spills under the direction of the relevant control agency.

The geographic scope of activities as directed by the OPEP (particularly for level two and three hydrocarbon spills) would likely apply to an area significantly beyond Esso's petroleum titles. This includes Commonwealth waters off south eastern Australia, and state waters of Victoria, New South Wales (NSW) and Tasmania. Staging areas for activities as far as practicable will be based in Victoria.

6.4 Division of Responsibilities

Spill response activities in the zones outlined above are shared between a number of parties, known as control agencies (organisations leading response activities) and support agencies (organisations that help with the provision of labour, platforms, or services). The (legal) obligation to respond is outlined as below:

Table 6-1 Control Agencies

Location of spill	Source	Control Agency for oil spills	Supporting Agency
Commonwealth Waters (>3NM from shorelines)	Petroleum activity	Esso	AMSA
	Ship associated with petroleum activity	Esso as first responder, under the direction of the Australian Maritime Safety Authority	Esso
State waters or shorelines (<3NM of coastline)	Petroleum activity / Ship	State Government (Vic — DTP; NSW — Transport for NSW; Tas — EPA) with Esso supporting operations	Esso, local state port authorities, AMSA, state-based wildlife agencies

In all instances of spills from Esso's petroleum activities, Esso's response activities should be considered to be regulated by NOPSEMA and directed by this OPEP, until such time as another control agency verifies its intention to stand up and assert control.

As a response grows in size and complexity, a range of other parties and agencies may become involved, either to acquit a legislative obligation, or to provide support to a control agency.

In all cases, for spills originating from Esso assets and activities, Esso will facilitate the provision of resources to the control agency for their use in mitigating the consequences of the spill.

6.5 Safety, Health and Environment Policy

Oil spill response activities under the control of Esso shall be implemented in a manner that reflects Esso's legal commitments to best practice workplace health and safety (WHS). That is, in accordance with (1) Esso's Safety, Health and Environmental policies and consistent with the outcomes sought from the (2) National Plan guidance paper *NP–GUI–026: Marine oil spill response health and safety*.

Prior to implementing spill response operations, for activities that are outside Esso's business as usual operations, activities will be risk assessed and should additional consequences be introduced, these shall be mitigated as appropriate.

Esso will develop and implement a spill safety plan which documents this process.

Safety risk mitigation measures, using a mix of process and personnel safety, will be put in place using the established hierarchy of control methods, as shown below in the Fig 10:

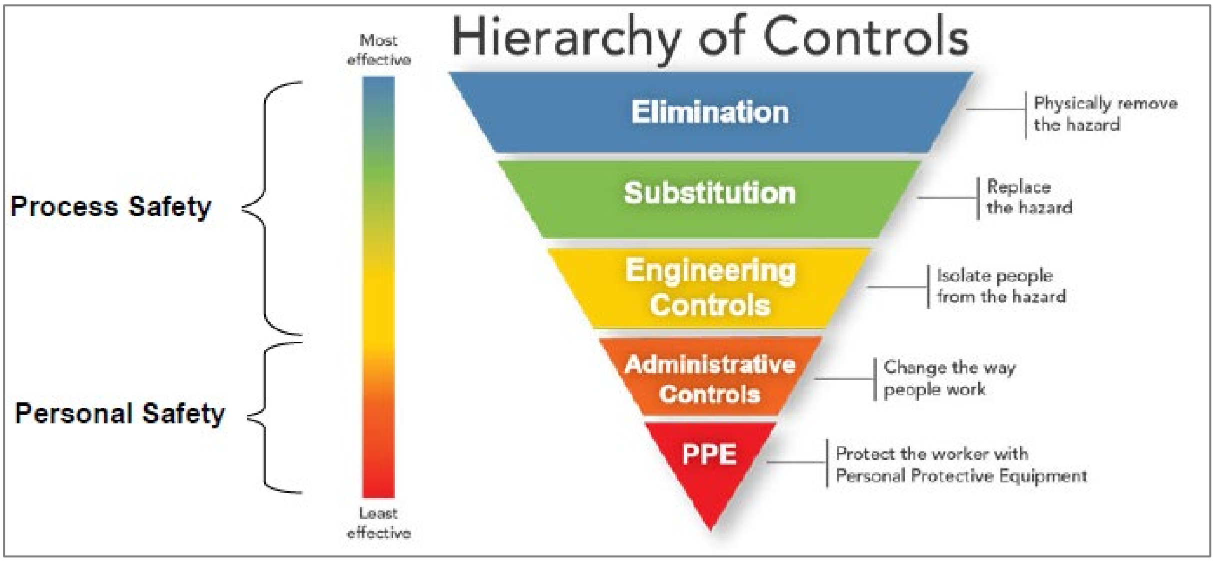


Figure 6-1 Workplace Health and Safety Hierarchy of Controls for Risk Mitigation

'Baseline' measures such as establishing controlled entry at polluted sites, wearing personal protective equipment and the use of safe working practices supported by suitable training, will be an integral part of response operations.

In cases where available measures to reduce the risk of injury or detrimental health implications cannot be lowered to an acceptable level, that activity or specific response strategy will not be viable until conditions change. Examples of this include situations where fresh hydrocarbons are releasing vapours, where sea conditions prevent safe working on the deck of a vessel, or where platforms and assets no longer present stable safe working platforms.

In implementing spill response activities, Esso, its contractors, and other parties supporting the response, shall always be mindful of the company's emergency response priorities, using the acronym 'PEAR':

P – People, E – Environment, A – Assets, R – Reputation

6.6 Interface with Other Documentation and Plans

This OPEP is a component of the EP in force for the specific Esso petroleum activity taking place and outlines the measures that Esso will put in place for hydrocarbon spills from that activity.

The OPEP also has a relationship with a number of other key Esso documents as outlined below:

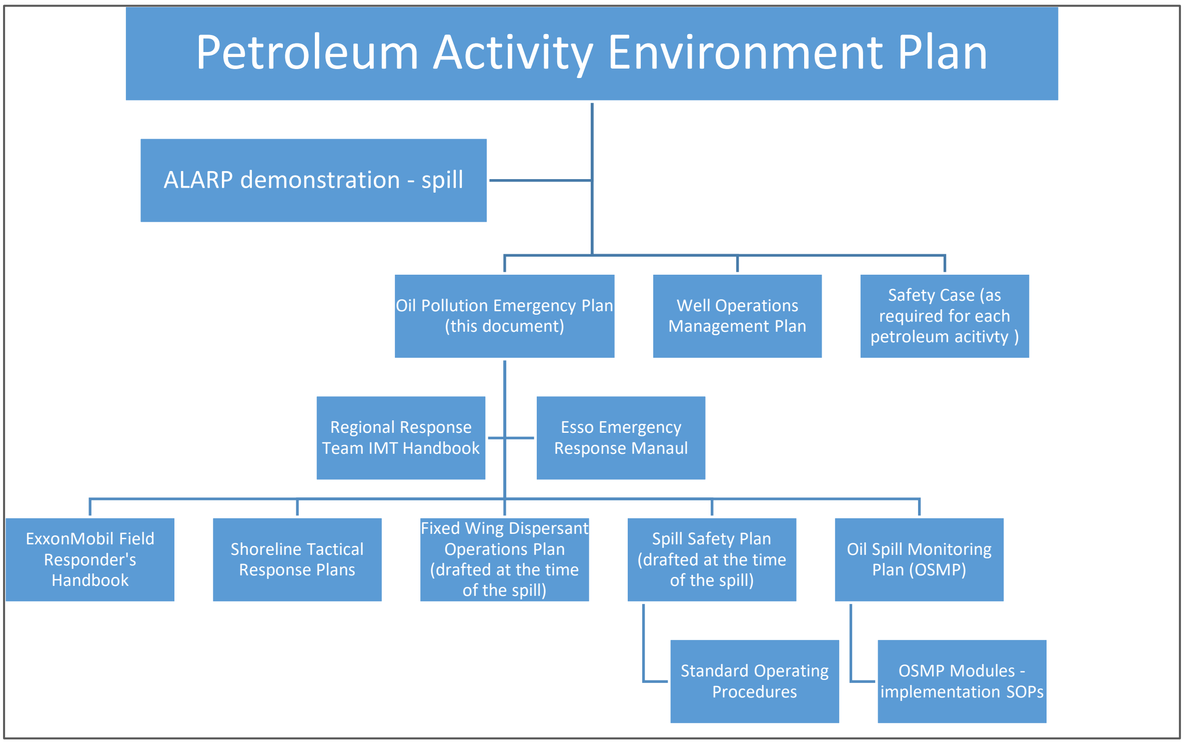


Figure 6-2 OPEP Relationship With Other Key Esso Environmental Documentation

This OPEP also has a number of linkages to external third-party spill response plans or documents. These outline how Esso is to engage with national and state government agencies for the provision of assistance to Esso, or from Esso to those parties, for spill response activities, and who is ultimately ‘in charge’ of clean up efforts in a particular geographical area. These links are detailed below:

Table 6-2 External Plans That Inform and Influence Actions Under This OPEP

Plan / Document
National Plan for Maritime Environmental Agencies (National Plan) (AMSA, 2020) National Plan for Maritime Environmental Emergencies 2020 (amsa.gov.au)
Outlines the resources and services that may be provided by AMSA and other government agencies to assist Esso Details nationally consistent processes and procedures spill response management and tactics and Outlines a range of guidance documents on the same.
Victorian Maritime Emergencies (Non-Search & Rescue) Plan https://www.emv.vic.gov.au/responsibilities/state-emergency-plans/state-maritime-emergencies-non-search-and-rescue-plan
Specifies control agency responsibilities and obligations under Victorian laws in Victorian waters. Specifies the mechanism by which Esso will engage to support the state for oil spill response and wildlife affected by marine pollution.
Victorian State Emergency Management Plan Victorian State Emergency Management Plan (SEMP).pdf (emv.vic.gov.au)
Outlines agency obligations for emergency management in Victorian state waters and shorelines.
Tasmanian Marine Oil Spill Contingency Plan (TASPLAN) https://epa.tas.gov.au/Pages/Document.aspx?docid=558
Specifies response agency responsibilities and obligations under Tasmanian laws in Tasmanian waters Specifies the mechanism by which Esso will support the state for oil spill response.
NSW State Waters Marine Oil and Chemical Spill Contingency Plan https://www.emergency.nsw.gov.au/Pages/publications/plans/sub-plans/state-waters-marine-oil-and-chemical-spill-contingency-plan.aspx
Specifies control agency responsibilities and obligations under NSW laws in NSW waters Specifies the mechanism by which Esso will support the state for oil spill response.
AMOSPlan www.amosc.com.au
Outlines the support (people, services and equipment) from AMOSC to Esso. Outlines the mutual aid (people, services and equipment) available from AMOSC's members to Esso. Details process to access surge spill response people, services and equipment.

7 Concept of Spill Response Operations

Esso's concept of operations for responding to spills is based on Esso's environmental commitment detailed in the ExxonMobil Environment Policy.

This translates to a series of commitments by Esso for each occasion that a loss of containment occurs or is suspected. Esso will undertake

1. To conduct early and accurate identification of split hydrocarbons
2. To conduct an assessment and identification of defensible and proportionate spill response strategies
3. To tactically implement identified spill response strategies in a timely fashion and
4. To monitor the effectiveness of those strategies in order to achieve Esso's stated environmental performance outcomes for this OPEP.

Esso will mobilise its significant national and global processes, services, contracts and resources to achieve the above.

7.1 Reactive and Proactive Response Stages

This OPEP is broken into two broad sections: (1) background, contextual and supporting information; and (2) response processes. Response processes are then broken down into two further stages: (A) assessment / reactive planning and (B) proactive planning stages.

(A) Assessment/reactive planning are the actions that Esso will undertake in the field by the Esso IMT based on a first-pass assessment of the situation. They are the best planned, reactive actions that can be reasonably expected to assist in achieving Esso's Environmental Performance Outcomes (EPO). Should the assessment indicate a Level Two or Three spill, many of these actions will be focused on the mobilisation of resources likely to be used in future operational periods for the tactical spill response.

(B) Proactive planning is the more settled, longer term project planning mode that Esso will undertake. It requires the mobilisation and setup of a full incident management team and will be supported by Esso's Emergency Support Group for strategic support.

7.1.1.1 Incident Management System

Esso Australia has adopted the global ExxonMobil standard of the incident control system (ICS) as its internal incident management system. ICS maps well onto, and is compatible with, the Australian interagency incident management system (AIIMS) adopted by Australian governments under the National Plan.

At the core of ICS is the concept of the 'planning p'. This is a standardised, systemic process used to identify and then action all incidents. It follows a basic five-step process outlined below:

1. Understand the situation
2. Establish incident objectives and strategy
3. Develop the plan that details the tactics to achieve the strategy/(ies)
4. Prepare and disseminate the plan
5. Execute, evaluate, and revise the plan

These steps are turned into the flow diagram below. This OPEP has the assessment/reactive and proactive stages mapped onto this diagram:

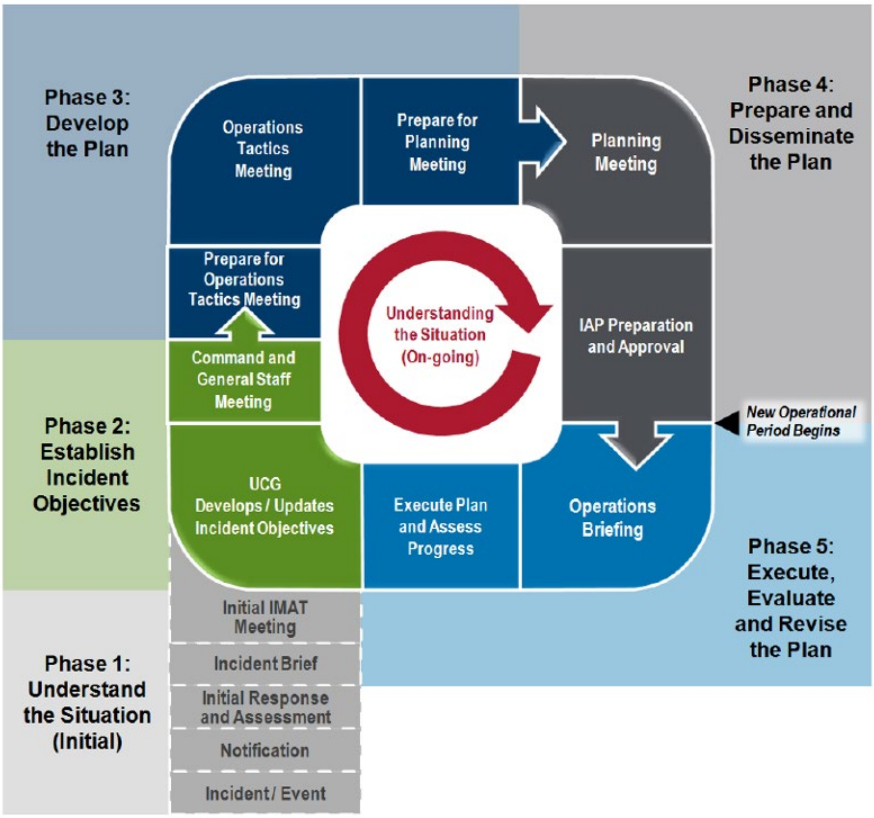


Figure 7-1 ICS Planning 'P'

Esso considers the use of ICS as one of the key controls to develop a robust and defensible incident action plan, which in turn is critical to achieve the best environmental outcomes at the time of the spill.

7.2 Banding of Responses Based on Control Agency Triggers and Stakeholder Interfaces with Esso

To hasten the implementation of appropriate spill response measures, Esso has developed three different action lists for use by the incident management team, based on the proximity of spilt oil to Victorian coastal waters and shorelines. The intent behind this 'banding' is to establish response measures which quickly establish the structure of and implement the most time critical responses using available resources.

Figure 7-2 outlines this intent:

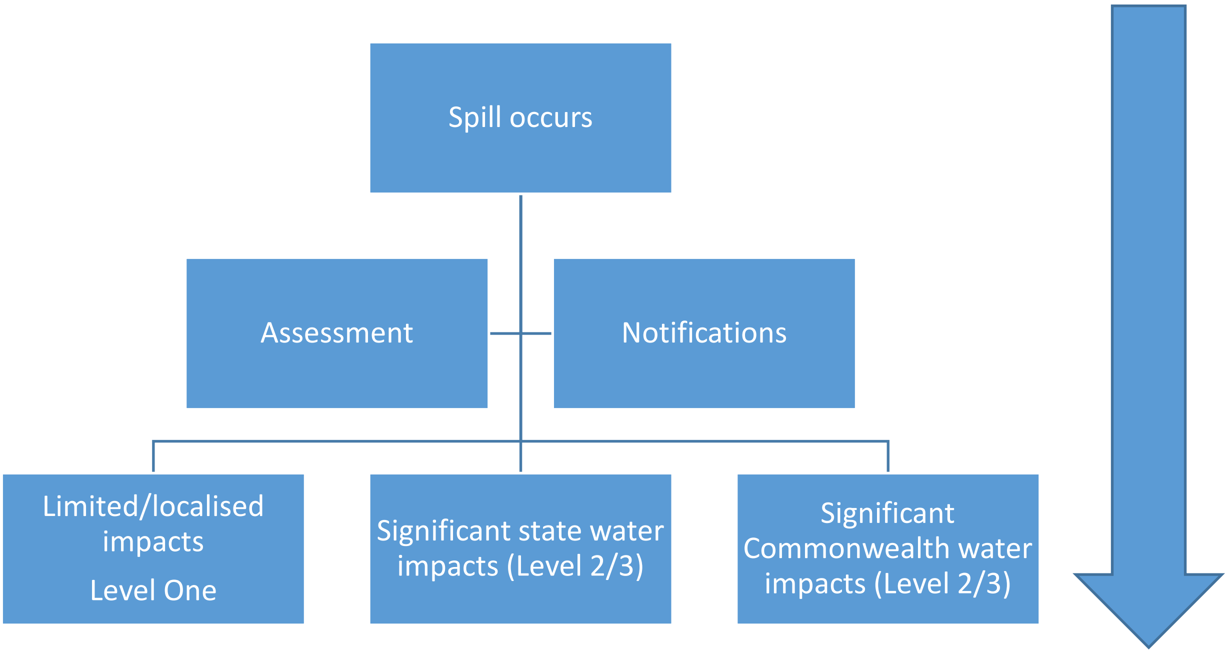


Figure 7-2 Banding Responses

7.2.1 Command Points, Staging and Locations

Esso has a number of operational hubs located in metropolitan Melbourne and Gippsland, which have been predetermined as suitable areas to stage marine, aviation and personnel operations. If available for use, incident command points will be located in Victorian government identified regional ICCs (ref: Victorian Emergency Operations Handbook, pp 117).

These are as below:

Type of area	Location	Address
Incident Command Centre	Esso HQ, Docklands Melbourne	9/644 Collins Street Melbourne, VIC
Gippsland Incident Command Points	Bullock Island, Lakes Entrance	2 Bullock Island Lakes Entrance, VIC
Equipment staging area	Longford Plants, Longford	Garretts Rd, Longford, Vic
	Barry Beach Marine Terminal	Main Access Rd, Agnes VIC
Marine staging areas	Barry Beach Marine Terminal	Main Access Rd, Agnes VIC
	Bullock Island, Lakes Entrance	2 Bullock Island Lakes Entrance, VIC
Fixed wing staging areas & heliports	Bairnsdale Airport	345 Bengworden Road, Bairnsdale, Vic
	Longford Heliport	Garretts Rd, Longford, Vic

The relative location of these points is show on the map below:

7.2.2 Oil Characteristics

The main physical properties that affect the behaviour of spilt oil are specific gravity, distillation characteristics, viscosity and pour points.

In the event of a spill, these oils will weather, or degrade, differently depending on the oil type and its physical / chemical properties as well as on the weather, the sea conditions and the length of time it is exposed to these conditions.

7.2.2.1 Diesel

Diesel is loaded from supply vessels onto all offshore platforms and is stored on platforms and vessels in bulk tanks. It is used in vessel and platform engines and operating equipment such as cranes.

Diesel (Group[7] 2 Oil) is a common marine fuel and is classed as a medium petroleum distillate. Marine diesel is a mixture of both volatile and persistent hydrocarbons.

Behaviour when spilt generally, rapid spreading, rapid evaporation and some dispersion or dissolution. Diesel may emulsify at low temperatures when fresh, but the emulsification is likely to be 'unstable'.

Marine diesel contains 95% light hydrocarbons (or non-persistent constituents) that are likely to evaporate when exposed to the atmosphere. The remaining 5% is composed of heavy hydrocarbons (or persistent compounds) that may persist on the sea-surface for extended periods.

The viscosity of marine diesel does not change significantly over time and hence has a strong tendency to physically entrain into the upper water column as oil droplets in the presence of waves but can refloat to the surface if wave energies abate (APASA, 2013).

7.2.2.2 Condensate

Condensate is a Group 1 liquid hydrocarbon resulting from a change in pressure and or temperature of gas — 'liquid gas'.

[7] Classification of petroleum-based oils or 'oil groups' are compiled from various IMO, ITOPF, US EPA and US Coastguard publications. Ref AMSA 2012 Table 8 for classification criteria.

When spilt, condensate behaves in a manner similar to diesel, with generally rapid spreading, rapid evaporation and dispersion/dissolution. There is a low likelihood of emulsification. However, it may contain inert, relatively non-toxic waxes which will persist for some time as they degrade.

Condensates comprise a very high content of volatile (or non-persistent) constituents (~97–99%). Therefore, it is expected that any hydrocarbons reaching the sea-surface would quickly be lost to the atmosphere via evaporation. Smaller droplets may remain in the water column for a longer period undergoing microbial degradation over time. Any persistent (heavy) hydrocarbons may persist longer in the form of small solid relatively non-toxic waxy flakes on the sea-surface or entrained in the water column in turbulent waters given the rough environmental conditions of the region.

7.2.2.3 Light Crude

Light crude oil is produced from a number of fields in the Gippsland Basin. .

Analysis of crudes indicates volatiles and semi to low volatile compounds constitute 84.8 - 86.3%. The remaining heavy hydrocarbons (or persistent compounds) will persist in the environment for a longer period of time as a liquid or semi-solid state, either on the sea surface, entrained in the water column or on shore. The nature of the weathered residues is likely to be a sticky, waxy paste-like oil that will become more crystalline over time as it weathers further.

The loss of volume through evaporation for some crude oils may be offset by tendency to form viscous emulsions (‘water in oil’). Oils with more than 3% by weight of asphaltenes create ‘stable emulsions’ while oils containing less than 3% by weight of asphaltenes only develop unstable emulsions (Fingas and Fieldhouse, 2004).

The maximum value of asphaltenes present in the light crude oils are all less than 0.05%wt so are unlikely to form stable emulsions that would impact on shoreline response and clean-up strategies. It is more likely that only temporary emulsions are likely to be generated and only at sea.

7.2.2.4 Waxy Crude

Waxy crudes are produced from some reservoirs, including Flounder and Moonfish. These crudes contain a high proportion of wax–with a corresponding high pour point. Waxy crudes are likely to solidify in the environment as it weathers over time.

The properties of these crudes classify them as a Group IV oil due to the high pour point (above ambient temperature) according to ITOPF (2014).

Given the tendency to form solid masses at ambient sea temperatures, the opportunity to use and effectiveness of chemical dispersants is diminished.

7.2.2.5 Summary of Hydrocarbon Characteristics Used in Oil Spill Trajectory Models

The physical characteristics of the oil types that were used for modelling are as follows:

	Density @ 15˚C	API	Dynamic Viscosity	Pour Point	Wax Content	Oil Property Category
Marine Diesel Oil (MDO)	829 kg/m^3	37.6	4.0 cP @ 25°C	-14 °C	-	Group II (light persistent oil)
Condensate (surrogate)	770.6 kg/m^3	52.15	0.14 cP @ 25°C	-3 °C	-	Group I (non-persistent oils)
Barracouta Condensate	772.3 kg/m^3	51.6	1.291 @ 20°C	-39 °C	1.8%	Group I (non-persistent oils)
Kipper Condensate	760.6 kg/m^3	54.5	0.91 @ 20°C	-39 °C	2.3%	Group I (non-persistent oils)

	Density @ 15˚C	API	Dynamic Viscosity	Pour Point	Wax Content	Oil Property Category
West Seahorse 3 Crude	792.5 kg/m³	48.0	2.0 cP @ 20ºC	-15 ºC	-	Group II (light persistent oil)
West Kingfish Crude	798.1 kg/m³	45.7	2.4 cP @ 20°C	9°C	25%	Group II (light persistent oil)
Halibut Crude	821.5 kg/m³	40.6	3.4 cP @ 20°C	0°C	23.7%	Group II (light persistent oil)
Flounder Crude	799.9 kg/m³	45.3	2.8 cP @ 20°C	18°C	32%	Group IV oil due to the high pour point
Moonfish Crude	887.6 kg/m³	27.8	5.14 (at 40 °C)	27°C	38.5%	Group IV oil due to the high pour point

8 Supporting Activities to Operations

8.1 Tiered Response Arrangements – Equipment, People and Staging Areas

Logistical and support arrangements for the supply of people, equipment and resources will operate in a tiered approach as below:

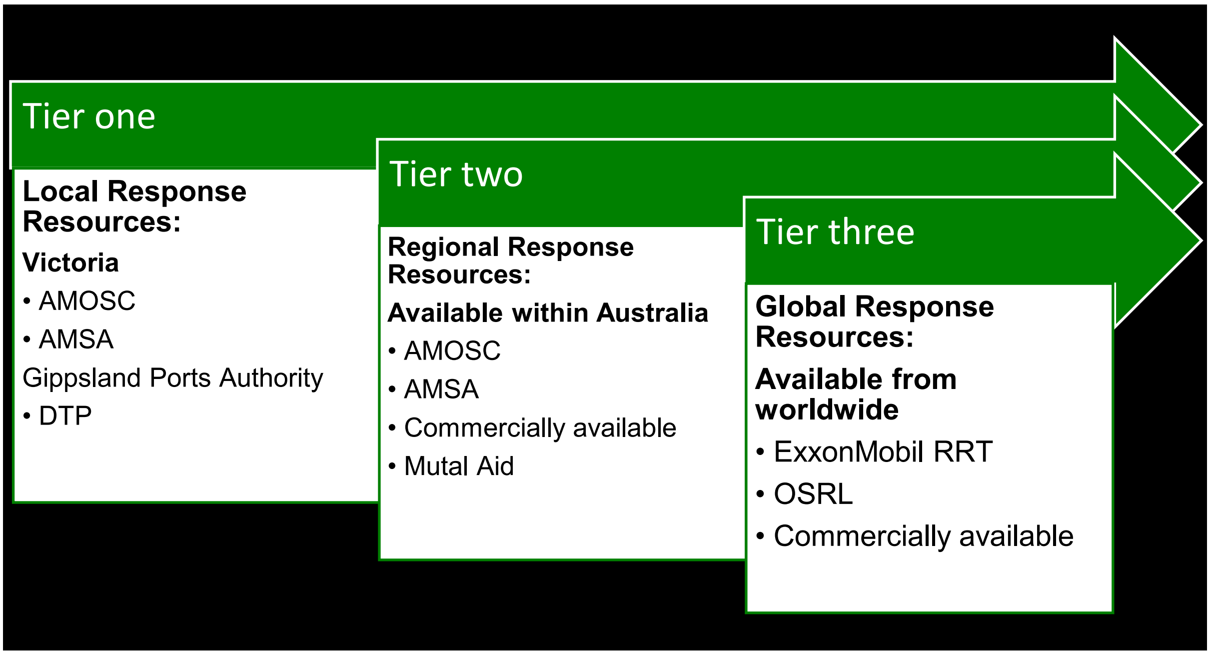


Figure 8-1 Tiered Response Arrangements

8.1.1 Tier 1 – Local Response Resources

EAPL maintains two stockpiles of oil spill response equipment based in the Gippsland region of Victoria at the Barry Beach Marine Terminal and the Long Island Point Fractionation Plant. The stockpiles include equipment suitable for offshore operations, dispersant application, shoreline and nearshore protection, and shoreline clean-up. Quantities of equipment held between the two locations are sufficient, based on the activation of TRPs in line with modeling indications of impact, to provide an initial response and include:

- shoreline protection/deflection boom
- shoreline skimming systems
- offshore booming packages
- offshore skimming systems
- shoreline temporary storage units,
- dispersant and
- decontamination kits

EAPL's immediate spill response equipment will come from its own tier one stockpiles and additional detail of capability in the initial phase of response is included in the Quick Reference Guides. For an up to date list of EAPL's oil spill response equipment refer to ***EAPL OSR Equipment List.***

EAPL maintain trained oil spill response personnel to mobilise an initial response to support the enactment of TRPs, SCAT, and shoreline clean-up.

8.1.2 Tier 2 – Regional Response Resources

Response is conducted by Esso using resources available from within Australia.

In response to a Tier 2 activation EAPL has the capability to mobilise sufficient oil spill response specific resources via AMOSC, AMSA (National Plan), third party contractors, and mutual aid (Industry stockpiles via AMOSPlan). A tiered response would evolve from the 'Initial Response Phase' into a 'Planned Phase – Decision Making', before graduating to a 'Planned Phase – Project implementation'. Staffing requirements for the initial phase would be met by the following with additional support continuing to be provided based on jurisdictional requirements in later phases.

AMOSC
As a member of AMOSC, equipment and resources from the Geelong, Fremantle, Broome, and Exmouth stockpiles are available for mobilisation to Gippsland. The bulk of the equipment, based in Geelong, is available within <12 hours. Additional equipment in Fremantle, Exmouth and Broome can be mobilised to Gippsland as needed by road or air.
A full inventory of AMOSC equipment is available from the AMOSC website
http://www.amosc.com.au/equipment.php

In addition to the AMOSC stockpiles, membership of AMOSC provides access through AMOSPlan to equipment, personnel, and resources owned or held by other oil companies within Australia. Further details of mutual aid capability is available through the AMOSC website above.

AMSA / National Plan Equipment
EAPL has access to AMSA equipment Australia-wide through AMOSC and the National Plan. AMSA maintains significant stockpiles of equipment in Melbourne, Adelaide, Brisbane, Dampier, Darwin, Devonport, Fremantle, Sydney, and Townsville. The closest National Plan stockpile is located in Melbourne, less than 7hours from the furthest point of eastern Gippsland in Victoria. A full inventory of AMSA equipment is available from the AMSA website:
https://amsa-forms.nogginoca.com/public/equipment.html?loc=%2Fapi%2Fv1%2Fasset%2F2615901

Oil Spill Response Personnel
In addition to the Tier 1 capacity provided by trained EAPL oil spill response personnel, EAPL can activate and mobilise AMOSC staff and AMOSC Core Group, and, through National Plan arrangements, state and national response team personnel.

General Personnel
Surge labour hire personnel can be accessed through local providers and EAPL contractors.

ExxonMobil also has a Singapore based Contingent Worker Contractors Team who can coordinate hire of additional personnel through a number of labour hire firms that ExxonMobil routinely work with to fulfil additional capacity requirements for longer term shoreline clean-up of a Tier 2 spill.

8.1.3 Tier 3 – Global Response Resources

Response is conducted by Esso using internationally available resources.

Additional resources, personnel and equipment shall be sourced internationally from Oil Spill Response Ltd through the Singapore base, and then from its other bases around the world to Gippsland. Esso global resources — such as the Regional Response Team — can also be mobilised to Gippsland or the IMT.

ExxonMobil Regional Response Team

The ExxonMobil Regional Response Team (RRT) is a Tier 3 Incident Management Team and is made up of approximately 500 trained personnel from across all business and service lines. The RRT is managed as two sub-teams, with one for the Americas and the other covering the rest of the world. Resources can be shared across regions as needed.

RRT Activation: +44 1372 223 232 (24/7 hotline)

The RRT's structure and processes are based on the Incident Command System (ICS). All RRT members receive initial training in the ICS and oil spill response through participation in the ExxonMobil University of Spill Management course. Additional training is provided based on role and function.

In the event of a major incident, the RRT can provide personnel and expertise to the Business Line to undertake an effective and sustained response. Services that can be provided by the RRT include, and are not limited to, the following:

Command

- Provide experienced Incident Commanders and Facilitators to work with the local Business Line in coordinating the response.

Operations

The RRT is able to provide experienced response team and coordination of third party experts for activities including:

- On water recovery
- Protection / deflection
- Shoreline clean up
- SCAT
- Waste Management
- Surveillance and monitoring
- Dispersant application
- Oiled wildlife response

Planning

- Development of the Incident Action Plan
- Resource Tracking
- Volunteer Management
- Situation mapping / Common Operating Picture
- Modelling
- Environmental specialist
- SCAT coordination
- Documentation and translation services

Logistics

- Mobilisation of Equipment & Personnel (including third party equipment)
- Customs/Freight Clearance advice
- Staging Area set up
- Security of impacted sites
- Personnel Transportation
- Accommodation for Response Personnel
- Food and Beverage for Response Personnel
- Procurement Services of Required Materials and Services
- Communications Equipment and Services
- Establish and manage large Incident Command Centre

Finance

- Claims Handling
- Time & Cost tracking
- Guidance on ExxonMobil's System of Management Controls
- Response Inquiry Centre - establish and manage a call centre to handle these inquiries in the local language.

Safety, Security & Health

- Industrial hygiene professionals to assist with establishing a safe working environment.
- Safety plans - undertake task risk assessment and implementing mitigating measures.
- Medical professionals to ensure the well-being of the responders.
- Security specialist to assist with planning and monitoring security in the areas of operations.

Public & Government Affairs

- Media and Social Media Monitoring
- Develop Communications Materials and Incident Website
- Organise Press Conferences, Town Hall Meetings and Official Visits

Law

- Provide guidance on all matters of a legal nature

OSRL

From the Esso global Tier 3 response contractor (OSRL) Esso can access 50% of the available stock. To this end the figures quoted for OSRL are representative of 50% of the total stockholding. A full inventory of OSRL equipment is available from the OSRL website http://www.oilspillresponse.com/activate-us/response-equipment

OSRL (UK) mobilisation to Gippsland, 3–5 days. OSRL (Singapore) mobilisation to Gippsland 2–4 days

Ambipar

ExxonMobil has an agreement with Ambipar Response (Ambipar) for provision of emergency response support.

During an incident Ambipar can support the ExxonMobil by providing up to 9 trained responders, per the contract, organized as a Tactical Team and Operational Team. These include:

- Tactical Team: Incident and Crisis Management Advisor and Technical Advisor to liaise with RRT leadership and direct the Ambipar Operational Team;
- Operational Team: Team Leader and 6 Response Specialists who can provide a range of intervention services including clean-up, assessment, remediation, confined space entry and decontamination.

Provision also exists to increase the number of Ambipar personnel, subject to availability.

Ambipar also maintain their own response equipment stockpile. The existing agreement does not provide assured access to equipment.

Activation and coordination of Ambipar is the responsibility of the RRT.

9 Templates and Forms

Situation Report (SitRep)

Oil Spill Volume Calculator

Oil Spill Trajectory Modelling request form

ICS forms

ICS 201-1 Map and situation summary

ICS 201-2 Current objectives and actions

ICS 201-3 Current organisation

ICS 201-4 Resource Summary

Refer to EMPC Australia - SSHE portal for additional ICS forms. EP&R Tools, Forms and Guide

Appendix A - ICS 204 Work Assignment Templates

Appendix B – OPEP Consultation Plan

Relevant control agencies

The OPGGS Environmental Regulation 11A establishes that titleholders (and those with access authority) detail consultation arrangements with relevant control agencies within the potentially exposed area as described in the Environment Plan.

To address this, control agencies within the potentially exposed area as described in the Environment Plan shall be consulted to inform content of the OPEP (see Table B-1).

Relevant control agencies will act as a single point of contact for their jurisdiction and may coordinate review and comment from other agencies.

Table B-1 Relevant control agencies (includes but not limited to)

Control Agency	Relevance
Australian Maritime Safety Authority	Commonwealth government agency responsible for maritime safety, protection of the marine environment including marine pollution and maritime aviation search and rescue.
Department of Transport and Planning (VIC)	Relevant for unplanned events. A branch of Transport Safety Victoria, working closely with vessel operators and waterway and port managers to provide expert knowledge, education, support and direction
Transport for NSW (NSW)	Relevant for unplanned events. The control agency for marine pollution incidents impacting NSW state waters. NSW waters could potentially be affected by an extended duration unplanned event.
Department of Primary Industries, Parks, Water and Environment (TAS)	Relevant for unplanned events as the control agency for marine pollution in Tasmanian state waters.

Sufficient time

Four to six weeks is generally considered sufficient time for relevant control agency to complete an internal review, based on prior feedback.

Relevant information

The following information may be provided to relevant control agencies:

- Brief description of activity, including the intended schedule, location, distances to nearest landfall and map
- Worst case discharge volumes
- Known or indicative oil type/properties
- Amenability of oil to dispersants
- Brief description of existing environment and protection priorities
- Key inputs and outputs of the environmental risk assessment
- Outcomes of oil spill trajectory modelling, including predicted times to enter State waters and contact shorelines
- Details on initial response actions and key activation timeframes
- Potential Incident Control Centre arrangements
- Potential staging areas / Forward Operating Base
- Details on response strategies
- Details on proposed IMT structure
- Details on exercise and testing arrangements of OPEP/OSCP

This list has been extracted from the EPA Tasmania – Offshore Petroleum Industry Guidance Note – Annex 3 and forms the basis of information provided. Additional information may be requested by individual agencies.

The information may be provided in summary form or through the provision of a draft EP or OPEP.

Ongoing consultation

The methods and content of ongoing consultation will be determined with relevant stakeholders and may include meetings, exercises, forums or written communication (see Table B-2).

Table B-2 Ongoing consultation with relevant stakeholders

Stakeholder	Meeting	Exercises	Collaborative Forums	Ad-hoc
Victoria State Control Agency **Department of Transport & Planning (DTP)**	Annual meeting	Annual review of Esso OSR exercise plan Participation in Esso and/or State exercises	Regional Marine Pollution Reference Group	Prior to commencement of new activities Changes to risk
Victoria Department Environment, Land, Water & Planning	Annual meeting	Annual review of Esso OSR exercise plan Participation in Esso and/or State exercises	Regional Marine Pollution Reference Group	-
NSW State Control Agency	Annual meeting	Participation in Esso and/or State exercises	-	Prior to commencement of new activities Changes to risk
Tasmania State Control Agency **Department of Primary Industries, Parks, Water and Environment**	Annual meeting	Participation in Esso and/or State exercises	-	Prior to commencement of new activities Changes to risk
Australian Maritime Safety Authority	Annual meeting	Participation in Esso, National Plan and/or State exercises	ES&T Workshops	Prior to commencement of new activities Changes to risk
Gippsland Ports	-	Participation in Esso, Regional and/or State exercises	Regional Marine Pollution Reference Group Esso Community Day	-
East Gippsland Shire Council	-	-	Regional Marine Pollution Reference Group Esso Community Day	-
Victorian Environmental Protection Authority	-	-	Regional Marine Pollution Reference Group	-

Consultation during an unplanned event

In the occurrence of an unplanned event, the methods and content of consultation with relevant stakeholders may be determined by notification requirements and can include meetings, phone calls or written communication (see Table B-3).

Table B-3 Consultation with relevant stakeholders during an unplanned event

Stakeholder	Incident Notification Requirement	Trigger	Method
Australian Maritime Safety Authority	Required for all spills from vessels	Notification requirement met NatPlan resources needs Impact to shipping	PolRep / SitRep Liaison Officer JSCC
Department of Agriculture, Water and the Environment **Parks Australia - Director of National Parks**	Required for all spills that are within a marine park, or could impact a marine park.	Notification requirement met	Verbal
Department of Agriculture, Water and the Environment	Required for all spills that impact or have the potential to impact on matters of national environmental significance (NES)	Notification requirement met	Verbal
Aboriginal Affairs Victoria		Planned shoreline protection or clean-up activities	Via Control Agency IMT
NSW State Control Agency **Transport for NSW**	Required for: all spills that could impact NSW waters.	Notification requirement met	SitRep Liaison Officer JSCC
Dept Energy, Environment & Climate Action – Oiled Wildlife		Potential impact to wildlife	Via Control Agency IMT OWR Coordinator / Liaison
VIC Department of Environment, Land, Water and Planning (Energy Emergency)		Potential impact to supply	Via ESG
TAS State Control Agency **Department of Primary Industries, Parks, Water and Environment**	Required for: all spills that could impact Tasmanian waters.	Notification requirement met	SitRep Liaison Officer JSCC
TAS Parks and Wildlife Service			Via Control Agency IMT
VIC State Control Agency **Department of Transport and Planning - SREC**	All spills that could impact Victorian state waters (> 80 L).		SitRep Liaison Officer JSCC
VIC Environment Protection Authority			Via Control Agency IMT
Transport Safety Victoria - Maritime Safety			Via Control Agency IMT
Parks Victoria		Impact to State waters or shoreline	Via Control Agency IMT

Stakeholder	Incident Notification Requirement	Trigger	Method
		ParksVic resources required	
NSW Department of Primary Industries		Impact to NSW State waters or shoreline	Verbal
Dept Energy, Environment & Climate Action – Earth Resources Regulation	Required for: all spills (80 L).	Notification requirement met	SitRep Liaison Officer JSCC
East Gippsland Shire Council			Via Control Agency IMT
Victorian Regional Channels Authority			Via Control Agency IMT
East Gippsland Catchment Management Authority			Via Control Agency IMT
National Offshore Petroleum Titles Administrator	Required for: all spills (80 L).		SitRep
National Offshore Safety Environmental Management Authority	Required for: all spills (80 L).		SitRep

Appendix C – Oil Spill Response Implementation

Table C-1: Environmental Performance – Oil Spill Response

Performance Outcome	Strategy	Control	Performance Standard	Measurement Criteria
To coordinate spill response operations in a timely manner to minimise impact to the environment	Incident Management	Incident Management Team	Trained personnel are available to fulfil Incident Commander, Operations Section Chief, Planning Section Chief, Logistics Section Chief, Safety Officer and Environmental Unit Lead roles within <1 hour of call out.	• IMT log records timing of events/assigned tasks
		Regional Response Team	Esso will assess requirement to mobilise RRT to support response activities for tier III response. If assessed to be required, RRT support will be made available: • <12 hours from notification for remote support • <72 hours for in country support	• IMT log records • Incident Action Plan
		Initial Oil Spill Response Actions: Assessment & Escalation 0–12 hours	Actions are implemented per timeframes detailed in OPEP Table 3-1 ERT Immediate Actions, Table 3-2 IMT Immediate Actions.	• IMT log • Common Operating Picture • Completed OPEP checklists
		Notifications	Notify authorities in accordance with regulatory requirements per Table 3-4 of OPEP	• IMT log (with supporting ICS forms) • Notification records /reports
To prevent further unplanned releases to the environment	Source control	Relief well drilling	Tier II / III ER Planning - Preliminary Relief Well Plan is completed before relief well is drilled with incident specific details. Including (estimate of cumulative days shown in brackets): • Site survey (ROV) conducted to confirm predetermined well location • Predetermined requirement for personnel and equipment mobilised (10 days to confirm and start mobilisation)	• Incident Specific Tier II / III Relief Well Plan • IMT Log • Incident Action Plan • Daily Drilling reports

Performance Outcome	Strategy	Control	Performance Standard	Measurement Criteria
			• Predetermine Dynamic Kill program confirmed or modified • Relief rig requested under Mutual Aid Agreement (or from Singapore – whichever is faster) mobilised with accompanying tug (or heavy lift vessel) (Relief Rig sourced within 10 days with plans to mobilise) • Relief Well specialist/SFRT/ROV contractors mobilised • Mobilisation of materials and equipment for relief well per confirmed drill program (Rig and equipment on location within 53 days) • Relief well drilling (35 days to drill) • Well secured within total estimate 98 day period	
		Well Kill Skid	Well Kill Skid is mobilised to platform within 48hours of first response. Well Kill is executed in accordance with the Australian Wells Tier II/III Emergency response Plan.	• IMT Log • Incident Action Plan
		Third Party Well Control Equipment	Incident specific well control plan is developed by Third Party Well Control contractor. Equipment is mobilised to platform and response executed in accordance with well control plan (estimated 14 days).	• Incident Specific response plan • IMT Log • Incident Action Plan
		Pipeline de-pressuring and watering out	Pipelines are de-pressured and/or watered out in accordance with the relevant procedures as soon as practicable once a spill is identified.	• IMT Logs • Platform logs
		Pipeline repair	Where feasible, pipeline repair activities are undertaken in accordance with relevant repair procedures (estimated 45 days).	• IMT Logs • Incident Action Plan

Performance Outcome	Strategy	Control	Performance Standard	Measurement Criteria
		Vessel Requirements	Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class. Where applicable: • Vessels with class certification are verified by International Association of Classification Societies (IACS) member. • Vessels comply with AMSA Domestic Commercial Vessel (DCV) requirements	• Vessel class certificates where applicable • Records of compliance with DCV requirements
		Chemical Discharge Assessment Process	All cement, drill fluids and additives planned for discharge are evaluated as acceptable in accordance with the Chemical Discharge Assessment Process.	Chemical assessment records confirm cements, drill fluids, additives, and/or their components are evaluated as acceptable prior to use / discharge.
		Solids Control Equipment	Solids control equipment (shale shakers and centrifuge/dryer) will treat cuttings to a level below 10% retained oil on dry weight basis; averaged over each well section, where Non Aqueous Fluid is used.	Retort test reports document residual oil on cuttings (ROC) measured.
Gather information and validate planning assumptions for current action plan and understand the extent, severity, persistence of the oil and potential environmental sensitives at risk.	Surveillance Monitoring & Visualisation (SMV) Strategy	Oil spill trajectory modelling (OSTM)	Implement OSMP module: • O1.2 Trajectory estimation Module to be implemented within 4 hours of initiation criteria.	• IMT log • Incident Action Plan • Oil spill trajectory modelling reports • Operational monitoring reports
		Oil Spill Tracking Buoys (STB)	Implement OSMP module: • O1.4 Remote observation Module to be implemented in accordance with requirements and timeframes in Section 3.1 of the OSMP. Satellite tracking buoys will be deployed in 24 hour intervals.	• IMT log • Incident Action Plan • OPEP checklist • Operational monitoring reports
		Satellite Imagery	Implement OSMP module: • O1.5 Satellite imagery Module to be implemented in accordance with requirements and timeframes in Section 3.1 of the	• IMT log • Incident Action Plan • Imagery reports • Operational monitoring reports

Performance Outcome	Strategy	Control	Performance Standard	Measurement Criteria
			OSMP (within 24 hours of initiation criteria being met).	
		Aircraft Surveillance	Implement OSMP module: • O1.3 Aerial or underwater observation Module to be implemented in accordance with requirements and timeframes in Section 3.1 of the OSMP (within 4 hours of initiation criteria being met).	• IMT log • Incident Action Plan • Observation reports • Operational monitoring reports
		Water and Oil quality monitoring	Implement OSMP modules: • O2.2 Fluorometry • O2.3 Water samples; Modules to be implemented in accordance with Section 3.2 of the OSMP.	• IMT log • Incident Action Plan • Laboratory reports • Operational monitoring reports
		OMSP Termination Criteria	Monitoring under OSMP modules O1 and O2 continued until termination criteria set out in Sections 3.1 and 3.2 of the OSMP are met.	• IMT log • Final operational monitoring reports
To prevent further unplanned releases to the environment		Vessel Requirements	Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class. Where applicable: • Vessels with class certification are verified by International Association of Classification Societies (IACS) member. • Vessels comply with AMSA Domestic Commercial Vessel (DCV) requirements	• Vessel class certificates where applicable • Records of compliance with DCV requirements
To reduce consequences to surface and shoreline values and sensitivities and increase the bioavailability of oil for microbial breakdown.	Dispersant Application	Dispersant spraying aircraft	Mobilise dispersant spraying Fixed Wing Aerial Dispersant (FWAD) aircraft within <4 hours of request for service. Dispersant application ability within <24 hours with up to 4 flights per day.	• IMT log • Incident Action Plan • Completed OPEP checklists
		Dispersant spraying vessels	Mobilise dispersant spraying vessels within the following timeframes;	• IMT log

Performance Outcome	Strategy	Control	Performance Standard	Measurement Criteria
			• 1st team dispersant application ability <48 hours of request of service • 2nd team dispersant application ability <72 hours of request for service Vessels can spray up to $3m^3$ of dispersant per day.	• Incident Action Plan • Completed OPEP checklists
		Incident specific NEBA	NEBA assessment is completed prior to dispersant use.	• IMT log • Incident Action Plan • Incident specific NEBA
		Halt dispersant application if wildlife are identified in the area	If EPBC Act listed migratory species (e.g. whales) are observed in the immediate vicinity of dispersant operations, aerial dispersant operations will cease until the animal has not been sighted for 30 minutes or unless otherwise advised by the relevant state authority.	• Observation reports • IMT log
		Vessel Requirements	Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class. Where applicable: • Vessels with class certification are verified by International Association of Classification Societies (IACS) member. • Vessels comply with AMSA Domestic Commercial Vessel (DCV) requirements	• Vessel class certificates where applicable • Records of compliance with DCV requirements
		Dispersant pre-selection and assessment	Only dispersants listed in Volume 3 Section 5.1 will be utilised, unless otherwise endorsed by the Statutory Authority	• IMT log • Incident Action Plan • Records stating dispersant types, locations, types and volumes
		Laboratory dispersant effectiveness testing	Laboratory dispersant effectiveness test results will be used to inform if use of dispersant is likely to reduce environmental impacts giving	• IMT log • Incident Action Plan

Performance Outcome	Strategy	Control	Performance Standard	Measurement Criteria
			consideration to elapsed time, weathering and selection of dispersant with highest efficacy.	
		Basic field dispersant effectiveness test	Dispersants will be test sprayed on all crude oil spills for efficacy prior to operational.	• IMT log • Report records
		Exclusion zones	Dispersant application is only accepted for: • Commonwealth waters, and • >10 m water depth, and • Outside Australian marine parks Dispersants are <u>not</u> to be used in State waters without approval of the Control Agency IMT.	• IMT log • Incident Action Plan • Incident specific NEBA • Approvals from Control Agency IMT
		Monitoring of dispersant in water and effectiveness	Implement OSMP module: • O2: Water and Oil Sampling In accordance with requirements and timeframes in Section 3.2 of the OSMP.	• IMT log • Incident Action Plan • Common Operating Picture • Operational monitoring reports
		Records of dispersant volumes	A record of the volumes of dispersant used in surface application will be kept throughout the response.	• IMT log • Incident Action Plan • Records stating dispersant types, locations, types and volumes • Completed OPEP checklist
		Surface dispersant only applied within daylight hours	Surface dispersants only applied in daylight hours	• IMT log • Incident Action Plan • Records stating dispersant types, locations, types and volumes

Performance Outcome	Strategy	Control	Performance Standard	Measurement Criteria
		Targeted dispersant application	Dispersants will be targeted at areas of thickest oil and considerations of oil type, amenability and volume will be assessed prior to any dispersant application.	• IMT log • Incident Action Plan • Records stating dispersant types, locations, types and volumes
To recover spilt oil before shoreline or other sensitivity contact.	Containment and recovery	Vessel Requirements	Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class. Where applicable: • Vessels with class certification are verified by International Association of Classification Societies (IACS) member. • Vessels comply with AMSA Domestic Commercial Vessel (DCV) requirements	• Vessel class certificates where applicable • Records of compliance with DCV requirements
		Incident specific NEBA	A incident specific NEBA is completed.	• IMT log • Incident Action Plan • Incident specific NEBA
		Containment and recovery operations only undertaken within daylight hours	Containment and recovery activities will only be undertaken in daylight hours to ensure trapped fauna are released as soon as possible.	• IMT log • Incident Action Plan • Records of fauna released
		Daily records of oil recovered	Daily Containment and Recovery operations are recorded (location, estimated amount of oil recovered, estimated amount of water recovered)	• IMT log • Incident Action Plan • Records stating locations, types and volumes of oil recovered
		Exclusion Zones	Exclusion zones are put in place which consider health and safety and environment risks. These exclusion zones are determined in consultation with the relevant statutory agency.	• IMT log • Incident Action Plan • Records stating exclusion zones

Performance Outcome	Strategy	Control	Performance Standard	Measurement Criteria
		Decanting performed in commonwealth waters in accordance with MARPOL requirements	AMSA must approve all decanted separated water to increase waste storage of recovered oil.	• IMT log • Incident Action Plan • Records of decanted water (oil in water) concentrations • Approval from AMSA
		Bass Strait Oil Spill Response Waste Management Plan	An incident specific Waste Management Plan is developed to ensure management of waste in accordance to Australian best practices and principals.	• IMT log records • Incident Action Plan • Incident specific waste management plan
		Containment & Recovery vessels	Mobilise containment and recovery vessels in accordance with the following timeframes; • 1x vessel C&R strike team on site <48 hours of service request • 2x vessel C&R strike team on site <72 hours of service request.	• IMT log records • Incident Action Plan • OPEP checklists
Reduce oil impact on shoreline environmental sensitivities	Shoreline Protection and Clean-up	Shoreline Assessment	Implement OSMP modules: • O3.1 Shoreline segmentation • O3.2 Shoreline character • O3.3 Oil on shorelines • O3.4 Shoreline profile In accordance with requirements and timeframes in Section 3.3 of the OSMP. Up to 12 trained shoreline assessment field personnel will be available in the first 24 hours. Up to an additional 12 trained shoreline assessment field personnel will be available in the first 14 days.	• IMT log • Incident Action Plan • Operational monitoring reports • Field reports

Performance Outcome	Strategy	Control	Performance Standard	Measurement Criteria
		Shoreline Tactical Response Plans (TRPs)	Where shoreline contact is predicted, implement shoreline TRPs in consultation with control agency	• IMT log • Incident Action Plan • OPEP checklist
		Incident specific NEBA	A incident specific NEBA is completed	• IMT log • Incident Action Plan • Incident specific NEBA
		Daily records of oil recovered	Daily Shoreline Protection and Clean-up operations are recorded (location, estimated amount of oil recovered, estimated amount of water recovered)	• IMT log • Incident Action Plan • Records stating locations, types and volumes of oil recovered
		Exclusion Zones	Exclusion zones are put in place which consider health and safety and environment risks. These exclusion zones are determined in consultation with the control agency.	• IMT log • Incident Action Plan • Records stating exclusion zones
		Shoreline clean up personnel	Where shoreline contact is predicted from operational monitoring to be accumulations >100m/m^3, shoreline clean up personnel will be mobilised in the first 48 hours including up to • 4 Foreman • 20 Labourers • 4 Specialised Operators The shoreline clean up personnel will be mobilised up to: • 188 Foreman • 1614 Labourers • 124 Specialised Operators	• IMT log • Incident Action Plan • OPEP Checklists

Performance Outcome	Strategy	Control	Performance Standard	Measurement Criteria
		Shoreline protection equipment	Where shoreline contact is predicted from operational monitoring to be accumulations >100m/m^3, shoreline clean up equipment is mobilised from closest stockpile in the first 48 hours including up to • 650m Shoreboom • 650m x Nearshore boom • 1x Offshore skimmer system • 12 x Fast Tanks • Anchor kits + accessories The shoreline clean up equipment to be mobilised from State/AMOSC/AMSA/OSRL stockpiles up to the following • 3,250m x Shoreboom • 2,025m x Nearshore boom • 1x Offshore skimmer system • 12 x Fast Tanks • Anchor kits + accessories	• IMT log • Incident Action Plan • OPEP Checklists
		Shoreline protection personnel	Where shoreline contact is predicted, shoreline protection personnel will be mobilised in the first 48 hours including up to • 27 Foreman • 82 Labourers • 63 Specialised Operators The shoreline clean up personnel will be mobilised up to: • 84 Foreman • 245 Labourers • 189 Specialised Operators	• IMT log • Incident Action Plan • OPEP Checklists

Performance Outcome	Strategy	Control	Performance Standard	Measurement Criteria
		Shoreline protection and clean-up operations only undertaken within daylight hours	Shoreline protection and clean-up activities will only be undertaken in daylight hours to minimise impacts caused by unplanned interactions with flora and fauna.	• IMT log • Incident Action Plan
		Bass Strait Oil Spill Response Waste Management Plan	An incident specific Waste Management Plan is developed to ensure management of waste in accordance to Australian best practices and principals.	• IMT log records timing of events/assigned tasks • Incident specific waste management plan
		Waste Management transport and disposal	Where shoreline contact is predicted from operational monitoring to be accumulations >100g/m^2, shoreline clean up equipment is mobilised from closest stockpile from 48 hours including up to Solid and Liquid storage and processing of waste available is up to: • 63000 KL of liquid storage • 280 KL/day of liquid processing • 10 iso flammable liquid trucks/ day • 10 non flammable liquid truck/ day • 33500 Tonne of solids storage • 1050 Tonne/day of solid processing • 20 Tonne solids trucks/ day	• IMT log • Incident Action Plan
		Implement measures to minimise secondary contamination at temporary storage locations	Soil will be initially sampled to establish baseline “clean” levels. Establish bunding adequate to hold the daily bagged totals	• IMT log • Incident Action Plan • Final operational monitoring reports

Performance Outcome	Strategy	Control	Performance Standard	Measurement Criteria
		OSMP Termination Criteria	Monitoring under OSMP module O3 continued until termination criteria set out in Section 3.3 of the OSMP are met.	• IMT log • Final operational monitoring reports
Change in water quality is limited to that allowed under MARPOL		Vessel Requirements	Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class. Where applicable: • Vessels with class certification are verified by International Association of Classification Societies (IACS) member. • Vessels comply with AMSA Domestic Commercial Vessel (DCV) requirements	• Vessel class certificates where applicable • Records of compliance with DCV requirements
Monitor, evaluate and reduce environmental impact on fauna	Oiled Wildlife Response (OWR)	Incident specific NEBA	A incident specific NEBA is completed	• IMT log • Incident Action Plan • Incident specific NEBA
		Shoreline Tactical Response Plans (TRPs)	Where OWR is predicted: • Inform and agree with Control Agency IMT tactical execution of planning OWR • Based on trajectory, agree with Control Agency IMT regarding applicable Shoreline TRPs. • Commence mobilisation of equipment, personnel and support for OWR	• IMT log • Incident Action Plan
		Daily OWR Records	Daily OWR operations are recorded (numbers, type and status of fauna)	• IMT log • Incident Action Plan • Records stating numbers, type and status of fauna
		Exclusion Zones	Exclusion zones are put in place which consider health and safety and environment risks. These exclusion zones are determined in consultation with the control agency.	• IMT log • Incident Action Plan

Performance Outcome	Strategy	Control	Performance Standard	Measurement Criteria
				• Records stating exclusion zones
		Fauna Observation	Where oiled wildlife impacts are predicted, implement OSMP modules: • O4.1 Fauna observation (at sea) • O4.2 Fauna observations (onshore) Modules to be implemented in accordance with requirements and timeframes in Section 3.4 of the OSMP.	• IMT log • Incident Action Plan • Operational monitoring reports
		Oiled wildlife personnel and subject matter expertise	Esso will consult with Control Agency IMT on requirements for OWR clean-up personnel, for all spills that impact wildlife. Esso will mobilise OWR personnel from own, AMOSC and tier three providers to meet DELWP requests	• IMT log records • Incident Action Plan • Record of oiled wildlife personnel and subject matter expertise
		Bass Strait Oil Spill Response Waste Management Plan	An incident specific Waste Management Plan is developed to ensure management of waste in accordance to Australian best practices and principals.	• IMT log records • Incident Action Plan • Incident specific waste management plan
		OSMP Termination Criteria	Monitoring under OSMP module O4 continued until termination criteria set out in Section 3.4 of the OSMP are met.	• IMT log • Final operational monitoring reports
Monitor and evaluate environmental impact and recovery from the spill and response activities.	Scientific Monitoring	Oil Spill Monitoring Program	Implement OSMP modules S1-S9, as required: • S1: Hydrocarbons in intertidal sediments and water • S2: Hydrocarbons in offshore sediments and water • S3: Fish and shellfish taint and toxicity for human consumption • S4: Short-term impacts to oiled fauna and flora	• IMT log • Incident Action Plan • Scientific monitoring reports

Performance Outcome	Strategy	Control	Performance Standard	Measurement Criteria
			• S5: Recovery of commercial and recreational fisheries • S6: Recovery of fauna • S7: Recovery of subtidal and intertidal benthic habitat • S8: Recovery of coastal flora • S9: Recovery of Ramsar values Modules to be implemented in accordance with requirements and timeframes in Section 4 of the OSMP.	
		OSMP Termination Criteria	Monitoring under OSMP module S1-9 continued until termination criteria set out in Section 4 of the OSMP are met.	• IMT log • Final operational monitoring reports

Appendix D – Quick Reference Information

Appendix E – Dispersant Testing Results

Table E-1: Dispersant efficacy on different Bass Strait crudes at an application rate of 20:1 (oil:dispersant)

Crude	Seasonal Conditions	Weathering	Dispersant					
			Corexit EC9527		Corexit EC9500A		Slickgone NS	
			10A*	5Q**	10A*	5Q**	10A*	5Q**
Snapper Crude Oil	Summer	Fresh	84.2	73.5	99.7	95.6	99.7	75.8
		Fresh (duplicate)	-	-	-	-	99.8	72.3
		12 hr	1.4	1.7	3.0	1.2	3.4	2.4
		24 hr	1.2	0.7	1.5	0.4	2.1	1.3
		48 hr	0.6	1.3	1.3	1.4	3.2	2.7
	Winter	Fresh	84.2	73.5	99.7	95.6	99.7	75.8
		Fresh (duplicate)	-	-	-	-	99.8	72.3
		12 hr	1.4	1.7	3.0	1.2	3.4	2.4
		24 hr	1.2	0.7	1.5	0.4	2.1	1.3
		48 hr	0.6	1.3	1.3	1.4	3.2	2.7
Flounder Crude Oil	Summer	Fresh	84.6	75.9	99.4	64.6	48.0	27.6
		Fresh (duplicate)	-	-	95.3	59.5	-	-
		12 hr	4.1	4.7	2.9	1.3	1.0	0.5
		24 hr	0.5	0.6	0.3	0.3	0.7	0.1
		48 hr	0.3	0.3	0.2	0.2	0.2	0.3
	Winter	Fresh	84.6	75.9	100.0	65.0	48.0	27.6
		Fresh (duplicate)	-	-	95.3	59.5	-	-
		12 hr	1.4	1.1	7.8	3.6	4.5	2.7
		24 hr	1.4	1.1	4.3	1.8	2.0	1.3
		48 hr	2.6	0.4	0.4	0.2	0.4	0.5
West Kingfish Crude Oil	Summer	Fresh	36.0	8.1	99.9	7.3	99.9	55.8
		Fresh (duplicate)	-	-	78.9	6.0	-	-
		12 hr	0.5	0.1	0.1	0.2	2.5	0.9
		24 hr	0.4	0.1	0.1	0.2	1.8	0.9
		48 hr	0.4	0.1	0.6	0.5	1.7	0.8
	Winter	Fresh	36.0	8.1	72.0	3.7	99.9	55.8
		12 hr	1.6	1.1	8.7	1.7	31.7	14.7

Crude	Seasonal Conditions	Weathering	Dispersant					
			Corexit EC9527		Corexit EC9500A		Slickgone NS	
			10A*	5Q**	10A*	5Q**	10A*	5Q**
		24 hr	0.4	0.4	0.8	0.3	2.4	1.3
		48 hr	0.4	0.1	0.6	0.5	1.7	0.8
Halibut Crude Oil	Summer	Fresh	99.9	51.9	99.7	16.9	95.0	45.9
		Fresh (duplicate)	-	-	-	-	90.9	45.8
		12 hr	0.2	0.2	0.3	0.3	0.9	0.6
		24 hr	0.2	0.2	0.3	0.3	0.9	0.6
		48 hr	0.1	0.1	0.1	0.1	0.3	0.5
	Winter	Fresh	99.9	51.9	99.7	16.9	95.0	45.9
		Fresh (duplicate)	-	-	-	-	90.9	45.8
		12 hr	4.4	2.7	2.4	2.0	4.0	1.2
		24 hr	1.5	0.6	0.6	0.9	0.9	0.5
Moonfish Crude Oil	-	Fresh	3.8	1.7	2.4	1.3	2.6	1.7
		Fresh (duplicate)	0.6	0.5	-	-	2.6	1.7

*Sample collected and analysed after 10 minutes of agitation

**Sample collected and analysed after agitation had stopped for 5 minutes

Appendix B – Bass Strait Operational and Scientific Monitoring Plan

Esso Australia Resources Pty Ltd
Bass Strait Operational & Scientific Monitoring Program

Document Number: AUGO-EV-EPL-001

OIMS MANUAL - DOCUMENT CONTROL DETAILS

TITLE:	Bass Strait Operational & Scientific Monitoring Program
REVISION:	5.1
REVISION STATUS:	NOPSEMA OMR for Bass Strait EP
DATE OF ISSUE:	1 July 2022
DOCUMENT ADMINISTRATOR:	Environment & Regulatory Advisor
OIMS DOCUMENT CATEGORY:	Special Controls Mandatory
MPI CLASSIFICATION:	None
RETENTION PERIOD:	IND, MIN ACT+10+LC (Indefinite, Retain while current + 10 years, then obtain Law Clearance prior to disposal)
MASTER STORAGE LOCATION:	UDocs (OIMS 10-2 Emergency Prep & Response)

APPROVALS:

Rev 5.1	Name	Position	Signature	Date
Endorsed By:	Hena Kalam	Offshore Risk, Env. & Regulatory Supervisor	On file	9 December 2020
Document Owner:	Hena Kalam	Offshore Risk, Env. & Regulatory Supervisor	On file	9 December 2020
Approved By	Simon Kemp	Offshore Asset Manager	On file	9 December 2020

Endorsed / approved by Esso Australia Pty Ltd, for and on behalf of Esso Australia Resources Pty Ltd.

REVISION HISTORY

Rev	Revision / Status	Date	Prepared by	Approved By
5.1	Document title change to reflect legislative changes; Administrative changes to Sections 1.4, 2.7, 2.8	30 December 2021	WP / LL	-
5	NOPSEMA OMR for Bass Strait Operations EP	9 December 2020	LL	Simon Kemp
4.1	Administrative changes to Sections 3.2.2, 3.2.4 and 2.8	27 August 2020	-	-
4	NOPSEMA RFFWI for Bass Strait Operations EP	10 June 2020	GHD / LL	Simon Kemp
3	NOPSEMA RFFWI (2) for JUR Drilling EP	30 December 2019	CT / HK	Simon Kemp
2	NOPSEMA OMR for JUR Drilling EP	2 December 2019	GHD	Simon Kemp
1	NOPSEMA RFFWI for JUR Drilling EP	23 October 2019	Natasha Carroll	Simon Kemp
0	Issued for acceptance	15 August 2019	Natasha Carroll	Simon Kemp
A	Issued for Review (IFR)	July 2019	Natasha Carroll	

DOCUMENT REVIEW AND UPDATE:

The Document Owner is responsible for maintaining and controlling changes to this document in accordance with the Document Management Manual (AUGO-PO-DMM-001). In the course of using this document, users may identify opportunities to improve its content. They are requested to provide suggestions to the Document Owner.

This document should be reviewed for accuracy and currency on a 5 yearly basis commencing from the original formal issue date. Major revisions to this manual are to comply with the OIMS System Manual/Process Management of Change procedures.

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00	SSHE Group Administrator	Docklands	Email/electronic

Quick Reference: Operational Monitoring Initiation & Termination Criteria

Module	Sub-Module(s)	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Implementation Time [2]
O1: Oil spill surveillance	O1.1 Weather and sea state; O1.2 Trajectory estimation; and O1.3 Aerial or underwater observation;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred	Planning Section Chief (PSC) (or delegate)	✓ The IMT IC (or delegate) considers that continuation of monitoring under O1[1] will not result in a change to the scale or location of active response options; **or** ✓ Two consecutive aerial or underwater observations show that oil has weathered and dissipated to <0.3 g/m^2; or Bonn appearance 1; or ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; **or** ✓ The Principal Investigator through the EUL (or delegate) has advised that continuation of monitoring under O1[1] may increase overall environmental impact.	Within 4 hours of initiation criteria being met.
	O1.4 Remote observation;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms the event as a Level 2 or Level 3 hydrocarbon spill.			Within 24 hours of initiation criteria being met.
	O1.5 Satellite imagery;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms the event as a Level 3 hydrocarbon spill;			Within 24 hours of initiation criteria being met.
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O1 is to commence.			Per above
O2: Water and oil sampling	O2.1 Collection of an oil sample	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred	PSC (or delegate)	✓ The IMT IC (or delegate) has determined that continuation of monitoring under the module is not necessary to meet the objectives of the response; **or** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response**.**	As soon as practicable following initiation criteria being met
	O2.2 Fluorometry O2.3 Water samples;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms the event as a Level 2 or Level 3 hydrocarbon spill; **or**			Within 24 hours of initiation criteria being met.

Module	Sub-Module(s)	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Implementation Time [2]
		✓ Application of dispersant has been selected as a response option by the IMT IC (or delegate).			
	O2.4 Dispersant Monitoring	✓ Application of dispersant has been selected as a response option by the IMT IC (or delegate).			
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O2 is to commence.			Per above
O3: Shoreline assessment	O3.1 Shoreline segmentation O3.2 Shoreline character O3.3 Oil on shorelines	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Results of Module O1 monitoring predict that shorelines could be impacted.	PSC (or delegate)	✓ The IMT IC (or delegate) has determined that continuation of monitoring under the module is not necessary to meet the objectives of the response; **or** ✓ Results of Module O1 and O3.3 monitoring demonstrate that shorelines have not been impacted and will not be impacted; **or** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; **or** ✓ The Principal Investigator through the EUL (or delegate) has advised that continuation of monitoring under O3[1] may increase overall environmental impact.	Within 24 hours of initiation criteria being met
	O3.4 Shoreline profile	✓ Modification of the shoreline profile is identified as a recommended strategy (e.g. through mechanical construction of pits, berms, or bulk waste removal)			Within 24 hours of initiation criteria being met
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O2 is to commence.			Per above
O4: Fauna observations	O4.1 Fauna observation (at sea)	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred	PSC (or delegate)	✓ The IMT IC (or delegate) has determined that continuation of monitoring under the module is not necessary to meet the objectives of the response; **or** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; **or**	Within 4 hours of initiation criteria being met
	O4.2 Fauna observations (onshore)	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms that data from Modules O1 and/or O3 predicted/confirmed shoreline exposure.			Within 24 hours of initiation criteria being met.

Module	Sub-Module(s)	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Implementation Time [2]
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O4 is to commence.		✓ The Principal Investigator through the EUL (or delegate) has advised that continuation of monitoring under O4[1] may increase overall environmental impact.	Per above
O5: Air quality	O5.1 Personnel and area monitoring O5.2 Laboratory analysis	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Confirmation by the Safety Officer (SO) (or delegate) that a health and safety risk to personnel is present	SO (or delegate)	✓ The Safety Officer SO (or delegate) has determined that there is no longer a health and safety risk; **or** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response.	Within 12 hours of initiation criteria being met.
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O5 is to commence.			Per above
O6: Sediment sampling	O6.1 Sediment samples (intertidal)	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms that data from Modules O1, O2 and/or O3 have predicted/confirmed exposure of intertidal benthic substrate.	PSC (or delegate)	✓ The IMT IC (or delegate) has determined that continuation of monitoring under the module is not necessary to meet the objectives of the response; **or** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; **or** ✓ The Principal Investigator through the EUL (or delegate) has advised that continuation of monitoring under O6[1] may increase overall environmental impact.	Within 24 hours of initiation criteria being met
	O6.2 Sediment samples (offshore);	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms that data from Modules O1 and/or O2 have predicted/confirmed exposure of offshore benthic substrate.			Within 24 hours of initiation criteria being met
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O6 is to commence.			Per above

Notes:

1. *Decision to terminate monitoring can be made for each individual sub-module independently.*

2. *A module is considered implemented when Esso have (i) confirmed initiation criteria have been met, (ii) the monitoring providers have been notified, (iii) sampling and analysis plans (where required) have been completed, and (iv) mobilisation has commenced.*

Quick Reference: Scientific Monitoring Initiation & Termination Criteria

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	Activation Time[1]	Implementation Time
S1: Hydrocarbons in intertidal sediments and water	S1.1 Water samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Principal Investigator through the EUL (or delegate) confirms that data from Modules O1 and/or O2 have predicted/confirmed exposure of intertidal waters	PSC (or delegate)	✓ Ambient hydrocarbon concentrations in intertidal waters have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ Ambient hydrocarbon concentrations in intertidal waters are below relevant ANZECC & ARMCANZ (2000) 99% species protection levels.	Principal Investigator through the EUL, in agreement with the Jurisdictional Authority relevant to the spill	Within 24 hours of initiation criteria being met;	Sampling and analysis plan to be ready within 24 hours of initiation criteria being met; Mobilisation and monitoring to commence within 24 hours of activation.
	S1.2 Sediment samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Principal Investigator through the EUL (or delegate) confirms that data from Modules O1 and/or O2 have predicted/confirmed exposure of intertidal or shoreline sediments		✓ Ambient hydrocarbon concentrations in intertidal sediments have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ Ambient hydrocarbon concentrations in intertidal sediments are below relevant ANZECC & ARMCANZ SQGV (Simpson *et al*. 2013) or NAGD (CoA 2009).			
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial		✓ Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.			

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	Activation Time[1]	Implementation Time
		implementation of S1 is to commence.					
S2: Hydrocarbons in offshore sediments and water	S2.1 Water samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Principal Investigator through the EUL (or delegate) confirms that data from Modules O1 and/or O2 have predicted/confirmed exposure to offshore waters	PSC (or delegate)	✓ Ambient hydrocarbon concentrations in offshore waters have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ Ambient hydrocarbon concentrations in offshore waters are below relevant ANZECC/ARMCANZ (2000) 99% species protection levels.	Principal Investigator through the EUL, in agreement with the Jurisdictional Authority relevant to the spill	Within 24 hours of initiation criteria being met;	Sampling and analysis plan to be ready within 24 hours of initiation criteria being met; Mobilisation and monitoring to commence within 24 hours of activation.
	S2.2 Sediment samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Principal Investigator through the EUL (or delegate) has determined that data from operational modules O1, O2 or O6 has confirmed exposure to either benthic substrate or waters within bottom 1 m of seabed		✓ Hydrocarbon concentrations in offshore sediments have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ Hydrocarbon concentrations in offshore sediments are below relevant ANZECC/ARMCANZ SQGV (Simpson *et al*. 2013) or NAGD (CoA 2009) trigger levels.			

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	Activation Time[1]	Implementation Time
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S2 is to commence.		✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.			
S3: Fish and shellfish taint and toxicity for human consumption	S3 Fish/shellfish tissue samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Principal Investigator through the EUL (or delegate) has determined that data from operational modules O2/O6 or scientific modules S1/S2 has confirmed either: (a) in-water hydrocarbon concentrations are above guideline levels known to cause tainting (Table 4.4.5 in ANZECC & ARMCANZ 2000); or (b) sediment hydrocarbon concentrations are above SQGV levels (Simpson *et al*. 2013) ✓ Principal Investigator through the EUL (or delegate) has determined that data	PSC (or delegate)	✓ Two sequential sample sets show ambient hydrocarbon concentrations are below guideline levels for tainting in ANZECC & ARMCANZ 2000); **and either** ✓ PAH and non-hydrocarbon constituent levels in fish and shellfish tissue have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ PAH and non-hydrocarbon constituent levels in fish and shellfish tissue are at or below levels specified by Food Standards Australia New Zealand (FSANZ).	Principal Investigator through the EUL, in agreement with the Jurisdictional Authority relevant to the spill	Within 24 hours of initiation criteria being met	Sampling and analysis plan to be ready within 7 days of initiation criteria being met; Mobilisation and monitoring to commence within 7 days of activation.

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	Activation Time[1]	Implementation Time
		from operational modules O2/O6 or scientific modules S1/S2 has confirmed either: (a) in-water non-hydrocarbon constituent concentrations are above guideline levels known to cause tainting (Table 4.4.5 in ANZECC & ARMCANZ 2000); or (b) sediment hydrocarbon concentrations are above SQGV levels (Simpson *et al*. 2013) **and** ✓ Agreement has been reached with the Jurisdictional Authority relevant to the spill to initiate the monitoring					
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S3 is to commence.		✓ **Or,** Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.			
S4: Short-term impacts to oiled fauna and flora	S4.1 Fauna surveys (vessel-based)	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and**	PSC (or delegate)	✓ Disturbance parameters (e.g. mortality, percentage oiled fauna/flora) have returned to within the expected natural dynamics	Principal Investigator through the EUL, in agreement with the	Within 24 hours of initiation criteria being met	Sampling and analysis plan to be ready within 24 hours of initiation criteria being met;

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	Activation Time[1]	Implementation Time
	S4.2 Fauna surveys (land-based) S4.3 Oiled fauna hydrocarbon testing;	✓ Principal Investigator through the EUL (or delegate) has determined that data from operational modules O4 has confirmed the presence of oiled fauna.		of baseline state and/or control sites; **or** ✓ Hydrocarbon concentrations from fauna samples have returned to within the expected natural dynamics of baseline state and/or control sites.	Jurisdictional Authority relevant to the spill		Mobilisation and monitoring to commence within 24 hours of activation.
	S4.4 Flora surveys	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Principal Investigator through the EUL (or delegate) has determined that data from operational modules O3 has confirmed the presence of oiled shorelines					
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S4 is to commence.		✓ Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.			
S5: Recovery of commercial and	S5 Desktop review of fishery stock;	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal	PSC (or delegate)	✓ Catch per Unit Effort (CPUE) for fishery stock assessments have returned to within the expected natural dynamics of baseline state and/or control sites; **or**	Principal Investigator through the EUL, in agreement with the	Within 24 hours of initiation criteria being met	Desktop assessment to commence within 24 hours of activation.

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	Activation Time[1]	Implementation Time
recreational fisheries		waters has occurred; and Principal Investigator through the EUL (or delegate) has confirmed that either: (a) Data from S3 confirms tainting in fish or shellfish tissue; or (b) Advice has been provided to government to restrict, ban or close a fishery; or (c) Declarations of intent by commercial fisheries or government agencies to seek compensation for alleged or possible damage.		✓ The physiological and biochemical parameters in the studied species have returned to baseline levels;	Jurisdictional Authority relevant to the spill		
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S5 is to commence.		✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.			

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	Activation Time[1]	Implementation Time
S6: Recovery of fauna	S6 Fauna surveys	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred, **and** ✓ Principal Investigator through the EUL (or delegate) has determined that data from operational module O4 or scientific module S4 has confirmed the exposure of fauna	PSC (or delegate)	✓ Disturbance parameters (e.g. estimated population) have returned to within the expected natural dynamics of baseline state and/or control sites	Principal Investigator through the EUL, in agreement with the Jurisdictional Authority relevant to the spill	Within 24 hours of initiation criteria being met	Sampling and analysis plan to be ready within 7 days of initiation criteria being met; Mobilisation and monitoring to commence within 7 days of activation.
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S6 is to commence.		✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.			
S7: Recovery of subtidal and intertidal benthic habitat	S7.1 Habitat mapping; S7.2 Macroalgae and sponges S7.3 Benthic infauna monitoring; S7.4 Intertidal and subtidal fish monitoring	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Principal Investigator through the EUL (or delegate) has determined that data from operational module O2/O6 or	PSC (or delegate)	✓ Disturbance parameters (e.g. species composition, percent cover) and health parameters (e.g. leaf condition) have returned to within the expected natural dynamics of baseline state and/or control sites	Principal Investigator through the EUL, in agreement with the Jurisdictional Authority relevant to the spill	Within 24 hours of initiation criteria being met	Sampling and analysis plan to be ready within 7 days of initiation criteria being met; Mobilisation and monitoring to commence within 7 days of activation.

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	Activation Time[1]	Implementation Time
		scientific module S1/S2/S4 has confirmed the exposure of either benthic substrate or waters within bottom 1 m of seabed					
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S7 is to commence.		✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring			
S8: Recovery of coastal flora	S8.1 Habitat mapping; S8.2 Condition monitoring	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Principal Investigator through the EUL (or delegate) has determined that data from operational module O3 or scientific module S4 has confirmed the exposure of coastal flora	PSC (or delegate)	✓ Disturbance parameters (e.g. abundance, percent cover) and health parameters (e.g. leaf condition) have returned to within the expected natural dynamics of baseline state and/or control sites.	Principal Investigator through the EUL, in agreement with the Jurisdictional Authority relevant to the spill	Within 24 hours of initiation criteria being met	Sampling and analysis plan to be ready within 7 days of initiation criteria being met; Mobilisation and monitoring to commence within 7 days of activation.
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S8 is to commence.		✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.			

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	Activation Time[1]	Implementation Time
S9: Recovery of Ramsar values	S9 Desktop review of wetland values	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Principal Investigator through the EUL (or delegate) has determined that (a) data from operational module O3 has confirmed the exposure of a Ramsar wetland; and (b) data from scientific modules S1, S4, S6, S7 or S8 confirm an impact to water/sediment quality, flora or fauna in the wetland.	PSC (or delegate)	✓ Wetland values that are important to the ECD* have returned to within the expected natural dynamics of baseline state and/or control sites. * as described in relevant Ramsar site documents prepared per the National ECD Framework	Principal Investigator through the EUL, in agreement with the Jurisdictional Authority relevant to the spill	Within 24 hours of initiation criteria being met	Desktop assessment to commence within 24 hours of activation.
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S9 is to commence.		✓ **Or**, agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.			

Notes:
1. *A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.*

Quick Reference: Event Level and Monitoring Modules

Spill Event	O1: Oil spill surveillance					O2: Water and oil sampling				O3: Shoreline assessment				O4: Fauna observations		O5: Air quality		O6: Sediment sampling	
	O1.1	O1.2	O1.3	O1.4	O1.5	O2.1	O2.2	O2.3	O2.4	O3.1	O3.2	O3.3	O3.4	O4.1	O4.2	O5.1	O5.2	O6.1	O6.2
	Weather and sea state	Trajectory estimation	Aerial or underwater observation	Remote observation	Satellite imagery	Collection of an oil sample	Fluorometry	Water samples	Dispersant monitoring	Shoreline segmentation	Shoreline character	Oil on shorelines	Shoreline profile	Fauna observation (at sea)	Fauna observation (onshore)	Personnel and area monitoring	Laboratory analysis	Sediment samples (intertidal)	Sediment samples (offshore)
Level 1	X	X	X	P		P	P	P	P	P	P	P	P	X	P	P	P	P	P
Level 2	X	X	X	P	P	X	P	X	P	P	P	P	P	X	P	P	P	P	P
Level 3	X	X	X	X	X	X	X	X	P	P	P	P	P	X	P	P	P	P	P

Key: X = always required; P = possibly required, dependent on selection of response options, the outcomes of operational modelling such as weather and sea state, observations and trajectory estimation that will provide information on the spill's persistence and potential for contact with shorelines / other receptors.

Spill Event	S1: Hydrocarbons in intertidal sediments and water		S2: Hydrocarbons in offshore sediments and water		S3: Fish and shellfish taint and toxicity for human consumption	S4: Short-term impacts to oiled fauna and flora				S5: Recovery of commercial and recreational fisheries	S6: Recovery of fauna	S7: Recovery of subtidal and intertidal benthic habitat				S8: Recovery of coastal flora		S9: Recovery of Ramsar values
	S1.1	S1.2	S2.1	S2.2	S3	S4.1	S4.2	S4.3	S4.4	S5	S6	S7.1	S7.2	S7.3	S7.4	S8.1	S8.2	S9
	Water samples	Sediment samples	Water samples	Sediment samples	Fish/shellfish tissue samples	Fauna surveys (vessel-based)	Fauna surveys (land-based)	Oiled fauna hydrocarbon testing	Flora surveys	Desktop review of fishery stock	Fauna surveys	Habitat mapping	Macroalgae and sponges	Benthic infauna monitoring	Intertidal and subtidal fish monitoring	Habitat mapping	Condition monitoring	Desktop review of wetland values
Level 1	P	P	P	P		P	P	P	P		P	P	P	P	P	P	P	P
Level 2	P	P	X	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Level 3	P	P	X	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P

Abbreviations

AMOSC	Australian Marine Oil Spill Centre
AMSA	Australian Maritime Safety Authority
ANOVA	Analysis of variance
ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agricultural and Resource Management Council of Australia and New Zealand
AUV	Autonomous underwater vehicle
BACI	Before After Control Impact
BoM	Bureau of Meteorology
BTEX	Benzene, toluene, ethylbenzene and xylene
CASA	Civil Aviation Safety Authority
DA	Described Area
DJPR	Department of Jobs, Precincts and Regions
DELWP	Department of Environment, Land, Water and Planning Victoria
DoEE	Department of the Environment and Energy
DOSS	Dioctyl sodium sulfosuccinate
DPI	Department of Primary Industry
DPIPWE	Department of Primary Industries, Parks, Water and Environment
ECD	Ecological Character Description
EMBSI	ExxonMobil Biological Sciences Inc
EP	Environment Plan
ERT	Emergency Response Team
EUL	Environment Unit Lead
EVM	Earned Value Management
SSHE	Safety, Security, Health & Environment
IC	Incident Commander
IMT	Incident Management Team
ITOPF	International Tanker Owners Pollution Federation Limited
IvC	Impact versus Control
JSA	Job Safety Analysis
LCL	Lower control limit
mBACI	Multiple Before After Control Impact
MES	Monitoring, evaluation and surveillance
NAGD	National Assessment Guidelines for Dredging
MNES	Matters of National Environmental Significance

NATA	National Association of Testing Authorities
NOAA	National Oceanic and Atmospheric Administration
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NSW	New South Wales
OIM	Offshore Installation Manager
OIMS	Operations Integrity Management System
OPEP	Oil Pollution Emergency Plan
OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage Act 2006
OSC	Operations Section Chief
OSMP	Operational and Scientific Monitoring Program
OSRL	Oil Spill Response Limited
OSTM	Oil Spill Trajectory Modelling
PAH	Poly aromatic hydrocarbons
PEA	Potentially Exposed Area
PERMANOVA	Permutational multivariate analysis of variance
PSC	Planning Section Chief
PSD	Particle size distribution
RAMSAR	Convention on Wetlands of International Importance
SCAT	Shoreline Clean-up Assessment Technique
SD	Standard deviation
SMART	Special Monitoring of Applied Response Technologies
SO	Safety Officer
SQG	Sediment Quality Guidelines
TOC	Total organic carbon
TPH	Total petroleum hydrocarbon
TRH	Total recoverable hydrocarbon
UAV	Unmanned aerial vehicle
UCL	Upper control limit
USA	United States of America
USEPA	United States Environment Protection Agency
USFDA	United States Food and Drug Administration
VFA	Victorian Fisheries Authority
VM	Vessel Master

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1. Introduction

1.1 Purpose

This Bass Strait Oil Spill Monitoring Plan (OSMP) is a key component of the environmental management framework (which also includes activity-specific Environment Plans (EP) and the Bass Strait Oil Pollution Emergency Plan (OPEP)) for offshore petroleum activities operated by Esso Australia Resources Pty Ltd (Esso) within the Gippsland region (Figure 1-1).

This OSMP outlines environmental monitoring that may be implemented in the event of a hydrocarbon spill to the marine or coastal environment. Information from operational monitoring provides situational awareness enabling the Incident Management Team (IMT) to make informed decisions regarding response options. Oil Spill monitoring modules are the principle tools for determining the extent, severity and persistence of environmental impacts from a hydrocarbon spill and associated response and/or remediation activities.

Note, this plan focuses on Oil Spill monitoring of a hydrocarbon spill event only. Hydrocarbon spill risks, prevention and response activities are described in the activity-specific EP and OPEP.

This OSMP is supported by a set of internal implementation guides for each of the Oil Spill monitoring modules. It is important to note that the implementation guides are not a prescriptive set of procedures that must strictly be followed, but are intended to provide Esso and their monitoring providers with sufficient information to efficiently finalise a monitoring design of an appropriate nature and scale in the event of a hydrocarbon spill. It is expected that individual monitoring plans and operating procedures would only be finalised once a spill event has occurred. This is essential to ensure the finalised monitoring plan/s are fit for purpose and tailored to the specific location, hydrocarbon type, environmental sensitivities, and the nature and scale of the individual spill.

This OSMP is to be read in conjunction with the activity-specific EP and OPEP when considering the existing environment, environmental impacts, risk management, performance standards, reporting compliance, and the decision processes that will apply in the event of a spill occurring.

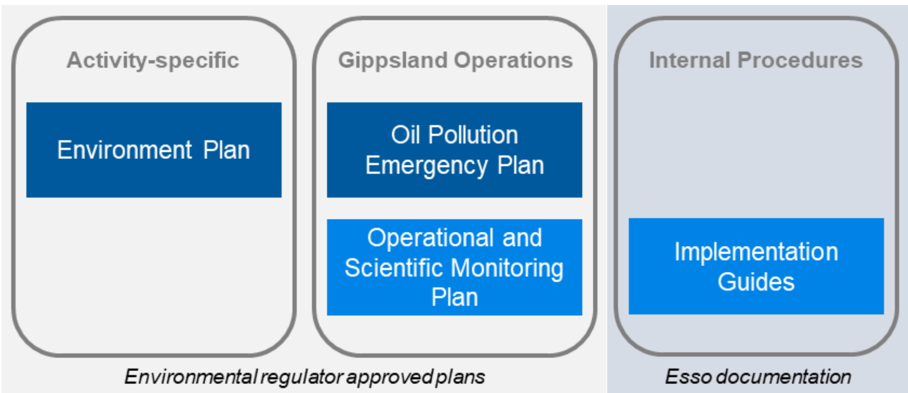

Figure 1-1: Environmental management framework for offshore petroleum activities in the Gippsland region

1.2 Objectives

The objectives of this OSMP are:

- Identify and describe the Oil Spill monitoring that may be implemented in the event of a hydrocarbon spill to the marine or coastal environment;

- Demonstrate an appropriate degree of readiness to implement this monitoring in the event of a hydrocarbon spill to the marine or coastal environment.

1.3 Scope

1.3.1. Activity types

This OSMP is relevant to all Esso petroleum activities within the Gippsland region regulated under the Commonwealth *Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGS) (Environment) Regulations 2009* and the Victorian *OPGGS Regulations 2011*. This includes, but is not limited to:

- Vessel operations;
- Drilling and completions;
- Well workovers and interventions;
- Subsea activities;
- Pipelay activities;
- Operations; and
- Decommissioning.

The OSMP modules provide for the rapid assessment of the extent of spread of oil from a Level 2 or Level 3 spill and effects on the environment both as a result of the spilt hydrocarbons and any oil spill response activities that may be used in the clean-up of the oil or any monitoring activities that may occur in response to the spill. The OSMP modules include provision for the rapid assessment of impacted and potentially affected wildlife including those listed as Matters of National Environmental Significance (MNES) under the EPBC Act (1999).

1.3.2. Hydrocarbon types and states

Esso's petroleum resources within the Gippsland region include both crude oil and natural gas; and petroleum activity related vessels typically use marine diesel oils. This OSMP is relevant to all hydrocarbon types and states (i.e. fresh and weathered); and all distributions throughout the environment (i.e. surface, entrained, dissolved and shoreline). Activity specific hydrocarbon properties are provided in the OPEP Appendix D Quick Reference Information.

1.3.3. Geographical extent

This OSMP is relevant and applicable to all Commonwealth and State marine and coastal areas that are potentially at risk of exposure to hydrocarbons in the event of a spill resulting from petroleum activities. Petroleum titles and selected environmental features within the vicinity of the Gippsland region is shown in Figure 1-2.

The spatial boundaries of an individual monitoring study will depend primarily on the actual or potential exposed area affected by the spill. Spatial boundaries will be sufficient to meet monitoring objectives, usually by determining impacted areas and the level of effects, linking effects to the spill source, and supporting decisions on clean-up strategies. Monitoring may also be undertaken outside the boundaries of a spill where monitoring programs require un-impacted reference sites. The spatial extent of a monitoring study would only be finalised once a spill event has occurred.

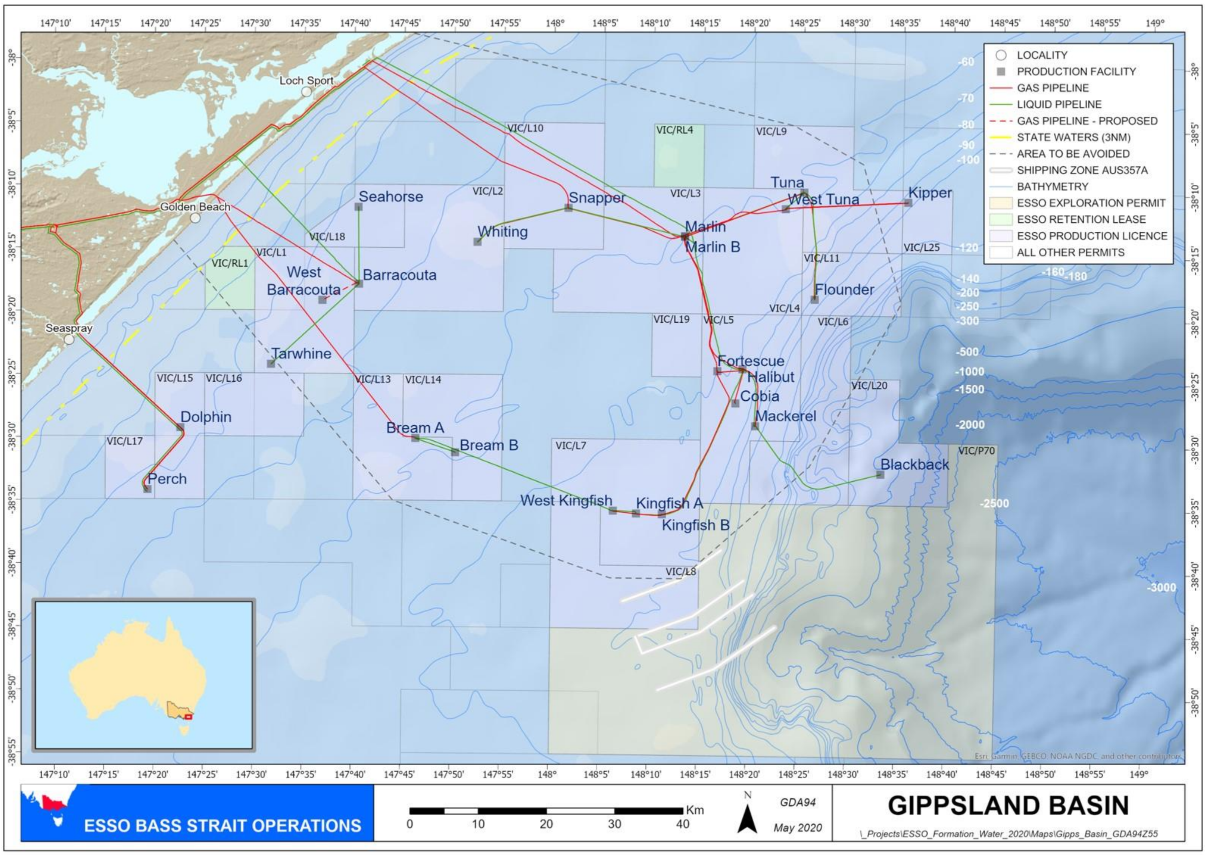

Figure 1-2: Esso assets within the Gippsland region

1.4 Regulatory requirements

Table 1-1 provides guidance on the OSMP requirements of the Commonwealth OPGGS (Environment) Regulations 2009, and Victorian OPGGS Regulations 2011, and reference to the relevant section of this document which addresses that requirement.

This OSMP incorporates regulatory guidance from the following documents:

- Guidance Note – Oil pollution risk management (NOPSEMA 2021)
- Information Paper – Operational and scientific monitoring programs (NOPSEMA 2020).

Table 1-1: Relevant Commonwealth and State environmental regulations for OSMPs

Regulation	Relevant section in this OSMP
OPGGS (Environment) Regulations	
Part 2, Division 2.3, Regulation 14 (5) The implementation strategy must include measures to ensure that each employee or contractor working on, or in connection with, the activity is aware of his or her responsibilities in relation to the environment plan, including during emergencies or potential emergencies, and has the appropriate competencies and training.	Sections 2.4 and 2.5
Part 2, Division 2.3, Regulation 14 (8AA) The oil pollution emergency plan must include adequate arrangements for responding to and monitoring oil pollution, including the following: (a) the control measures necessary for timely response to an emergency that results or may result in oil pollution; (b) the arrangements and capability that will be in place, for the duration of the activity, to ensure timely implementation of the control measures, including arrangements for ongoing maintenance of response capability; (c) the arrangements and capability that will be in place for monitoring the effectiveness of the control measures and ensuring that the environmental performance standards for the control measures are met; (d) the arrangements and capability in place for monitoring oil pollution to inform response activities.	Sections 2, 3, and 4
Part 2, Division 2.3, Regulation 14 (8D) The implementation strategy must provide for monitoring of impacts to the environment from oil pollution and response activities that: (a) is appropriate to the nature and scale of the risk of environmental impacts for the activity; and (b) is sufficient to inform any remediation activities.	Sections 2, 3, and 4
Victoria OPGGS Regulations	
Part 2.2, Division 3, Regulation 16 (5) The implementation strategy must include measures to ensure that each employee or contractor working on, or in connection with, the activity is aware of his or her responsibilities in relation to the environment plan, including during emergencies or potential emergencies, and has the appropriate competencies and training	Sections 2.4 and 2.5

1.5 Target audience

In the event of a hydrocarbon spill, Esso is responsible for the implementation and adherence to this OSMP. This OSMP is intended for use by, but not limited to:

- Incident Management Team (IMT) personnel including:
  - Incident Commander (IC);
  - Operations Section Chief (OSC):
  - Planning Section Chief (PSC);
  - Environment Unit Lead (EUL)
  - Safety Officer (SO)
- Platform Emergency Response Team (ERT) personnel including:
  - Offshore Installation Manager (OIM);
  - Vessel Master (VM);
- Esso environment team;
- Monitoring provider personnel including:
  - Principal Investigator;
  - Monitoring/Field teams.

2. OSMP Framework and Implementation

2.1 Types of monitoring

Oil spill monitoring has been divided into two types (Oil Spill) which are undertaken for two distinct, but closely related, purposes (NOPSEMA 2016).

Operational monitoring collects information about the spill and associated response activities to aid planning and decision making for executing spill response or clean-up operations. Operational monitoring may include both initial response phase monitoring (i.e. rapid qualitative and observational data gathering for situational awareness) and advanced response phase monitoring (i.e. quantitative measurement) (Hook *et al*. 2016). Operational monitoring typically finishes when the spill response is terminated.

Six operational monitoring modules have been identified (see Section 3):

- O1: Oil Spill Surveillance;
- O2: Water and Oil Sampling;
- O3: Shoreline Assessment;
- O4: Fauna Observations;
- O5: Air Quality;
- O6: Sediment Sampling.

Scientific monitoring focusses on evaluating environmental impact and recovery from the spill and response activities. Scientific monitoring may be undertaken over an extended period to fully understand impacts.

Nine scientific monitoring modules have been identified (see Section 4):

- S1: Hydrocarbons in Intertidal Sediments and Water;
- S2: Hydrocarbons in Offshore Sediments and Water;
- S3: Fish and Shellfish Taint and Toxicity for Human Consumption;
- S4: Short-Term Impacts to Oiled Fauna and Flora;
- S5: Recovery of Commercial and Recreational Fisheries;
- S6: Recovery of Fauna;
- S7: Recovery of Subtidal and Intertidal Benthic Habitat;
- S8: Recovery of Coastal Flora;
- S9: Recovery of Ramsar Values.

Operational monitoring studies inform offshore and nearshore/shoreline response strategies, and information collected during these studies may trigger scientific monitoring. Oil Spill monitoring studies may occur simultaneously (i.e. scientific monitoring can start before a response operation is completed). Note, some data that may be used within scientific monitoring analyses can also only be collected during the initial phase of the oil spill response (e.g. 'reactive' baseline data) (Hook *et al*. 2016).

2.2 Initiation and termination of monitoring

Initiation and termination criteria have been defined for each individual operational monitoring (Section 3) and scientific monitoring (Section 4) module. The criteria for the initiation and termination of monitoring modules will be assessed on a daily basis during a response operation, and then as-required for any ongoing scientific monitoring modules.

Initiation for operational monitoring modules is typically dependent on presence of a spill, response options being implemented and information from surveillance activities. Termination criteria are typically based on there being no benefit to response planning or a response has ceased, no increase in environmental risk, compliance with relevant environmental guidelines or benchmarks (where available). Termination criteria for operational monitoring also require that any related scientific monitoring initiation criteria have been assessed.

Initiation for scientific monitoring modules is typically dependant on information from operational monitoring results, specifically outcomes of monitoring, evaluation and surveillance (MES) activities, and indications that relevant environmental guidelines or benchmarks have been exceeded (where available). Scientific monitoring may also be needed to determine if ecological impact criteria as defined in the OPEP for Response Level 1 are met or not (and if not an incident should be escalated to a higher level). Termination criteria are based on sufficient evidence to demonstrate no impact from hydrocarbon and/or a return to the expected natural dynamics of the area.

All monitoring modules can also be initiated by the IMT IC (or delegate) irrespective of other criteria being met. This may be an independent Esso decision, or made in conjunction with the relevant Jurisdictional Authority. Depending on the scenario, these studies may be a full or only partial implementation of the relevant operational or scientific module.

The safety of sampling personnel will be assed prior to the collection of any samples and will only occur if safe to do so. Sampling collection will only occur in daylight hours and when wind and sea states allow for the safe collection of samples. It may not be safe for a vessel to get close to a spill if there is positive gas detection. Samples will be undertaken when the presence of spilt oil is detectable.

2.3 Implementation guides

The implementation guides, which sit behind each of the modules outlined in Sections 3 and 4, are not a prescriptive set of procedures that must strictly be followed, but are intended to provide Esso and their monitoring providers with sufficient information to efficiently finalise a monitoring design of an appropriate nature and scale in the event of a hydrocarbon spill. The guides include:

- A description of minimum requirements, adopted standards and/or best practice guidance for monitoring design, sampling techniques and reporting requirements;
- A list of resources (e.g. equipment, personnel) recommended to implement the monitoring;
- Draft standard operating procedures.

It is expected that individual monitoring plans and operating procedures would only be finalised once a spill event has occurred. This is essential to ensure the finalised monitoring plan/s are fit for purpose and tailored to the specific location, hydrocarbon type, environmental sensitivities, and the nature and scale of the individual spill.

Where practicable, the draft standard operating procedures are aligned with existing standards and processes (e.g. Hook *et al*. 2016; NOAA 2006).

2.4 Roles and responsibilities

The key roles (and their associated responsibilities) for the implementation of this OSMP are shown in Table 2-1. Depending on the scale of the event, individual people may perform multiple roles; similarly, multiple people may share the same role.

Table 2-1: Key roles and responsibilities relating to implementation of the OSMP

Role	Responsibilities
IMT IC	• Day to day responsibility for facilitating/coordinating monitoring activities under this OSMP; • Initiation and termination of operational monitoring modules; • Initiation of scientific monitoring modules
PSC	• Initiating Oil Spill monitoring modules when initiation criteria met; • Coordination analysis and distribution of data obtained through operational monitoring, including integration of data into the common operating picture
EUL	• Advising IC on which Oil Spill monitoring modules should be implemented when initiation criteria met; • Activation and liaison with service providers to implement scientific modules • Facilitating/coordinating data and reports from monitoring to the IMT for use in response planning; • Initiation and termination of operational monitoring modules, based on advice from the Principal Investigator; • Initiation and termination of scientific monitoring modules, based on advice from the Principal Investigator • Report review and approval for scientific monitoring modules, prepared by the monitoring team.
OIM / VM	• Initiation of spill surveillance in the initial response phase of a spill; • May undertake day to day responsibilities (e.g. under delegation from the IMT IC).
Principal Investigator	• Responsible for implementation of a particular operational or scientific monitoring module; • Review and/or carry out study's monitoring reporting requirements; • Provides advice with respect to environmental issues as required, including initiation and termination of monitoring modules.
Field Teams	• Implement the operational or scientific monitoring module; • Data QA/QC and reporting; • Compliance with the requirements of this OSMP

2.5 Training and competency

Minimum competencies and experience for key OSMP-specific roles for the operational and scientific modules are detailed in the "Responsibilities, competencies and resources" section of each module in this OSMP. The OSMP Specific team will be scaled up according to the severity of the incident based on external capabilities.

The Esso ERT/IMT have completed oil spill response competency and training in accordance with Table 9-2 in Volume 4 of the EP. In addition to this the Environment Unit Lead is required to have a relevant tertiary degree in engineering, environment science, environmental management or similar. The selection of the Environmental Unit Lead is based on relevant experience as an Environment Advisor, with experience and/or training in the implementation of monitoring programs.

Based on the severity of an oil spill additional resources may be brought in from the ExxonMobil Regional Response Team to support the IMT.

2.6 External Resources

Resources for monitoring (e.g. personnel and equipment) may be outsourced to contractors. Esso currently has a contract in place with a local environmental consultancy to provide this environmental support. In the event that additional resources are required, other consultancy capacity will be utilised (as needed) and may extend to specialist contractors such as research agencies engaged in long-term marine monitoring programs.

Esso will also access specialist capabilities as required (e.g. OSTM via AMOSC).

Esso has identified a pool of NATA accredited laboratories with capabilities for undertaking analyses required as part of Oil Spill monitoring scopes (Table 2-8).

2.7 Third Party OSMP Consultant

2.7.1. Roles and responsibilities

The Third Party OSMP Consultant has an organisation that allows for considerable support to the field, laboratory and office teams involved in the implementation of the OSMP and its modules. Details of the support roles that may be required for the implementation of the OSMP are provided in Table 2-2.

Table 2-2: Summary of support roles (as required)

Role	Responsibilities
Third Party OSMP Consultant Project Director (PD)	Point of contact at a project level for high level contractual and commercial issues Final approver of key deliverables produced by Third Party OSMP Consultant During OSMP implementation high level of liaison with IMT
Third Party OSMP Consultant Project Manager (PM)	Overall project program, progress, budgets, & reporting Management of Third Party OSMP Consultant project team Responsible for Third Party OSMP Consultant Sub-consultancy, subcontractor and Service Provision agreements Client liaison/coordination at IMT level During OSMP implementation: • Command and control of OSMP activities undertaken by Third Party OSMP Consultant • Liaison with IMT • Overarching implementing and monitoring the OSMP activities undertaken by Third Party OSMP Consultant Reports to Third Party OSMP Consultant Project Director
Third Party OSMP Consultant Operations Officer	Overall coordination and management of OSMP modules undertaken by Third Party OSMP Consultant Review and sign off of OSMP deliverables produced from modules undertaken by Third Party OSMP Consultant Ensuring technical compliance and maintaining quality of OSMP deliverables During OSMP implementation for modules implemented by Third Party OSMP Consultant: • Organise initial response mobilisation • Coordinate OSMP operations • Organise mobilisation/escalation/de-escalation/demobilisation activities • Assist Planning and Logistical Officers in development of field activity synergies among operational and scientific monitoring modules Reports to Third Party OSMP Consultant Project Manager
Principal Investigator (Third Party OSMP Consultant)	Ensuring technical compliance and maintaining quality of allocated operational or scientific monitoring module deliverables from modules implemented by Third Party OSMP Consultant

Role	Responsibilities
	Review of allocated operational or scientific monitoring module deliverables During OSMP implementation assist in coordination and management of allocated operational or scientific monitoring module Reports to Third Party OSMP Consultant Operations Officer
Field Supervisor (Third Party OSMP Consultant)	During OSMP implementation for modules implemented by Third Party OSMP Consultant responsible for SSHE requirements and meeting survey technical objectives during field monitoring Reports to Third Party OSMP Consultant Operations Officer
SSHE Advisor (Third Party OSMP Consultant)	Third Party OSMP Consultant SSHE Advisory role and monitors compliance Review/Approval of SSHE documentation (SSHE Plan, JSA) SSHE Incident Investigations and Reporting Reports to Third Party OSMP Consultant Project Manager Supports SSHE & SP performance reviews Prepare SSHE Alerts and deliver SSHE trainings, briefings
SSHE Focal Point (Third Party OSMP Consultant)	SSHE liaison with Esso SSHE Performance reports Supports project adherence to SSHE Plan Reports to Third Party OSMP Consultant Project Manager
Project Controls Officer (Third Party OSMP Consultant)	PRISM Set Up & Maintenance EVM & Reporting Scheduling Change management, document control, invoicing Reports to Third Party OSMP Consultant Project Manager
Environment & Approvals Officer	Environmental Approvals Licences, Permits, Statutory Approvals Reports to Project Manager
Quality Assurance Officer	Internal QA audits Reports to Project Manager
Third Party OSMP Consultant Logistics Officer	Reports to Project Manager During OSMP implementation: • Organise plant (e.g. aircraft, vessels) • Estimate future service and support requirements • Provision of logistics advice to Operations and Planning Officers
Third Party OSMP Consultant Planning Officer	Reports to Project Manager During OSMP implementation: • Collect, analyse and utilise OSMP information • Risk analysis of technical OSMP service provision (e.g. weather, spill behaviour, projections) • Maintain record of communications and actions including resources requested/allocated/in use.
Third Party OSMP Consultant Safety Officer	Reports to Project Manager During OSMP implementation: • Provide SSHE services in support of the OSMP activities • Review and approve all SSHE documentation in the provision of OSMP services • Risk analysis of SSHE OSMP service provision (e.g. cyclones, interface issues) and that services undertaken in a safe matter
Third Party OSMP Consultant Admin Officer	Reports to Project Manager During OSMP implementation: • Same as role of Project Controls Officer during OSMP implementation

Role	Responsibilities
Principal Investigator	Reports to Project Manager • Responsible for implementation of a particular operational or scientific monitoring module; • Review and/or carry out study's monitoring reporting requirements; • Provides advice with respect to environmental issues as required, including initiation and termination of monitoring modules.
Field Teams	Reports to Principal Investigator • Implement the operational or scientific monitoring module; • Data QA/QC and reporting; • Compliance with the requirements of this OSMP

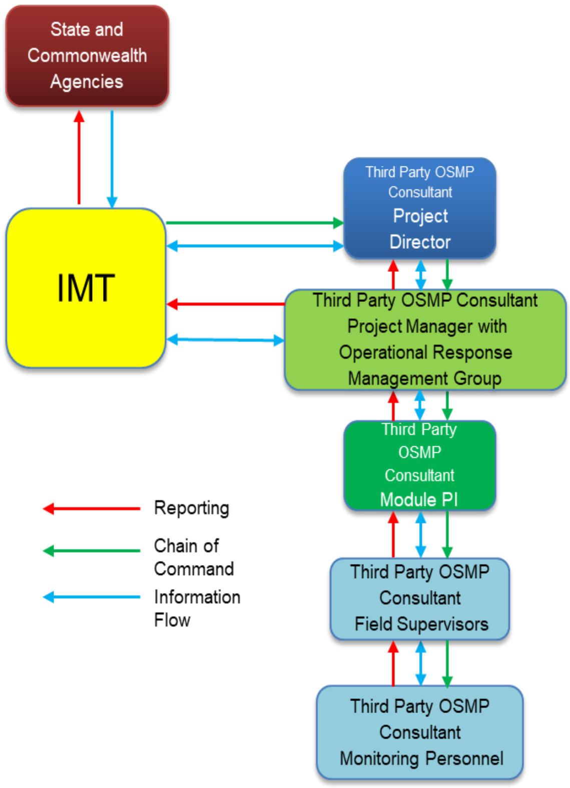

Figure 2-1: OSMP modules implementation organogram between Esso and the Third Party OSMP Consultant

2.7.2. OSMP resourcing

In the activation of the OSMP substantial resources are likely to be required for an extended period of time. Although it is more likely that discontinuous deployment periods are likely this has not been assumed in developing this resourcing strategy (i.e. continuous requirement assumed). The resourcing needs are based on the likely requirements for information.

The operational modules together with S1, S2 and S4 will commence at notification of a spill. Scientific modules have slightly differing needs as their aim is to assess the potential impacts and recovery from a spill. However there may be a need to collect reactive baseline data prior to hydrocarbons contacting the environment and potentially causing impacts to that environment. There are a number of scientific modules that are therefore initiated soon, if not immediately, after notification of a spill in order to collect a reliable reactive baseline as existing baseline data may not be available.

Generally, the following resourcing procedure will be adhered to:

- The Third Party OSMP Consultant Planning Officer and Third Party OSMP Consultant Operations Officer will develop Survey Plan(s) to meet the objectives of OM(s) survey(s) that are provided by the IMT IC. Surveys may entail carrying out acquiring information for multiple OMs with individual ground, vessel and aerial survey teams on the same plant to optimise synergies and efficiencies.
- Field personnel and office-based personnel will be sourced from the organisations that comprise the OSMP team (Table 2-3). The Mobilisation Plan will identify a pool of field staff from which to select for mobilisation to meet initial requirements. Thereafter, during escalation and/or maintenance of the OM modules staff across the pool of field personnel pool will be selected on the basis of availability and capabilities to meet the survey(s) objectives.
- The Task Leaders in consultation with the Third Party OSMP Consultant Logistics Officer will be responsible for organising equipment and laboratory supplies (if needed) for their respective modules. The Operational Response Management Group (ORMG) will support Task Leaders to facilitate the transport of equipment and laboratory supplies
- Office-based personnel will be mobilised on an ‘as needed’ basis for data analysis and reporting for all OM modules to ensure timely information flow to the IMT for response planning and assessment.

The Third Party OSMP Consultant has water and sediment sampling equipment, laboratory equipment, sample storage, marine monitoring equipment, ROV and cameras. A list of available equipment is included in the Third Party Staff and Equipment Register which is reviewed quarterly.

2.7.3. Field staff resources available

The Third Party OSMP Consultant has sufficient resources in terms of personnel to meet the staffing needs of the monitoring program in both the immediate and longer term. These are detailed in the Third Party Staff and Equipment Register. The Third Party OSMP Consultant has identified personnel and resource that are available to be deployed. This is reviewed quarterly to ensure the Third Party OSMP Consultant has the necessary resources for each worst case discharge scenario, ensuring that the number of personnel required for each module at different intervals after the spill event can be fulfilled within the required timeframes.

The Third Party OSMP Consultant has available the resources of its Victorian Environment Team which are highly experienced in the collection of water and sediment quality samples, remediation and also in flora and fauna survey and marine environmental survey. In all the Third Party OSMP Consultant has, in Victoria, 45 people. The Third Party OSMP Consultants are also able to mobilise personnel from major Australian Offices (Melbourne, Sydney, Perth and Brisbane), regional centres (Wollongong and Sunshine Coast) and New Zealand (Wellington) within a 48 hour time frame. Additional personnel, predominantly from the United States of America can be mobilised after 48 hours to supplement the Australian based teams. Overall, the Third Party OSMP Consultants have a total off 167 personnel.

In summary the Third Party OSMP Consultant team has the resources available to choose from to deploy as shown in Table 2-3.

Table 2-3 Third Party OSMP Consultant Availability

Module	No. Staff Available (< 48 hour mobilisation)	Total No. Staff Available*
01: Oil spill surveillance	31	51
02: Water and oil sampling	40	98
03: Shoreline assessment	44	52
04: Fauna observations	34	38
05: Air quality	6	47
06: Sediment sampling	45	52
S1: Hydrocarbons in intertidal sediments and water	40	46
S2: Hydrocarbons in offshore sediments and water	40	44
S3: Fish and shellfish taint and toxicity for human consumption	15	18
S4: Short-term impacts to oiled fauna and flora	29	33
S5: Recovery of commercial and recreational fisheries	6	10
S6: Recovery of fauna	34	39
S7: Recovery of subtidal and intertiday benthic habitat	15	18
S8: Recover of coastal flora	31	34
S9: Recovery of Ramsar values	14	14

Note: * Total number of personnel available includes those available to deploy < 48 hours and > 48 hours.

An annual test of the capability of the Third Party OSMP Consultant to provide these resources is conducted. The Third Party OSMP Consultant maintains a register of the available resources, updated quarterly, including:

- Role in OSMP implementation
- Provider (company name)
- Provider contact details
- Contractual arrangement status
- Resource (name(s)) identified
- Minimum qualification and experience requirements
- Whether qualification and experience requirements are met
- Completion of OSMP familiarisation training

2.7.4. Awareness of role in OSMP implementation

The approach to the OSMP implementation summarised in Table 2-4 shows the activities for the Third Party OSMP Consultant that includes phases prior to and after OSMP activation. The outputs of the Readiness Phase includes the awareness of staff and resources through OSMP familiarisation training.

Table 2-4 OSMP implementation phases

Phase	Period	Activity	Purpose	Output
Readiness	Prior to spill	Personnel, contractors and equipment providers prepare for and continue to be prepared for activation of OSMP. Register of OSMP implementation personnel is maintained and updated quarterly	'Readiness' for timely response to implement OSMP.	Register of OSMP implementation personnel Awareness by all participants that they are to be available and ready for OSMP implementation OSMP familiarisation
Mobilising	Notification of a Level 2 or 3 spill	Third Party OSMP Consultant Project Manager and Initial Field Team mobilise onsite) Water and sediment sampling teams report to surveillance vessel(s) for deployment to site. Mobilise monitoring teams based on initiation criteria: Mobilise, personnel equipment and vessels to port Load equipment/ supplies on vessel and depart port	Initiate modules as quickly as possible and within timeframes required by OSMP.	Timely mobilisation of monitoring program.
Monitoring during Spill response	During a spill, before shoreline contact.	Implement relevant OM modules	Inform response planning and manage early stages of spill.	Operational data reported regularly throughout response
		Implement relevant SM modules Collect reactive baseline data. Collate and assess existing baseline data.	Establish baselines and analyse behaviour of spill hydrocarbons	Baseline data reports for each monitoring study.
	During a spill after shore line contact.	Continue to implement modules.	Inform response planning and management	Operational data reported regularly throughout response
Spill Response Termination	At end of spill response	Terminate modules when criteria met	Discontinue modules linked specifically to spill response phase.	Consolidated data on spill response to IMT IC. Consolidated data to inform later Scientific studies.

Monitoring Post-spill response	From termination of spill response until termination criteria met	Update SAPs for long-term monitoring.	Modify frequency /number of long-term monitoring sites. (Not if termination criteria met during spill response phase).	Approval of long-term monitoring SAPs

2.7.5. Staff availability for deployment in initial response

The following table summarises staff that are available for deployment to respond to the requirements of the OSMP after the initial confirmation of a Tier 2 or Tier 3 spill. Many staff are capable of performing tasks in a number of modules. Further details are included in the Third Party Staff and Equipment Register which is reviewed on a quarterly basis.

Table 2-5 Personnel Availability

Module	Minimum PI Competency Requirement	Number of PIs identified	Minimum Field Staff Competency Requirement	No. Staff Available (<48hr mobilisation)	*Total No. Staff Available (including >48hr mobilisation)
O1: Oil spill surveillance	Level 1 - Familiarisation with relevant requirements of the OSMP and OPEP. Level 2/3 – Relevant experience in coordination of operational monitoring	2	Lead observer to be experienced in surveillance techniques. All team members to be familiar with the relevant spill observation, estimation and recording techniques.	31	51
O2: Water and oil sampling	Level 1 - Familiarisation with relevant requirements of the OSMP and OPEP. A least 10 years' experience in the collection and analysis of water quality samples. Level 2/3 – Relevant experience or training in coordination of operational monitoring	2	Familiarisation with oil and water sampling and recording techniques.	40	98
O3: Shoreline assessment	Familiarisation with relevant requirements of the OSMP and OPEP. A least 10 year experience in shoreline survey including the analysis of data.	2	Familiarisation with relevant observation and recording techniques. Zoologist for fauna observations.	44	52
O4: Fauna observations	Level 1 - Familiarisation with relevant requirements of the OSMP and OPEP. A least 10 years' experience in the collection and analysis of fauna data. Level 2/3 - Doctorate in environmental science	2	Familiarisation with the fauna identification and recording techniques.	34	38

Module	Minimum PI Competency Requirement	Number of PIs identified	Minimum Field Staff Competency Requirement	No. Staff Available (<48hr mobilisation)	*Total No. Staff Available (including >48hr mobilisation)
O5: Air quality	Level 1 – Experience in implementation of safety or industrial hygiene programs in the oil & gas industry A least 10 years experience in the collection and analysis of air quality measurements and data. Level 2/3 - Qualifications in Occupational Health & Safety, or Industrial Hygiene from a recognised institution or equivalent tertiary study in technical area; Familiarisation with relevant requirements of the OSMP and OPEP.	2	Trained in use of personnel air monitoring equipment.	6	47
O6: Sediment sampling	Level 1 - Familiarisation with relevant requirements of the OSMP and OPEP. At least 10 years experience in the collection and analysis of sediment quality samples. Level 2/3 B.Sc in Env Science or engineering	2	Familiarisation with sediment sampling and recording techniques.	45	52
S1: Hydrocarbons in intertidal sediments and water	Doctorate in environmental science, At least 10 years' experience in the collection of environmental samples from water and sediments; Familiarisation with relevant requirements of the OSMP and OPEP.	2	Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area. Experienced in sediment and water quality sampling and recording techniques.	40	45
S2: Hydrocarbons in offshore sediments and water	Doctorate in environmental science, At least 10 years' experience in the collection of environmental samples from water and sediments; Familiarisation with relevant requirements of the OSMP and OPEP.	2	Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area. Experienced in the relevant sampling and/or recording techniques.	40	44

Module	Minimum PI Competency Requirement	Number of PIs identified	Minimum Field Staff Competency Requirement	No. Staff Available (<48hr mobilisation)	*Total No. Staff Available (including >48hr mobilisation)
S3: Fish and shellfish taint and toxicity for human consumption	Doctorate in environmental science; At least 10 years experience in the collection of fish and shellfish for laboratory analysis; Familiarisation with relevant requirements of the OSMP and OPEP.	2	<u>Field Teams</u> Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalenttertiary study in technical area. Experienced in the fish/shellfish collection, sampling and recording techniques. <u>Olfactory Analysis Panel</u> Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area. Experienced in olfactory analysis.	15	18
S4: Short-Term impacts to oiled fauna and flora	Doctorate in environmental science; At least 10 years' experience infauna survey including the survey of marine fauna; Familiarisation with relevant requirements of the OSMP and OPEP.	2	Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area. Experienced in the relevant sampling and/or recording techniques.	29	33
S5: Recovery of commercial and recreational fisheries	Doctorate in environmental science; At least 10 years' experience in the collection and analysis of fishery data Experienced in fisheries data analysis.	2	N/A	6	10
S6: Recovery of fauna	Doctorate in environmental science;	2	Bachelor degree in environmental science or an engineering degree from	34	39

Module	Minimum PI Competency Requirement	Number of PIs identified	Minimum Field Staff Competency Requirement	No. Staff Available (<48hr mobilisation)	*Total No. Staff Available (including >48hr mobilisation)
	At least 10 years experience in the survey and analysis of fauna data; Familiarisation with relevant requirements of the OSMP and OPEP		a recognised institution or equivalent tertiary study in technical area. Experienced in the relevant sampling and/or recording techniques.		
S7: Recovery of subtidal and intertidal benthic habitat	Doctorate in environmental science; At least 10 years' experience in the collection and analysis of data relating to marine infauna; Familiarisation with relevant requirements of the OSMP and OPEP	2	Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area. Experienced in the relevant sampling and/or recording techniques.	15	18
S8: Recovery of coastal flora	Doctorate in environmental science; At least 10 years' experience in the collection and analysis of data on flora including coastal flora; Familiarisation with relevant requirements of the OSMP and OPEP	2	Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area. Experienced in the relevant sampling and/or recording techniques.	31	34
S9: Recovery of Ramsar values	At least 10 years experience in dealing with Ramsar values including the analysis of changes to those values; Familiarisation with relevant requirements of the OSMP and OPEP Experienced in wetland ecology	2	N/A	14	14

(*) Total number of personnel available includes those available to deploy <48 hours and >48 hours.

2.7.6. Non-personnel resources

A summary of the likely key non-personnel resource requirements for each module is shown below in Table 2-6. Further information on the resources identified in this table is provided below and in the Third Party OSMP Staff and Equipment Register. The number of resources required will depend on the number of field teams for each module as well as efficiencies where one field team may collect data/samples for multiple modules.

Table 2-6: Non-personnel resource requirements

Equipment	O1	O2	O3	O4	O5	O6	S1	S2	S3	S4	S5	S6	S7	S8	S9
Fixed wing aircraft	✓		✓	✓											
Helicopter	✓		✓	✓											
Vehicles		✓	✓	✓	✓	✓	✓			✓		✓	✓	✓	
Vessels	✓	✓	✓	✓		✓		✓	✓	✓		✓	✓		
UAV	✓			✓						✓					
Sampling equipment		✓	✓			✓	✓	✓	✓	✓					
ROV	✓					✓	✓	✓		✓			✓		
Fluorometer		✓													
NATA accredited lab		✓	✓		✓	✓	✓	✓	✓	✓					
Oil Spill Trajectory Modelling services	✓														
Satellite imagery services	✓														

Aircraft

There may be a requirement for aircraft to support spill surveillance, shoreline assessment and fauna observations. There is access to helicopters through the Esso owned and operated helicopter fleet based out of Longford. An agreement is in place with a third party supplier to provide a fixed wing aircraft.

Vehicles

The Third Party OSMP Consultant has sufficient resources to meet the vehicle needs of the monitoring program in both the immediate and longer term. The Third Party OSMP Consultant has 4WD vehicles available (as detailed in the Third Party OSMP Staff and Equipment Register). The Third Party OSMP Consultant has Australia-wide contracts with rental car providers so that within 24 hours these vehicles can be supplemented with as many 4WD as needed for the duration of the monitoring programs.

Vessels

There is requirement for both large and small vessels to allow the monitoring to be completed as per the program.

Inshore vessels available through the Third Party OSMP Consultant are detailed in the Third Party OSMP Staff and Equipment Register.

Esso has an in principal agreement with a number of vessels capable of operating offshore 24 hours per day. Details of these vessels are maintained in the OSMP Vessel Register.

In addition to the vessels identified in the register, the Esso support vessel used for ongoing operations may be used for surveillance and monitoring in the event of a spill. Esso also has an agreement in place with a third party supplier for the provision of additional vessels for surveillance and monitoring.

Sampling Equipment

The Third Party OSMP Consultant has a contract with three NATA accredited laboratories in Victoria that it can utilise, which are summarised in Table 2-7. In addition they have the required sampling equipment available for water quality and sediment quality, including a flow-through fluorometer. The Third Party OSMP Consultant also has a suite of ROVs, an automated underwater vehicle (AUV) and drones (with CASA certified operators) for rapid survey of intertidal reefs. The Third Party OSMP Consultant has fully certified divers with all required equipment including a suite of underwater cameras as well as side scan sonar units for mapping undersea habitats. All these resources are available for immediate deployment pending other commitments.

Table 2-7: Third Party OSMP Laboratories

Laboratory	Contact Details
Australian Laboratory Services (Melbourne)	4 Westall Road, Springvale VIC 3171 Ph: 03 8549 9600
Envirolabs (Melbourne)	25 Research Drive, Croydon South VIC 3136 Ph: 03 9763 2500
Eurofins (Melbourne)	6 Monterey Road, Dandenong South VIC 3175

Initial response sampling kits

Given the short implementation time for sub-module O2.1, Esso has identified the following locations as stocking initial response spill sampling kits:

- Longford Plants Laboratory
- Long Island Point Laboratory
- Esso's contracted supply vessel
- Longford Heliport
- Sale Office (stored for deployment on inspection vessel when being used)
- Pipelines Warehouse - Sale
- Westbury Pumping Station

The initial response kits contain the equipment to obtain and store an oil sample from the water surface or from land.

Personnel should familiarise themselves with the sampling procedure (see Implementation Guide for O2: Water and Oil Sampling); but otherwise no specific training or qualifications are required to use the initial response kits to collect an oil sample.

Laboratory Access

Esso has identified the following NATA accredited laboratories within the region to support the various operational and scientific monitoring modules. Laboratories with the appropriate capabilities to support specific modules have been identified within the relevant modules.

Table 2-8: NATA accredited laboratories

Laboratory	Contact Details
Australian Laboratory Services (Melbourne)	4 Westall Road, Springvale VIC 3171 Ph: 03 8549 9600

Laboratory	Contact Details
Australian Laboratory Services (Traralgon)	Hazelwood Road, Traralgon VIC 3844 Ph: 03 5176 4170
Ecotox Services Australia	27/2 Chaplin Drive, Lane Cove NSW 2066 Ph: 02 9420 9481
Eurofins MGT	25 Kingston Town Close, Oakleigh VIC 3166 Ph: 03 8564 5000
Intertek Geotechnical	41-45 Furnace Road, Welshpool WA 6106 Ph: 08 9458 8877
Leeder Analytical Pty Ltd	33 Steane St, Fairfield, VIC, 3078 Phone: 03 9481 4167
Longford Plants Laboratory	Garretts Road, Longford VIC 3851 Ph: 03 5149 6259
National Measurement Institute	1/153 Bertie Street, Port Melbourne VIC 3207 Ph: 03 9644 4888

Modelling and Imagery Services

Esso (via ExxonMobil) is a member of the AMOSC. AMOSC membership allows access to RPS to provide predictive modelling capabilities in the event of an oil spill. Alternatively, modelling may also be requested from:

- Oil Spill Response Limited (OSRL);
- Exxon Mobil's in-house service (EMBSI).
- Australian Maritime Safety Authority (AMSA), noting that requests for modelling under the National Plan can only be made by Commonwealth or State/Territory spill response control agencies, or by AMOSC

Esso Australia has tracking buoys available, and additional buoys are available for hire from AMOSC. Esso also has agreements in place to allow access to satellite imagery services for remote observation of the spill.

2.8 Communication Management

Stakeholder (including regulators) consultation and external reporting requirements are described in the activity-specific EPs. This includes the requirement to consult with the:

- National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA)
- Department of Agriculture, Water and Environment (DAWE) in the event that a hydrocarbon spill is likely to impact matters of national environmental significance;
- Parks Australia, Director of National Parks, in the event that a hydrocarbon spill and/or response activity are likely to impact an Australian Marine Park;
- Australian Fisheries Management Authority (AFMA)

If the spill may impact Victorian waters then consultation will occur with:

- Department of Transport (DoT);
- Environment Protection Agency (EPA);
- Department of Environment, Land, Water and Planning (DELWP)

If the spill may impact Tasmanian waters then consultation will occur with:

- The Environment Protection Authority Division of the Department of Primary Industries, Parks, Water, and Environment (DPIPWE)

If the spill may impact New South Wales waters then consultation will occur with:

- NSW Environment Protection Authority;
- Transport for NSW

2.9 Review and Revision

Regulation 19 of the OPGGS (E) Regulations provides for the revision of this OSMP. Review and update of the OSMP may be initiated through findings from drills/exercises, actual events, internal or external assessments, audits, changes to regulation, or via planned periodic review. As per the EP&R Guide, this document is subject to:

- an annual review
- a mid-cycle (i.e. 2.5 – 3 years) comprehensive update
- 5 yearly revision and resubmission (in accordance with resubmission of Environment Plans)

Any changes made during review and revision must be tracked and documented in order to demonstrate continued compliance with regulatory accepted versions of this document. Changes made to the OSMP should be reviewed against *OPGGS (Environment) Regulations 2009* (Reg 7, Reg 8, Reg 17) to determine if a resubmission is required.

The annual review should be a general review of the OSMP to ensure it remains applicable to current operations. The annual review of the OSMP will include the annual test of the Third Party OSMP Consultants' capability to provide resources to fulfil the requirements of this OSMP (Section 2.7).

Table 2-9 describes the topics that should be considered when completing a mid-cycle update of the OSMP.

Table 2-9: Scope of revision of OSMP

Topic	Useful Links / References
Reference to most recently published NOPSEMA guidance documents	https://www.nopsema.gov.au/environmental-management/environment-resources/
Values and sensitivities within the DA including:	
• KEFs	https://www.environment.gov.au/sprat-public/action/kef/search http://www.environment.gov.au/marine/publications/ south-east-marine-region-profile http://www.environment.gov.au/topics/marine/marine-bioregional-plans/temperate-east
• MNES	https://parksaustralia.gov.au/marine/ parks/south-east/ https://parksaustralia.gov.au/marine/ parks/temperate-east/
• Species Profile and Threats Database	http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl
• BIAs	https://environment.gov.au/marine/ marine-species/bias
• Ramsar Wetlands	http://www.environment.gov.au/cgi-bin/wetlands/alphablist.pl
• Marine protected areas	https://parkweb.vic.gov.au/explore/ find-a-park/marine-protected-areas https://www.parks.tas.gov.au/index.aspx?base=397 https://www.dpi.nsw.gov.au/fishing/marine-protected-areas
Environmental Baseline Information	Refer to Implementation Plans for a summary of existing baseline data available in the Gippsland Region. Refer to linked references to review existing baseline data and establish if updates to existing baseline data is required.
Stakeholder Consultation	Consult with the Stakeholder Engagement Advisor for guidance on any relevant items to be considered.
Lessons Learned	Refer to Exercise reports for lessons learned to be considered. EP&R SharePoint – Offshore Drills and Exercises

3. Operational Monitoring

The following sections outline the individual operational monitoring modules that may be implemented in the event of a hydrocarbon spill to the marine or coastal environment. The tables describe the key aims, initiation and termination criteria, implementation times, and provide a high-level description of monitoring, reporting and resources. The studies are presented separately below; however, in practice they may be undertaken simultaneously.

These overviews are supported by internal implementation guides for each of the operational monitoring modules. The implementation guides have been prepared to provide Esso and their monitoring providers' sufficient information to efficiently finalise a monitoring design of an appropriate nature and scale in the event of a hydrocarbon spill.

Six operational monitoring modules have been identified:

- O1: Oil Spill Surveillance;
- O2: Water and Oil Sampling;
- O3: Shoreline Assessment;
- O4: Fauna Observations;
- O5: Air Quality;
- O6: Sediment Sampling.

3.1 O1: Oil Spill Surveillance

3.1.1. Purpose

The development and implementation of effective responses to oil spills depends critically on the knowledge of the extent and likely fate and behaviour of oil once exposed to ambient weather and sea state conditions. The purpose of this module is to:

- Track the location, extent and thickness of the surface oil slick to gain situational awareness of the incident and validate and inform forecasting and Oil Spill Trajectory Modelling (OSTM);
- Collect and collate relevant weather and sea state conditions to inform OSTM and response actions;
- Predict sensitivities at risk and fate/behaviour of the spill to inform response actions and scientific monitoring;
- Provide location of slick to O2 (water and oil sampling) monitoring team;
- Provide feedback on the extent, location, appearance and thickness of a dispersed slick (applicable only if dispersants used).

3.1.2. Initiation and termination criteria

Initiation Criteria	O1.1 Weather and sea state; O1.2 Trajectory estimation; and O1.3 Aerial or underwater observation;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred
	O1.4 Remote observation;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms the event as a Level 2 or Level 3 hydrocarbon spill.

	O1.5 Satellite imagery;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms the event as a Level 3 hydrocarbon spill;
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O1 is to commence.
Termination Criteria	✓ The IMT IC (or delegate) considers that continuation of monitoring under O1[1] will not result in a change to the scale or location of active response options; **or** ✓ Two consecutive aerial or underwater observations show that oil has weathered and dissipated to <0.3 g/m^2; or Bonn appearance code 1; or ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; **or** ✓ The Principal Investigator through the EUL (or delegate) has advised that continuation of monitoring under O1[1] may increase overall environmental impact.	

Notes:

1. *Decision to terminate monitoring can be made for each individual sub-module independently.*

3.1.3. Implementation

implementation time[1]	✓ O1.1, O1.2 and O1.3 within 4 hours of initiation criteria being met; ✓ O1.4 and O1.5 within 24 hours of initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for O1: Oil Spill Surveillance*
Reporting	✓ Results from data collation, visual/remote surveillance, modelling and/or image analysis reported daily to PSC; ✓ Final report prepared within one-week of termination criteria being met; report provided to PSC.

Notes:

1. *A module is considered implemented when Esso have (i) confirmed initiation criteria have been met, (ii) the monitoring providers have been notified, (iii) sampling and analysis plans (where required) have been completed, and (iv) mobilisation has commenced.*

3.1.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during operational module O1. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook *et al*. 2016);
- Aerial Observation of Marine Oil Spills (ITOPF 2014);
- SMART Protocols (NOAA 2006).

Sub-module	Sampling technique	Data collection and/or analysis
O1.1 Weather and sea state	• Data records collation; • Visual surveillance	• Data records sourced from Bureau of Meteorology (BoM) or local weather stations; • Sea state observations manually recorded from vessels, offshore platform or shore.
O1.2 Trajectory estimation	• Manual estimation; • OSTM.	• Manual estimation can be completed quickly and with limited data (wind and currents, spill origin and/or present location) • OSTM is generally completed by specialist consultants.
O1.3	• Visual surveillance; • Remote sensing.	• Visual observations of the location, extent, and appearance of the spill.

Sub-module	Sampling technique	Data collection and/or analysis
Aerial or underwater observation		• Estimates of volume based on percentage cover and oil thickness.
O1.4 Remote observation	• Satellite tracking	• Buoys are deployed and position can be tracked via satellite.
O1.5 Satellite imagery	• Satellite imagery analysis	• Remote sensing and image analysis to determine presence of oil slicks.

3.1.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation and termination of this operational monitoring module. These roles may delegate responsibilities as appropriate; e.g. the ERT VM/OIM may be responsible for the initiation if the IMT has not yet been established. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the EP.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement operational module O1. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for O1 in the event of a spill; • Implement O1; • Review and/or carry out reporting requirements; • Compliance with the requirements of O1 and the OSMP; • Provide advice with respect to environmental issues as required.	• Level 1 - Familiarisation with relevant requirements of the OSMP and OPEP. • Level 2/3 – Relevant experience in coordination of operational monitoring
Field Teams (2 to 3 people)	• Conduct visual observations; • Completing field data sheets; • QA/QC data quality.	• Lead observer to be experienced in surveillance techniques; • All team members to be familiar with the relevant spill observation, estimation and recording techniques.

Resources

The key resources required for implementation of Module O1 include a fixed wing aircraft and/or helicopter for aerial surveillance. UAVs may be utilised to support aerial surveillance. Vessels may also be required for on-water surveillance of the spill and observations of weather and sea state. Use of a ROV may be required for subsea activities such as detection or tracking of the spill. Access to Oil Spill Trajectory Modelling services and satellite imagery services may be required for spill modelling and remote surveillance. Further information on access to these resources is provided in Section 2.7.6.

3.2 O2: Water and Oil Sampling

3.2.1. Purpose

The purpose of this module is to provide quantitative measures of water quality and oil (hydrocarbon) characteristics to:

- Determine the physical and chemical characteristics of the spilled oil to validate trajectory forecasts or models (i.e. provide information regarding the spill source characterisation);
- Obtain samples of spilled oil for retention or additional analysis (e.g. fingerprinting);
- Establish background concentrations of total petroleum hydrocarbon (TPH) and polyaromatic hydrocarbons (PAH), and non-hydrocarbon constituents in sea water;
- Determine concentrations of TPH and PAH within the spill plume to validate and enhance OSTM and support assessment of environmental and social impacts;
- Determine the concentrations of non-hydrocarbon constituents (e.g. heavy metals) within the spill plume;
- Determine the effectiveness of dispersants in reducing concentrations of oil in the water column (applicable only if dispersants used);
- To inform scientific monitoring.

3.2.2. Initiation and termination criteria

Initiation Criteria	O2.1 Collection of an oil sample	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred
	O2.2 Fluorometry O2.3 Water samples;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms the event as a Level 2 or Level 3 hydrocarbon spill; **or** ✓ Application of dispersant has been selected as a response option by the IMT IC (or delegate).
	O2.4 Dispersant Monitoring	✓ Application of dispersant has been selected as a response option by the IMT IC (or delegate).
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O2 is to commence.
Termination Criteria	✓ The IMT IC (or delegate) has determined that continuation of monitoring under the module is not necessary to meet the objectives of the response **and** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; **or** ✓ The Principal Investigator through the EUL (or delegate) has advised that continuation of monitoring under O2[1] may increase overall environmental impact.	

Notes:

1. Decision to terminate monitoring can be made for each individual sub-module independently.

3.2.3. Implementation

Minimum time to implement[1]	✓ O2.1: as soon as practicable following initiation criteria being met; ✓ O2.2, O2.3, O2.4: within 24 hours of initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for O2: Water and Oil Sampling*
Reporting	✓ Results from in-situ analysis of samples reported daily to PSC; ✓ Results from laboratory analysis of samples reported as available to PSC; ✓ Final report prepared within one-week of termination criteria being met; report provided to PSC.

Notes:

1. A module is considered implemented when Esso have (i) confirmed initiation criteria have been met, (ii) the monitoring providers have been notified, (iii) sampling and analysis plans (where required) have been completed, and (iv) mobilisation has commenced.

3.2.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during operational module O2. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook *et al*. 2016);
- SMART Protocols (NOAA 2006);
- ASTM D4489 2017 Standard Practices for Sampling of Waterborne Oils.

Sub-module	Sampling technique	Data collection and/or analysis
O2.1 Collection of an oil sample	• Surface oil sample collection[1]	• Physical characteristics (e.g. wax content, dynamic viscosity, density, volatiles); • Chemical characteristics (e.g. PAH)
O2.2 Fluorometry	• Water column profiling	• TPH
O2.3 Water samples	• Surface and sub-surface water sample collection	• Laboratory analysis for hydrocarbons (e.g. TPH, PAH); • Laboratory analysis for non-hydrocarbon parameters (e.g. heavy metals); • Dispersant (e.g. DOSS).
O2.4 Dispersant Monitoring	• Surface and sub-surface water sample collection	• Laboratory analysis for hydrocarbons (e.g. TPH, PAH); • Laboratory analysis for non-hydrocarbon parameters (e.g. heavy metals); • Dispersant (e.g. DOSS).

Notes:

1. The location of Initial response sampling kits has been identified to facilitate the sampling required under O2.1.

3.2.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation and termination of this operational monitoring module. These roles may delegate responsibilities as appropriate; e.g. the ERT VM/OIM may be responsible for initiation if the IMT has not yet been established. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the OPEP.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement operational module O2. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for O2 in the event of a spill; • Implement O2; • Review and/or carry out reporting requirements; • Compliance with the requirements of O2 and the OSMP; • Provide advice with respect to environmental issues as required.	• Level 1 - Familiarisation with relevant requirements of the OSMP and OPEP. • A least 10 years' experience in the collection and analysis of water quality samples. • Level 2/3 – Relevant experience or training in coordination of operational monitoring
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories • Completing field data sheets • QA/QC data quality	• Familiarisation with oil and water sampling and recording techniques.

Resources

The key resources required for implementation of Module O2 include vessels for on-water sampling and monitoring as well as vehicles for coastal water sampling. A flow-through fluorometer may be required for monitoring oil in water concentrations. Sampling equipment will be required for sampling of the oil slick itself and sampling of water from both inside and outside the spill area. Further information on access to these resources is provided in Section 2.7.6.

Esso has also identified the following NATA accredited laboratories within the region with the capabilities to support the analysis for operational module O2:

NATA accredited laboratory	Details
Australian Laboratory Services (Melbourne)	Main Melbourne Laboratory 4 Westall Road, Springvale VIC 3171 Phone: 03 8549 9600
Australian Laboratory Services (Traralgon)	Hazelwood Road, Traralgon VIC 3844 Phone: 03 5176 4170
National Measurement Institute	1/153 Bertie Street, Port Melbourne VIC 3207 Phone: 03 9644 4888
Leeder Analytical Pty Ltd	33 Steane St, Fairfield, VIC, 3078 Phone: 03 9481 4167

3.3 O3: Shoreline Assessment

3.3.1. Purpose

This module outlines a Shoreline Clean-up Assessment Technique (SCAT) to be used to directly inform shoreline clean-up, provide recommendations to operations, and ensure the clean-up is completed. The purpose of this module is to:

- Determine the physical, biological and dynamic properties of shorelines at risk, in order to:
  - Predict the oil behaviour and distribution;
  - Determine the most appropriate clean-up methods;
  - Identify sensitive or vulnerable areas or resources;
  - Determine whether any pre-impact actions are warranted;
- Determine the characteristics and distribution of oil on the shoreline in order to predict the potential for oil persistence and / or natural removal;
- Determine the effectiveness of shoreline response strategies and provide feedback to the IMT.

3.3.2. Initiation and termination criteria

Initiation Criteria	O3.1 Shoreline segmentation O3.2 Shoreline character O3.3 Oil on shorelines	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred
	O3.4 Shoreline profile	✓ Modification of the shoreline profile is identified as a recommended strategy (e.g. through mechanical construction of pits, berms, or bulk waste removal)
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O3 is to commence.
Termination Criteria	✓ The IMT IC (or delegate) has determined that continuation of monitoring under the module is not necessary to meet the objectives of the response **and** ✓ Results of Module O1 monitoring demonstrate that shorelines will not be impacted; **or** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; **or** ✓ The Principal Investigator through the EUL (or delegate) has advised that continuation of monitoring under O3[1] may increase overall environmental impact.	

Notes:

1. *Decision to terminate monitoring can be made for each individual sub-module independently.*

3.3.3. Implementation

Implementation Time [1]	✓ O3.1, O3.2, O3.3, O3.4: within 24 hours of initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for O3: Shoreline Assessment*
Reporting	✓ Results from data collation, visual surveillance, in-situ monitoring reported daily to PSC; ✓ Final report prepared within one-week of termination criteria being met; report provided to PSC.

Notes:

1. *A module is considered implemented when Esso have (i) confirmed initiation criteria have been met, (ii) the monitoring providers have been notified, (iii) sampling and analysis plans (where required) have been completed, and (iv) mobilisation has commenced.*

3.3.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during operational module O3. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook *et al*. 2016);
- SMART Protocols (NOAA 2006);
- Shoreline Assessment Job Aid (NOAA 2007)
- Shoreline Clean up Assessment Technique (SCAT) Oil Spill Response Limited (updated)
- The Open Water Oil Identification Job Aid for Aerial Observation (NOAA 2016)

Sub-module	Sampling technique	Data collection and/or analysis
O3.1 Shoreline character	• Visual surveillance	• Physical and biological characteristics (e.g. shoreline dimensions, habitat type, substrate type, wind/wave energy etc.).
O3.2 Oil on shorelines	• Visual surveillance; • Surface and sub-surface water sample collection	• Visual assessment of oil extent, percent cover, thickness etc.; • In-situ or laboratory analysis for hydrocarbon content (e.g. TPH). • Assessment of endpoints from clean-up, identification of suggested clean-up techniques

3.3.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation and termination of this operational monitoring module. These roles may delegate responsibilities as appropriate. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the OPEP.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement operational module O3. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for O3 in the event of a spill; • Implement O3; • Review and/or carry out reporting requirements; • Compliance with the requirements of O3 and the OSMP; • Provide advice with respect to environmental issues as required.	• Familiarisation with relevant requirements of the OSMP and OPEP. • A least 10 years' experience in shoreline survey including the analysis of data. • Relevant experience or training in coordination of operational monitoring
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories; • Completing field data sheets; • QA/QC data quality.	• Familiarisation with relevant observation and recording techniques • Zoologist for fauna observations.

Resources

Depending on the size and location of the spill, fixed wing aircraft or helicopters may be required for aerial surveys to help cover a broader area and to quickly assess remote or difficult to access locations. Similarly, vessels may be required for shoreline assessment to conduct vessel-based surveys or allow access to the shoreline. Vehicles will be required to support ground surveys. Sampling equipment is required for taking water and sediment samples to support visual observations of oil on shorelines.

Esso has also identified the following NATA accredited laboratories within the region with the capabilities to support the analysis for operational module O3:

NATA accredited laboratory	Details
Australian Laboratory Services (Melbourne)	Main Melbourne Laboratory 4 Westall Road, Springvale VIC 3171 Phone: 03 8549 9600
Australian Laboratory Services (Traralgon)	Hazelwood Road, Traralgon VIC 3844 Phone: 03 5176 4170
National Measurement Institute	1/153 Bertie Street, Port Melbourne VIC 3207 Phone: 03 9644 4888
Leeder Analytical Pty Ltd	33 Steane St, Fairfield, VIC, 3078 Phone: 03 9481 4167

3.4 O4: Fauna Observations

3.4.1. Purpose

This module is designed to inform responses to spills where there is the potential for exposure to fauna either onshore (e.g. seals or birds on the shoreline) or offshore (e.g. whales or birds either in/on the water). The purpose of this module is to:

- Identify the presence of onshore and offshore fauna, including marine mammals and seabirds, in the response area (i.e. near the oil slick, response vessels or aircraft) in order to implement mitigation strategies, such as reduce vessel speeds, halt operations, move vessels or aircraft from the area, increase flight altitude or consider "hazing" strategies.
- Locate potentially oiled fauna for recovery (i.e. by government agencies (Department of Environment, Land, Water and Planning (DELWP) and Parks Victoria or as directed).

3.4.2. Initiation and termination criteria

Initiation Criteria	O4.1 Fauna observation (at sea)	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred
	O4.2 Fauna observations (onshore)	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms that data from Modules O1 and/or O3 predicted/confirmed shoreline exposure.
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O4 is to commence.
Termination Criteria	✓ The IMT IC (or delegate) has determined that continuation of monitoring under the module is not necessary to meet the objectives of the response **or** ✓ Results of Module O1 monitoring demonstrate that shorelines will not be impacted; **or** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; **or** ✓ The Principal Investigator through the EUL (or delegate) has advised that continuation of monitoring under O4[1] may increase overall environmental impact.	

Notes:

1. Decision to terminate monitoring can be made for each individual sub-module independently.

3.4.3. Implementation

Implementation time [1]	✓ O4.1: within 4 hours of initiation criteria being met; ✓ O4.2: within 24 hours of initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for O4: Fauna Observations*
Reporting	✓ Results from visual surveillance reported daily to PSC; ✓ Final report prepared within one-week of termination criteria being met; report provided to PSC.

Notes:

1. *A module is considered implemented when Esso have (i) confirmed initiation criteria have been met, (ii) the monitoring providers have been notified, (iii) sampling and analysis plans (where required) have been completed, and (iv) mobilisation has commenced.*

3.4.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during operational module O4. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook *et al*. 2016);
- Australian National Guidelines for Whale and Dolphin (DoEE 2017).

Sub-module	Sampling technique	Data collection and/or analysis
O4.1 Fauna observations (at sea)	• Visual surveillance	• Regular observations of the location, species, activity, evidence of oiling etc.
O4.2 Fauna observations (onshore)	• Visual surveillance	• Regular observations of the location, species, activity, evidence of oiling etc.

3.4.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation and termination of this operational monitoring module. These roles may delegate responsibilities as appropriate; e.g. the ERT VM/OIM may be responsible for the initiation if the IMT has not yet been established. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the OPEP.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement operational module O4. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for O4 in the event of a spill; • Implement O4; • Review and/or carry out reporting requirements; • Compliance with the requirements of O4 and the OSMP; • Provide advice with respect to environmental issues as required.	• Level 1 - Familiarisation with relevant requirements of the OSMP and OPEP. • At least 10 years' experience in the collection and analysis of fauna data. • Level 2/3 - Doctorate in environmental science

Personnel	Responsibilities	Competencies
Field Teams (1 to 2 people)	• Conduct sampling and record data; • Completing field data sheets; • QA/QC data quality.	• Familiarisation with the fauna identification and recording techniques.

Resources

Fixed wing aircraft and/or helicopters may be required for aerial surveillance of fauna with fixed wing aircraft typically utilised for extensive offshore areas and helicopters used for slow speed near shore surveys. This would likely be an extension of surveillance and observation undertaken as part of Module O1. Vessels may also be used to support at sea fauna observations. Vehicles will be required to support onshore fauna observations. UAVs could be used for rapid data collection about faunal colonies via video or photographs.

3.5 O5: Air Quality

3.5.1. Purpose

In the event of a hydrocarbon spill, people will need to be deployed on site for monitoring and/or response and clean-up operations. Monitoring of air quality is necessary to ensure the protection and safety of human health. The purpose of this module is to:

- Establish a safe perimeter prior to any response operations being conducted where personnel may be exposed to hazards of airborne gases and vapours
- Identify any hazards from airborne gases and vapours;
- Determine the need for respiratory protection for environmental monitoring and clean-up workers; and
- Comply with occupational health regulatory requirements.

3.5.2. Initiation and termination criteria

Initiation Criteria	O5.1 Personnel and area monitoring O5.2 Laboratory analysis	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Confirmation by the Safety Officer (SO) (or delegate) a health and safety risk to personnel is present
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or ✓ Partial implementation of O5 is to commence.
Termination Criteria	✓ The SO (or delegate) has determined that there is no longer a health and safety risk; **or** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response.	

Notes:

1. *Decision to terminate monitoring can be made for each individual sub-module independently.*

3.5.3. Implementation

Implementation time [1]	✓ O5.1 and O5.2: within 12 hours of initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for O5: Air Quality*
Reporting	✓ Results from personnel monitoring reported daily to SO; ✓ Results from laboratory sampling reported as available to SO; ✓ Final report prepared within one-week of termination criteria being met; report provided to SO.

Notes:

1. *A module is considered implemented when Esso have (i) confirmed initiation criteria have been met, (ii) the monitoring providers have been notified, (iii) sampling and analysis plans (where required) have been completed, and (iv) mobilisation has commenced.*

3.5.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during operational module O4. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Occupational Health Monitoring Plan (Centre for Toxicology and Environmental Health 2011);
- Oil Spill Response Field Manual (ExxonMobil 2008).

Sub-module	Sampling technique	Data collection and/or analysis
O5.1 Personnel and area monitoring	• Direct-read personal or area gas monitoring	• In-situ data collected and compared against known guideline levels.
O5.2 Laboratory analysis	• Laboratory analysis of vapour monitors	• Laboratory analysis for hydrocarbons (e.g. BTEX, TPH).

3.5.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation and termination of this operational monitoring module. These roles may delegate responsibilities as appropriate; e.g. the ERT VM/OIM may be responsible for the initiation if the IMT has not yet been established. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the OPEP.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement operational module O5. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for O5 in the event of a spill; • Implement O5; • Review and/or carry out reporting requirements; • Compliance with the requirements of O5 and the OSMP; • Provide advice with respect to environmental issues as required.	• Level 1 – Experience in implementation of safety or industrial hygiene programs in the oil & gas industry • A least 10 years' experience in the collection and analysis of air quality measurements and data. • Level 2/3 - Qualifications in Occupational Health & Safety, or Industrial Hygiene from a recognised institution or equivalent tertiary study in technical area; • Familiarisation with relevant requirements of the OSMP and OPEP.
Monitoring personnel	• To conduct air quality monitoring to determine safe exposure levels in operating environment	• Trained in use of personnel air monitoring equipment

Resources

It is expected that vehicles will be required to support onshore air quality monitoring through both personnel and area monitoring. Laboratory analysis of vapour monitors comprises part of this module. Esso has also identified the following NATA accredited laboratories within the region with the capabilities to support the analysis for operational module O5:

NATA accredited laboratory	Details
Australian Laboratory Services (Traralgon)	Hazelwood Road, Traralgon VIC 3844 Phone: 03 5176 4170
Longford Plants Laboratory	Garretts Road, Longford VIC 3851 Phone: 03 5149 6259

3.6 O6: Sediment Sampling

3.6.1. Purpose

The purpose of this module is to provide quantitative measures of sediment quality to:

- Establish background concentrations of TPH and PAH, and non-hydrocarbon constituents in sediment;
- Determine concentrations of TPH, PAH and non-hydrocarbon constituents (e.g. heavy metals) within exposed sediments to inform response strategies;
- Determine the effectiveness of clean-up operations;
- To inform scientific monitoring.

3.6.2. Initiation and termination criteria

Initiation Criteria	O6.1 Sediment samples (intertidal)	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms that data from Modules O1, O2 and/or O3 have predicted/confirmed exposure of intertidal benthic substrate.
	O6.2 Sediment samples (offshore);	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms that data from Modules O1 and/or O2 have predicted/confirmed exposure of offshore benthic substrate.
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O6 is to commence.
Termination Criteria	✓ The IMT IC (or delegate) has determined that continuation of monitoring under the module is not necessary to meet the objectives of the response **and** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; **or** ✓ The Principal Investigator through the EUL (or delegate) has advised that continuation of monitoring under O6[1] may increase overall environmental impact.	

Notes:

1. *Decision to terminate monitoring can be made for each individual sub-module independently.*

3.6.3. Implementation

Implementation time [1]	✓ O6.1 and O6.2: within 24 hours of initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for O6: Sediment Sampling*
Reporting	✓ Results from in-situ sampling reported daily to EUL; ✓ Results from laboratory sampling reported as available to EUL; ✓ Final report prepared within one-week of termination criteria being met; report provided to EUL.

Notes:

1. *A module is considered implemented when Esso have (i) confirmed initiation criteria have been met, (ii) the monitoring providers have been notified, (iii) sampling and analysis plans (where required) have been completed, and (iv) mobilisation has commenced.*

3.6.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during operational module O6. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook *et al.* 2016).

Sub-module	Sampling technique	Data collection and/or analysis
O6.1 Sediment samples (intertidal)	• Surface and sub-surface sediment sample collection	• Laboratory analysis for hydrocarbons (e.g. TPH, TRH, PAH, BTEX); • Laboratory analysis for non-hydrocarbon parameters (e.g. TOC, PSD, heavy metals, nutrients).
O6.2 Sediment samples (offshore)	• Surface sediment sample collection	• Laboratory analysis for hydrocarbons (e.g. TPH, TRH, PAH, BTEX); • Laboratory analysis for non-hydrocarbon parameters (e.g. TOC, PSD, heavy metals, nutrients).

3.6.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation and termination of this operational monitoring module. These roles may delegate responsibilities as appropriate; e.g. the ERT VM/OIM may be responsible for the initiation if the IMT has not yet been established. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the OPEP.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement operational module O6. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for O6 in the event of a spill; • Implement O6; • Review and/or carry out reporting requirements; • Compliance with the requirements of O6 and the OSMP; • Provide advice with respect to environmental issues as required.	• Level 1 - Familiarisation with relevant requirements of the OSMP and OPEP. • A least 10 years' experience in the collection and analysis of sediment quality samples. • Level 2/3 - Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area;
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories • Completing field data sheets • QA/QC data quality	• Familiarisation with sediment sampling and recording techniques.

Resources

Sediment sampling will be conducted on both intertidal and offshore sediments with vehicles required to support the intertidal sediment sampling and vessels required to support the offshore sediment sampling. Sediment sampling equipment such as corers and grab samplers will be required to collect sediment samples. Offshore sediment sampling may utilise ROVs. A NATA accredited laboratory will be required to analyse sediment samples. Esso has identified the following NATA accredited laboratories within the region with the capabilities to support the analysis for operational module O6:

NATA accredited laboratory	Details
Australian Laboratory Services (Melbourne)	Main Melbourne Laboratory 4 Westall Road, Springvale VIC 3171 Phone: 03 8549 9600
Australian Laboratory Services (Traralgon)	Hazelwood Road, Traralgon VIC 3844 Phone: 03 5176 4170
National Measurement Institute	1/153 Bertie Street, Port Melbourne VIC 3207 Phone: 03 9644 4888
Leeder Analytical Pty Ltd	33 Steane St, Fairfield, VIC, 3078 Phone: 03 9481 4167

4. Scientific Monitoring

The following sections outline the individual scientific monitoring modules that may be implemented in the event of a hydrocarbon spill to the marine or coastal environment. The sections describe the purpose, initiation and termination criteria, implementation timing, and provide a high-level description of monitoring, reporting and resources required. The modules are presented separately below; however, in practice they may be undertaken simultaneously.

These overviews are supported by internal implementation guides for each of the scientific monitoring modules. The implementation guides have been prepared to provide Esso and their monitoring providers sufficient information to efficiently finalise a monitoring design of an appropriate nature and scale in the event of a hydrocarbon spill.

Scientific monitoring generally has objectives relating to attributing cause-effect interactions of the spill with changes to the surrounding environment. Consequently, such studies are required to account for natural or sampling variation, and study designs must be robust and produce defensible data. Scientific monitoring is typically conducted over a wider study area taking into account the potentially exposed area, extending beyond the spill footprint, and a longer time period, extending beyond the spill response.

Nine scientific monitoring modules have been identified:

- S1: Hydrocarbons in Intertidal Sediments and Water;
- S2: Hydrocarbons in Offshore Sediments and Water;
- S3: Fish and Shellfish Taint and Toxicity for Human Consumption;
- S4: Short-Term Impacts to Oiled Fauna and Flora;
- S5: Recovery of Commercial and Recreational Fisheries;
- S6: Recovery of Fauna;
- S7: Recovery of Subtidal and Intertidal Benthic Habitat;
- S8: Recovery of Coastal Flora;
- S9: Recovery of Ramsar Values.

Guidance on various experimental monitoring approaches for scientific monitoring (e.g. use of baseline data in 'before versus after' analyses, and alternative approaches such as 'control versus impact' and 'gradient approach') is provided in Appendix A. Appendix B describes an approach to utilising baseline data where and when available; and a list of known regional studies and/or data sources. Specific guidance and sampling approaches are described within the implementation guides for each scientific monitoring module.

Guidance documents which provide information such as key locations, receptors and values will be used to inform monitoring design. The management plans for both Commonwealth and State Protected Areas that may be impacted by a spill do not provide guidance as to the levels of acceptable change nor do they state acceptable levels of contaminants including hydrocarbons, however aspects such as key values will be taken into account. Esso will also take into account information from other documents that provide guidance for protected areas such as Corner Inlet and the Gippsland Lakes and in addition will undertake consultation with relevant asset managers of protected areas as well as asset managers responsible for natural assets that are not protected such as commercial and recreational fishery managers. There are also other sources of guidance for the levels of acceptable change such as the Victorian State Environment Protection Policies (Waters) which gives guidance as to levels of change that are considered acceptable for various bodies of water within the state jurisdiction. In addition the conservation advices / recovery plans for Matters of National Environmental Significance (MNES) listed under the EPBC Act also provide guidance on levels of acceptable change and the actions that may be required to ensure protection / recovery of listed species and communities including aspects such as spatial and temporal distribution.

Initiation and/or termination criteria for some of the scientific monitoring modules require the use of 'accepted guidelines and/or benchmark values'. Where available, Australian guidelines (e.g. ANZECC

& ARMCANZ 2000) or regionally relevant data is used. Where these are unavailable or inappropriate for a selected parameter, toxicity screening benchmarks developed by the USEPA in response to the Deepwater Horizon incident (e.g. USEPA 2015), or other international guidelines (e.g. USEPA 2017) may be adopted. Specific guidance on benchmark values are described within the overviews below, and in the implementation guides, for each individual scientific monitoring module.

4.1 S1: Hydrocarbons in Intertidal Sediments and Water

4.1.1. Purpose

The purpose of this module is to provide quantitative measures of intertidal sediment and water quality. Scientific module S1 will assess and monitor concentrations of hydrocarbons and metals in intertidal sediments and water by:

- Establishing the baseline concentrations of hydrocarbons and metals in water and sediment at identified pre-impact (if practicable) or control (i.e. un-impacted) intertidal sites;
- Monitoring concentrations of hydrocarbons, metals and nutrients (if bioremediation techniques used as part of response operations) in intertidal water and sediments at identified control and impact sites.

4.1.2. Initiation and termination criteria

Initiation Criteria	S1.1 Water samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Principal Investigator through the EUL (or delegate) confirms that data from Modules O1 and/or O2 have predicted/confirmed exposure of intertidal waters
	S1.2 Sediment samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Principal Investigator through the EUL (or delegate) confirms that data from Modules O1 and/or O2 have predicted/confirmed exposure of intertidal or shoreline sediments
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S1 is to commence.
Termination Criteria	S1.1 Water samples	✓ Ambient hydrocarbon concentrations in intertidal waters have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ Ambient hydrocarbon concentrations in intertidal waters are below relevant ANZECC & ARMCANZ (2000) 99% species protection levels; **or** ✓ There has been no demonstrable impact on intertidal water quality from hydrocarbons.
	S1.2 Sediment samples	✓ Ambient hydrocarbon concentrations in intertidal sediments have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ Ambient hydrocarbon concentrations in intertidal sediments are below relevant ANZECC & ARMCANZ SQGV (Simpson *et al*. 2013) or NAGD (CoA 2009) trigger levels
	All sub-modules	✓ **Or** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.

4.1.3. Implementation

Activation Time[1]	✓ S1 to be activated within 24 hours of initiation criteria being met;
Implementation Time	✓ Sampling and analysis plan to be ready within 24 hours of initiation criteria being met; ✓ Mobilisation and monitoring to commence within 24 hours of activation.
Implementation Plan	✓ Refer to *Implementation Guide for S1: Hydrocarbons in intertidal sediments and water*
Reporting	✓ Summary report to be provided to Esso Environment Unit Lead following completion of each field survey event; ✓ Final report (including all data and associated interpretation and analysis) prepared following the termination criteria for the module being met.

Notes:

1. *A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.*

4.1.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during scientific module S1. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook *et al*. 2016);
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ 2000)
- Revision of the ANZECC/ARMCANZ Sediment Quality Guidelines (Simpson *et al*. 2013);
- National Assessment Guidelines for Dredging (CoA 2009).

Sub-module	Sampling technique	Data collection and/or analysis
S1.1 Water samples	• Surface and sub-surface water sample collection[1]	• Laboratory analysis for hydrocarbons (e.g. TPH, TRH, PAH, BTEX); • Laboratory analysis for non-hydrocarbon parameters (e.g. metals, nutrients).
S1.2 Sediment samples	• Surface and sub-surface sediment sample collection[2]	• Laboratory analysis for hydrocarbons (e.g. TPH, TRH, PAH, BTEX); • Laboratory analysis for non-hydrocarbon parameters (e.g. TOC, PSD, metals, nutrients).

Notes:

1. *Sampling techniques as per operational module O2.3.*
2. *Sampling techniques as per operational module O6.1.*

4.1.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation of this scientific monitoring module. These roles may delegate responsibilities as appropriate. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the OPEP.

Esso environmental team

Termination of this scientific monitoring module is the responsibility of Esso Environment Lead.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement scientific module S1. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for S1 in the event of a spill; • Implement S1; • Review and/or carry out reporting requirements; • Compliance with the requirements of S1 and the OSMP; • Provide advice with respect to environmental issues as required.	• Doctorate in environmental science, • At least 10 years' experience in the collection of environmental samples from water and sediments; • Familiarisation with relevant requirements of the OSMP and OPEP.
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories; • Completing field data sheets; • QA/QC data quality.	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area; • Experienced in sediment and water quality sampling and recording techniques.

Resources

Vehicles will be required to support sampling of intertidal sediments and water. Sampling equipment for both sediment and water sampling will be required. Some resources for Module S1 can likely be shared with Modules O6 and S2. A NATA accredited laboratory will be required for analysis of the intertidal sediment and water samples. Esso has identified NATA accredited laboratories with the capabilities to support the analysis for scientific module S1, including but not limited to:

NATA accredited laboratory	Details
Australian Laboratory Services (Melbourne)	4 Westall Road, Springvale VIC 3171 Ph: 03 8549 9600
Eurofins MGT	25 Kingston Town Close, Oakleigh VIC 3166 Ph: 03 8564 5000
National Measurement Institute	1/153 Bertie Street, Port Melbourne VIC 3207 Ph: 03 9644 4888
Leeder Analytical Pty Ltd	33 Steane St, Fairfield, VIC, 3078 Phone: 03 9481 4167

4.2 S2: Hydrocarbons in Offshore Sediments and Water

4.2.1. Purpose

The purpose of this module is to provide quantitative measures of offshore sediment and water quality. Scientific module S2 will assess and monitor concentrations of hydrocarbons and metals in offshore sediments and water by:

- Establishing the baseline concentrations of hydrocarbons and metals in water and sediment at identified pre-impact (if practicable) or control (i.e. un-impacted) offshore sites;
- Monitoring concentrations of hydrocarbons, metals and nutrients (if bioremediation techniques used as part of response operations) in offshore sediments and water at identified control and impact sites.

4.2.2. Initiation and termination criteria

Initiation Criteria	S2.1 Water samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Principal Investigator through the EUL (or delegate) confirms that data from Modules O1 and/or O2 have predicted/confirmed exposure to offshore waters
	S2.2 Sediment samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Principal Investigator through the EUL (or delegate) has determined that data from operational modules O1, O2 or O6 has confirmed exposure to either benthic substrate or waters within bottom 1 m of seabed
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S2 is to commence.
Termination Criteria	S2.1 Water samples	✓ Ambient hydrocarbon concentrations in offshore waters have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ Ambient hydrocarbon concentrations in offshore waters are below relevant ANZECC/ARMCANZ (2000) 99% species protection levels.
	S2.2 Sediment samples	✓ Hydrocarbon concentrations in offshore sediments have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ Hydrocarbon concentrations in offshore sediments are below relevant ANZECC/ARMCANZ SQGV (Simpson *et al*. 2013) or NAGD (CoA 2009) trigger levels.
	All sub-modules	✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.

4.2.3. Implementation

Activation Time[1]	✓ S2 to be activated within 24 hours of initiation criteria being met
Implementation Time	✓ Sampling and analysis plan to be ready within 24 hours of initiation criteria being met; ✓ Mobilisation and monitoring to commence within 24 hours of activation.
Implementation Plan	✓ Refer to *Implementation Guide for S2: Hydrocarbons in offshore sediments and water*
Reporting	✓ Summary report to be provided to Esso Environment Lead following completion of each field survey event; ✓ Final report (including all data and associated interpretation and analysis) prepared following the termination criteria for the module being met.

Notes:

1. *A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.*

4.2.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during scientific module S2. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook *et al*. 2016);
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ 2000)
- Revision of the ANZECC/ARMCANZ Sediment Quality Guidelines (Simpson *et al*. 2013);
- National Assessment Guidelines for Dredging (CoA 2009).

Sub-module	Sampling technique	Data collection and/or analysis
S2.1 Water samples	• Surface and sub-surface water sample collection[1]	• Laboratory analysis for hydrocarbons (e.g. TPH, TRH, PAH, BTEX); • Laboratory analysis for non-hydrocarbon parameters (e.g. metals, nutrients)
S2.2 Sediment samples	• Surface sediment sample collection[2]	• Laboratory analysis for hydrocarbons (e.g. TPH, TRH, PAH, BTEX); • Laboratory analysis for non-hydrocarbon parameters (e.g. TOC, PSD, metals, nutrients).

Notes:

1. *Sampling techniques as per operational module O2.3.*
2. *Sampling techniques as per operational module O6.2.*

4.2.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation of this scientific monitoring module. These roles may delegate responsibilities as appropriate. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the OPEP.

Esso environmental team

Termination of this scientific monitoring module is the responsibility of Esso Environment Lead.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement scientific module S2. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for S2 in the event of a spill • Implement S2 • Review and/or carry out reporting requirements • Compliance with the requirements of S2 and the OSMP • Provide advice with respect to environmental issues as required	• Doctorate in environmental science, • At least 10 years' experience in the collection of environmental samples from water and sediments; • Familiarisation with relevant requirements of the OSMP and OPEP
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories • Completing field data sheets • QA/QC data quality	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area • Experienced in the relevant sampling and/or recording techniques.

Resources

Vessels and ROVs will be required to support sampling of offshore sediments and water. Sampling equipment for both sediment and water sampling will be required. Some resources for Module S2 can likely be shared with Modules O6 and S1. A NATA accredited laboratory will be required for analysis of the offshore sediment and water samples. Esso has identified NATA accredited laboratories with the capabilities to support the analysis for scientific module S2, including but not limited to:

NATA accredited laboratory	Details
Australian Laboratory Services (Melbourne)	4 Westall Road, Springvale VIC 3171 Phone: 03 8549 9600

NATA accredited laboratory	Details
Eurofins MGT	25 Kingston Town Close, Oakleigh VIC 3166 Phone: 03 8564 5000
National Measurement Institute	1/153 Bertie Street, Port Melbourne VIC 3207 Phone: 03 9644 4888
Leeder Analytical Pty Ltd	33 Steane St, Fairfield, VIC, 3078 Phone: 03 9481 4167

4.3 S3: Fish and Shellfish Taint and Toxicity for Human Consumption

4.3.1. Purpose

The purpose of this module is to:

- Provide an understanding of the levels of taint in commercial and recreational fish and/or shellfish species;
- Undertake a chemical analysis of the level of PAH and non-hydrocarbon constituents (e.g. metals) in fish and/or shellfish tissue to assess the level of risk for human consumption;
- Determine if differences exist in concentration of PAH and non-hydrocarbon constituents (e.g. metals) in fish and/or shellfish samples collected from impact and control sites.
- Determine if differences exist in the olfactory status of fish and/or shellfish samples collected from areas exposed to an oil spill (impact) and from control sites;
- Assess possible sources of specific odours via qualitative evaluation;
- Determine the persistence of taint over a specified time period;

4.3.2. Initiation and termination criteria

Initiation Criteria	S3 Fish/shellfish tissue samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Principal Investigator through the EUL (or delegate) has determined that data from operational modules O2/O6 or scientific modules S1/S2 has confirmed either: (a) in-water hydrocarbon concentrations are above guideline levels known to cause tainting (Table 4.4.5 in ANZECC & ARMCANZ 2000); or (b) sediment hydrocarbon concentrations are above SQGV levels (Simpson *et al*. 2013) ✓ Principal Investigator through the EUL (or delegate) has determined that data from operational modules O2/O6 or scientific modules S1/S2 has confirmed either: (a) in-water non-hydrocarbon constituent concentrations are above guideline levels known to cause tainting (Table 4.4.5 in ANZECC & ARMCANZ 2000); or (b) sediment hydrocarbon concentrations are above SQGV levels (Simpson *et al*. 2013) **and** ✓ Agreement has been reached with the Jurisdictional Authority relevant to the spill to initiate the monitoring
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S3 is to commence.
Termination Criteria	S3 Fish/shellfish tissue samples	✓ Two sequential sample sets show ambient hydrocarbon concentrations are below guideline levels for tainting in ANZECC & ARMCANZ 2000); **and either** ✓ PAH and non-hydrocarbon constituent levels in fish and shellfish tissue have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ PAH and non-hydrocarbon constituent levels in fish and shellfish tissue are at or below levels specified by Food Standards Australia New Zealand (FSANZ).

	All sub-modules	✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.

4.3.3. Implementation

Activation Time[1]	✓ S3 to be activated within 24 hours of initiation criteria being met
Implementation Time	✓ Sampling and analysis plan to be ready within 7 days of initiation criteria being met; ✓ Mobilisation and monitoring to commence within 7 days of activation.
Implementation Plan	✓ Refer to *Implementation Guide for S3: Fish and shellfish taint and toxicity for human consumption*
Reporting	✓ Summary report to be provided to Esso Environment Lead following completion of each field survey event; ✓ Final report (including all data and associated interpretation and analysis) prepared following the termination criteria for the module being met.

Notes:

1. A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.

4.3.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during scientific module S3. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook *et al*. 2016);
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ 2000)
- Protocol for Interpretation and Use of Sensory Testing and Analytical Chemistry Results for Re-Opening Oil-Impacted Areas Closed to Seafood Harvesting Due to The Deepwater Horizon Oil Spill (USFDA 2010)

Sub-module	Sampling technique	Data collection and/or analysis
S3 Fish/shellfish tissue samples	• Fish and/or shellfish collection; • Biological tissue sampling	• Physical specimen characteristics (e.g. length, sex, visible lesions etc.); • Laboratory analysis of tissue samples for hydrocarbons (e.g. PAH); • Olfactory analysis.

4.3.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation of this scientific monitoring module. These roles may delegate responsibilities as appropriate. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the OPEP.

Esso environmental team

Termination of this scientific monitoring module is the responsibility of Esso Environment Lead.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement scientific module S3. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for S3 in the event of a spill; • Implement S3; • Review and/or carry out reporting requirements; • Compliance with the requirements of S3 and the OSMP; • Provide advice with respect to environmental issues as required.	• Doctorate in environmental science; • At least 10 years' experience in the collection of fish and shellfish for laboratory analysis; • Familiarisation with relevant requirements of the OSMP and OPEP.
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories; • Completing field data sheets; • QA/QC data quality.	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area; • Experienced in the fish/shellfish collection, sampling and recording techniques.
Olfactory Analysis Panel (2 to 3 people)	• Conduct sensory evaluation of fish and/or shellfish samples.	• Bachelor degree in degree environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area; • Experienced in olfactory analysis.

Resources

Vessels will be required to support collection of fish and shellfish samples. Equipment required for collection of samples may include baited traps and lure lines. A NATA accredited laboratory will be required for analysis of the fish and shellfish samples. Esso has identified NATA accredited laboratories with the capabilities to support the analysis for scientific module S3, including but not limited to:

NATA accredited laboratory	Details
Australian Laboratory Services (Melbourne)	4 Westall Road, Springvale VIC 3171 Ph: 03 8549 9600
Intertek Geotechnical	41-45 Furnace Road, Welshpool WA 6106 Ph: 08 9458 8877
National Measurement Institute	1/153 Bertie Street, Port Melbourne VIC 3207 Ph: 03 9644 4888
Leeder Analytical Pty Ltd	33 Steane St, Fairfield, VIC, 3078 Phone: 03 9481 4167

4.4 S4: Short-Term Impacts to Oiled Fauna and Flora

4.4.1. Purpose

For the purposes of this module 'fauna' is defined as avifauna (seabirds and shorebirds) and marine megafauna (predominately pinnipeds). 'Flora' is defined as both aquatic flora (e.g. kelp present on subtidal reefs) and coastal flora (e.g. mangroves and saltmarsh).

The purpose of this module is to assess any short-term effects of oiling on marine fauna and flora which may have resulted from an oil spill. Module S5 is designed to conduct:

- Visual inspections of wildlife in the near shore marine environment and assess the number and species of oiled fauna and their health;
- Visual inspections of wildlife on shoreline environments, including at breeding areas and determine the number and species of oiled wildlife, and their general health;
- Surveys of coastal, subtidal and intertidal flora populations to identify the species present and record health condition parameters; and

- Fingerprint analysis of oil samples taken from oiled fauna to provide quantitative measures on the composition, type, estimated age and weathering and degradation of the product.

4.4.2. Initiation and termination criteria

Initiation Criteria	S4.1 Fauna surveys (vessel-based) S4.2 Fauna surveys (land-based) S4.3 Oiled fauna hydrocarbon testing;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Principal Investigator through the EUL (or delegate) has determined that data from operational modules O4 has confirmed the presence of oiled fauna.
	S4.4 Flora surveys	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Principal Investigator through the EUL (or delegate) has determined that data from operational modules O3 has confirmed the presence of oiled shorelines
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S4 is to commence.
Termination Criteria	S4.1 Fauna surveys (vessel-based) S4.2 Fauna surveys (land-based) S4.3 Oiled fauna hydrocarbon testing;	✓ Disturbance parameters (e.g. mortality, percentage oiled fauna/flora) have returned to within the expected natural dynamics of baseline state and/or control sites; and ✓ Hydrocarbon concentrations from fauna samples have returned to within the expected natural dynamics of baseline state and/or control sites.
	All sub-modules	✓ Or, agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.

4.4.3. Implementation

Activation Time[1]	✓ S4 to be activated within 24 hours of initiation criteria being met
Implementation Time	✓ Sampling and analysis plan to be ready within 24 hours of initiation criteria being met ✓ Mobilisation and monitoring to commence within 24 hours of activation.
Implementation Plan	✓ Refer to *Implementation Guide for S4: Short-term impacts to oiled fauna and flora*
Reporting	✓ Summary report to be provided to Esso Environment Lead following completion of each field survey event; ✓ Final report (including all data and associated interpretation and analysis) prepared following the termination criteria for the module being met.

Notes:

1. *A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.*

4.4.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during scientific module S4. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook *et al*. 2016).

Sub-module	Sampling technique	Data collection and/or analysis
S4.1 Fauna surveys (vessel-based)	• Visual surveillance	• Quantitative observation records (e.g. presence, abundance, behaviour etc.).

Sub-module	Sampling technique	Data collection and/or analysis
S4.2 Fauna surveys (land-based)	• Visual surveillance	• Quantitative observation records (e.g. presence, abundance, behaviour etc.).
S4.3 Oiled fauna hydrocarbon testing	• Oil sample collection	• Physical characteristics (e.g. wax content, dynamic viscosity, density, volatiles); • Chemical characteristics (e.g. PAH)
S4.4 Flora surveys	• Coastal vegetation surveys • Subtidal and intertidal benthic habitat surveys	• Quantitative observation records (e.g. vegetation type, percent cover, health parameters etc.).

4.4.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation of this scientific monitoring module. These roles may delegate responsibilities as appropriate. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the OPEP.

Esso environmental team

Termination of this scientific monitoring module is the responsibility of Esso Environment Lead.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement scientific module S4. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for S4 in the event of a spill • Implement S4 • Review and/or carry out reporting requirements • Compliance with the requirements of S4 and the OSMP • Provide advice with respect to environmental issues as required	• Doctorate in environmental science; • At least 10 years' experience infauna survey including the survey of marine fauna; • Familiarisation with relevant requirements of the OSMP and OPEP
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories • Completing field data sheets • QA/QC data quality	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area • Experienced in the relevant sampling and/or recording techniques.

Resources

Vehicles will be required to support land-based fauna surveys and flora surveys. Vessels will be required for implementation of vessel-based fauna surveys and may be supported by the use of UAVs for rapid collection of data via video or photographs of colonies. ROVs may be required for surveys of subtidal flora. Sampling equipment may be used by trained animal handlers to sample oil found on oiled wildlife and will require a NATA accredited laboratory to analyse the oil samples. Esso has identified NATA accredited laboratories with the capabilities to support the analysis for scientific module S4, including but not limited to:

NATA accredited laboratory	Details
Australian Laboratory Services (Melbourne)	4 Westall Road, Springvale VIC 3171 Ph: 03 8549 9600
Intertek Geotechnical	41-45 Furnace Road, Welshpool WA 6106 Ph: 08 9458 8877
Leeder Analytical Pty Ltd	33 Steane St, Fairfield, VIC, 3078 Phone: 03 9481 4167
National Measurement Institute	1/153 Bertie Street, Port Melbourne VIC 3207 Ph: 03 9644 4888

4.5 S5: Recovery of Commercial and Recreational Fisheries

4.5.1. Purpose

This module provides a semi-quantitative longer-term assessment of whether commercial and recreational fisheries have been impacted by a spill and the level of that impact pertaining to fish catch volume and effort rates. Module S5 will assess changes to fishery stocks due to oil exposure by:

- Determining the catch composition of species in each of the main fisheries following exposure to the spill;
- Summarise commercial catch volume and effort data post-oil spill and compare to pre-existing (baseline) information provided by the Victorian Fisheries Authority (VFA), the New South Wales Department of Primary Industries (NSW DPI)), Tasmanian Department of Primary Industries, Parks, Water and Environment (DPIPWE), and/or Australian Fisheries Management Authority (AFMA); and,
- Calculate catch-per-unit effort for fish/shellfish species to determine any change in abundance.

4.5.2. Initiation and termination criteria

Initiation Criteria	S5 Desktop review of fishery stock;	✓ ✓	Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred; **and** Principal Investigator through the EUL (or delegate) has confirmed that either: (a) data from S3 confirms tainting in fish or shellfish tissue; or (b) in response from government / State IC advice
	All sub-modules	✓	The IMT IC (or delegate) has advised that either full or partial implementation of S5 is to commence.
Termination Criteria	S5 Desktop review of fishery stock;	✓	Catch per Unit Effort (CPUE) for fishery stock assessments have returned to within the expected natural dynamics of baseline state and/or control sites.
	All sub-modules	✓	**Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.

4.5.3. Implementation

Activation Time[1]	✓ S5 to be activated within 24 hours of initiation criteria being met
Implementation Time	✓ Desktop assessment to commence within 24 hours of activation.
Implementation Plan	✓ Refer to *Implementation Guide for S5: Long-term impacts to commercial and recreational fisheries*
Reporting	✓ Final report (including all data and associated interpretation and analysis) prepared following the termination criteria for the module being met.

Notes:

1. *A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.*

4.5.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during scientific module S5. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Sub-module	Sampling technique	Data collection and/or analysis
S5.1 Desktop review of fishery stock	• Desktop review.	• Stakeholder liaison and data collation; • CPUE analyses.

4.5.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation of this scientific monitoring module. These roles may delegate responsibilities as appropriate. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the OPEP.

Esso environmental team

Termination of this scientific monitoring module is the responsibility of Esso Environment Lead.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement scientific module S5. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Implement S5; • Review and/or carry out reporting requirements; • Compliance with the requirements of S5 and the OSMP; • Provide advice with respect to environmental issues as required • QA/QC data quality.	• Doctorate in environmental science; • At least 10 years' experience in the collection and analysis of fishery data; • Familiarisation with relevant requirements of the OSMP and OPEP; • Experienced in fisheries data analysis.

Resources

Module S5 is a desktop review and does not require mobilisation of non-personnel resources.

4.6 S6: Recovery of Fauna

4.6.1. Purpose

The purpose of this module is to provide semi-quantitative measures of changes to population dynamics of indicator fauna to assess long-term environmental effects on these species which may result from a hydrocarbon spill (i.e. assess the extent of damage and measure the degree of recovery, where possible). Module S6 will assess and monitor oil impacts to fauna populations by:

- Monitoring changes in population dynamics (pup counts, breeding success, population changes over time) at identified control and impact sites;
- Assessing the impact of a hydrocarbon spill on indicator fauna by analysing pre and post-impact data on population sizes at control and impact (where existing baseline data is available) sites.

4.6.2. Initiation and termination criteria

Initiation Criteria	S6 Fauna surveys	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred, **and** ✓ Principal Investigator through the EUL (or delegate) has determined that data from operational module O4 or scientific module S4 has confirmed the exposure of fauna
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S6 is to commence.
Termination Criteria	S6 Fauna surveys	✓ Disturbance parameters (e.g. estimated population) have returned to within the expected natural dynamics of baseline state and/or control sites.
	All sub-modules	✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.

4.6.3. Implementation

Activation Time[1]	✓ S6 to be activated within 24 hours of initiation criteria being met
Implementation Time	✓ Sampling and analysis plan to be ready within 7 days of initiation criteria being met; ✓ Mobilisation and monitoring to commence within 7 days of activation
Implementation Plan	✓ Refer to *Implementation Guide for S6: Long-term impacts to fauna*
Reporting	✓ Summary report to be provided to Esso Environment Lead following completion of each field survey event; ✓ Final report (including all data and associated interpretation and analysis) prepared following the termination criteria for the module being met.

Notes:

1. *A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.*

4.6.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during scientific module S6. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook *et al*. 2016).

Or other related scientific studies (e.g. Kirkwood *et al*. 2005; Goldsworth *et al*. 2000).

Sub-module	Sampling technique	Data collection and/or analysis
S6.1 Fauna surveys	• Visual surveillance	• Quantitative observation records (e.g. population, chicks/pups abundance, behaviour etc.).

4.6.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation of this scientific monitoring module. These roles may delegate responsibilities as appropriate. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the OPEP.

Esso environmental team

Termination of this scientific monitoring module is the responsibility of Esso Environment Lead.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement scientific module S6. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for S6 in the event of a spill • Implement S6 • Review and/or carry out reporting requirements • Compliance with the requirements of S6 and the OSMP • Provide advice with respect to environmental issues as required	• Doctorate in environmental science; • At least 10 years' experience in the survey and analysis of fauna data; • Familiarisation with relevant requirements of the OSMP and OPEP
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories • Completing field data sheets • QA/QC data quality	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area • Experienced in the relevant sampling and/or recording techniques.

Resources

Vessels and vehicles will likely be required to access sites for ongoing monitoring of fauna at sea and on land.

4.7 S7: Recovery of Subtidal and Intertidal Benthic Habitat

4.7.1. Purpose

The purpose of this module is to assess long-term environmental effects on subtidal and intertidal benthic communities which may have resulted from an oil spill or response (i.e. assesses the extent of damage and measure the degree of recovery in benthic communities, where possible). Module S7 will assess and monitor long-term impacts to subtidal and intertidal benthic communities by:

- Undertaking habitat extent analysis to rapidly collect and process real-time data on abiotic and biotic parameters to determine subtidal and intertidal habitat classifications;
- Monitoring seagrass at impact and reference sites to determine extent of change (if any) in biomass and estimated cover due to oil impacts;

- Monitoring macroalgae and sponge at impact and reference sites to determine extent of change (if any) in biomass and estimated cover due to oil impacts;
- Monitoring benthic infauna at impact and reference sites to determine extent of change (if any) to species composition and abundance; and
- Monitoring fish at impact and reference sites to determine extent of change (if any) to species composition and abundance.

4.7.2. Initiation and termination criteria

Initiation Criteria	S7.1 Habitat mapping; S7.2 Macroalgae and sponges S7.3 Benthic infauna monitoring; S7.4 Intertidal and subtidal fish monitoring	✓ ✓	Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred; **and** Principal Investigator through the EUL (or delegate) has determined that data from operational module O2/O6 or scientific module S1/S2/S4 has confirmed the exposure of either benthic substrate or waters within bottom 1 m of seabed
	All sub-modules	✓	The IMT IC (or delegate) has advised that either full or partial implementation of S7 is to commence.
Termination Criteria	S7.1 Habitat mapping; S7.2 Macroalgae and sponges S7.3 Benthic infauna monitoring; S7.4 Intertidal and subtidal fish monitoring	✓	Disturbance parameters (e.g. species composition, percent cover) and health parameters (e.g. leaf condition) have returned to within the expected natural dynamics of baseline state and/or control sites.
	All sub-modules	✓	**Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring

4.7.3. Implementation

Activation Time[1]	✓	S7 to be activated within 24 hours of initiation criteria being met
Implementation Time	✓ ✓	Sampling and analysis plan to be ready within 7 days of initiation criteria being met; Mobilisation and monitoring to commence within 7 days of activation.
Implementation Plan	✓	Refer to *Implementation Guide for S7: Long-term impacts to subtidal and intertidal benthic habitat*
Reporting	✓ ✓	Summary report to be provided to Esso Environment Lead following completion of each field survey event; Final report (including all data and associated interpretation and analysis) prepared following the termination criteria for the module being met.

Notes:

1. *A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.*

4.7.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during scientific module S7. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook *et al*. 2016).

Or other related scientific studies (e.g. Anderson *et al*. 2009; English *et al*. 1997; Brown *et al*. 2004; Cappo *et al*. 2006).

Sub-module	Sampling technique	Data collection and/or analysis
S7.1 Habitat mapping	• Visual and/or remote sensing surveillance (e.g. towed camera, tagging, side-scanning sonar etc.)	• Identification of habitat type and composition; • Mapping of habitat extent.
S7.2 Macroalgae and sponge	• Visual and/or remote sensing surveillance (e.g. towed camera, tagging, side-scanning sonar etc.)	• Population and community parameters (composition, cover, abundance, diversity)
S7.3 Benthic Infauna monitoring	• Infauna sample collection (e.g. sediment grab sampling)	• Population parameters (abundance, composition etc.).
S7.4 Intertidal and subtidal fish or monitoring	• Visual and/or remote sensing surveillance (e.g. divers, BRUVS etc.)	• Population parameters (abundance, composition etc.).

4.7.5. Responsibilities, competencies, and resources

The IMT IC and EUL have responsibilities relating to the initiation of this scientific monitoring module. These roles may delegate responsibilities as appropriate. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the OPEP.

Esso environmental team

Termination of this scientific monitoring module is the responsibility of Esso Environment Lead.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement scientific module S7. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for S7 in the event of a spill • Implement S7 • Review and/or carry out reporting requirements • Compliance with the requirements of S7 and the OSMP • Provide advice with respect to environmental issues as required	• Doctorate in environmental science; • At least 10 years' experience in the collection and analysis of data relating to marine infauna; • Familiarisation with relevant requirements of the OSMP and OPEP
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories • Completing field data sheets • QA/QC data quality	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area • Experienced in the relevant sampling and/or recording techniques.

Resources

Vehicles and vessels will be required to support monitoring of nearshore and offshore benthic habitats and communities respectively. ROVs may be required for remote surveillance of benthic habitats and communities.

4.8 S8: Recovery of Coastal Flora

4.8.1. Purpose

The purpose of this module is to assess potential long-term environmental effects on the extent, composition and health of coastal flora communities which may have resulted from an oil spill (i.e. assess the extent of damage and measure the degree of recovery in coastal flora populations, where possible). Module S8 assesses and monitors long-term impacts to coastal flora by:

- Establishing the baseline (background) data on coastal flora community composition, structure and health at identified control and impact sites. Post-spill, pre-impact (reactive baseline) sampling will be undertaken if practicable e.g. if timing permits. This data will augment existing baseline information);
- Monitoring coastal flora communities over time at identified control and impact sites by assessing community extent, composition, structure and health; and
- Assessing the impact of a hydrocarbon spill on coastal flora communities by analysing long-term pre- and post-impact data at control and impact sites.

4.8.2. Initiation and termination criteria

Initiation Criteria	S8.1 Habitat mapping; S8.2 Condition monitoring	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Principal Investigator through the EUL (or delegate) has determined that data from operational module O3 or scientific module S4 has confirmed the exposure of coastal flora
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S8 is to commence.
Termination Criteria	S8.1 Habitat mapping; S8.2 Condition monitoring	✓ Disturbance parameters (e.g. abundance, percent cover) and health parameters (e.g. leaf condition) have returned to within the expected natural dynamics of baseline state and/or control sites.
	All sub-modules	✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.

4.8.3. Implementation

Activation Time[1]	✓ S8 to be activated within 24 hours of initiation criteria being met
Implementation Time	✓ Sampling and analysis plan to be ready within 7 days of initiation criteria being met; ✓ Mobilisation and monitoring to commence within 7 days of activation.
Implementation Plan	✓ Refer to *Implementation Guide for S8: Long-term impacts to coastal fauna*
Reporting	✓ Summary report to be provided to Esso Environment Lead following completion of each field survey event; ✓ Final report (including all data and associated interpretation and analysis) prepared following the termination criteria for the module being met.

Notes:

1. *A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.*

4.8.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during scientific module S8. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook *et al*. 2016).

Or other related scientific studies (e.g. English *et al*. 1997).

Sub-module	Sampling technique	Data collection and/or analysis
S8.1 Habitat mapping	• Remote sensing surveillance (e.g. multispectral imagery)	• Identification of habitat type and composition; • Mapping of habitat extent.
S8.2 Condition monitoring	• Visual (e.g. quadrats, photographs)	• Population parameters (e.g. abundance, percent cover etc.). • Health parameters (e.g. leaf cover, leaf damage, etc.)

4.8.5. Responsibilities, competencies, and resources

The IMT IC and EUL have responsibilities relating to the initiation of this scientific monitoring module. These roles may delegate responsibilities as appropriate; e.g. the ERT VM/OIM may be responsible for the initiation if the IMT has not yet been established. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the OPEP.

Esso environmental team

Termination of this scientific monitoring module is the responsibility of Esso Environment Lead.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement scientific module S8. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for S8 in the event of a spill • Implement S8 • Review and/or carry out reporting requirements • Compliance with the requirements of S8 and the OSMP • Provide advice with respect to environmental issues as required	• Doctorate in environmental science; • At least 10 years' experience in the collection and analysis of data on flora including coastal flora; • Familiarisation with relevant requirements of the OSMP and OPEP
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories • Completing field data sheets • QA/QC data quality	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area • Experienced in the relevant sampling and/or recording techniques.

Resources

Vehicles will be required to support the visual surveys involved in monitoring of coastal flora.

4.9 S9: Recovery of Ramsar Values

4.9.1. Purpose

This module is aimed at establishing whether oil entering Ramsar wetland has resulted in an alteration to the ecological character of the system. The purpose of this module is to:

- Assess long-term impacts of an oil spill on the ecological character of Ramsar sites.

4.9.2. Initiation and termination criteria

Initiation Criteria	S9 Desktop review of wetland values	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Principal Investigator through the EUL (or delegate) has determined that (a) data from operational module O3 has confirmed the exposure of a Ramsar wetland; and (b) data from scientific modules S1, S4, S6, S7 or S8 confirm an impact to water/sediment quality, flora or fauna in the wetland.
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S9 is to commence.
Termination Criteria	S9 Desktop review of wetland values	✓ Wetland values that are important to the ECD* have returned to within the expected natural dynamics of baseline state and/or control sites.
	All sub-modules	✓ **Or**, agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.

* as described in relevant Ramsar site documents prepared per the National ECD Framework

4.9.3. Implementation

Activation Time[1]	✓ S9 to be activated[1] within 24 hours of initiation criteria being met
Implementation Time	✓ Desktop assessment to commence within 24 hours of activation.
Implementation Plan	✓ Refer to *Implementation Guide for S9: Long-term impacts to Ramsar values*
Reporting	✓ Final report (including all data and associated interpretation and analysis) prepared following the termination criteria for the module being met.

Notes:

1. *A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.*

4.9.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during scientific module S9. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, desktop reviews will be undertaken in line with relevant guidance documents, such as:

- National Framework and Guidance for Describing the Ecological Character of Australian Ramsar Wetlands (DEWHA 2008).

Sub-module	Sampling technique	Data collection and/or analysis
S9 Desktop review of wetland values	• Desktop review.	• Data collation (including relevant information from scientific modules S1, S4, S6, S7 and S8 where relevant). • Comparison to known ecological character descriptions of Ramsar wetlands.

4.9.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation of this scientific monitoring module. These roles may delegate responsibilities as appropriate; e.g. the ERT VM/OIM may be responsible for the initiation if the IMT has not yet been established. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the OPEP.

Esso environmental team

Termination of this scientific monitoring module is the responsibility of Esso Environment Lead.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement scientific module S9. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Implement S9 • Review and/or carry out reporting requirements • Compliance with the requirements of S9 and the OSMP • Provide advice with respect to environmental issues as required • QA/QC data quality	• Doctorate in environmental science; • At least 10 years' experience in dealing with Ramsar values including the analysis of changes to those values; • Familiarisation with relevant requirements of the OSMP and OPEP • Experienced in wetland ecology.

Resources

Module S9 is a desktop review and will not require mobilisation of non-personnel resources.

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Appendix A: General guidance and approaches for scientific monitoring design

This appendix provides guidance on survey design approaches that are likely to be utilised for the scientific monitoring modules:

- Impact versus Control (IvC);
- Gradient of Impacts;
- Before-After-Control-Impact (BACI);
- Control Chart;
- Lines of Evidence.

The design of monitoring studies should ensure, as far as possible, that the planned monitoring activities are practicable and that the objectives of the study will be met. The design must result in the collection of meaningful data and, where practicable, data that are sufficiently powerful to detect ecologically relevant changes.

The final survey design(s) can depend on a variety of factors, included but not limited to:

- Scale and pattern of potential effects of the spill;
- Availability of baseline data and/or ability to rapidly obtain baseline data;
- Time frame available to gather pre- and post-spill data;
- Availability of operational monitoring data;
- Availability of appropriate control sites;
- Statistical approach proposed for data analysis;
- Range of possible chronic and acute effects on the parameters of concern, based on the characteristics of the spill;
- Monitoring frequency required to ensure short-and long-term impacts are detected;
- Legislative requirements;
- Available resources and equipment to conduct the work in terms of personnel, logistics, and access.

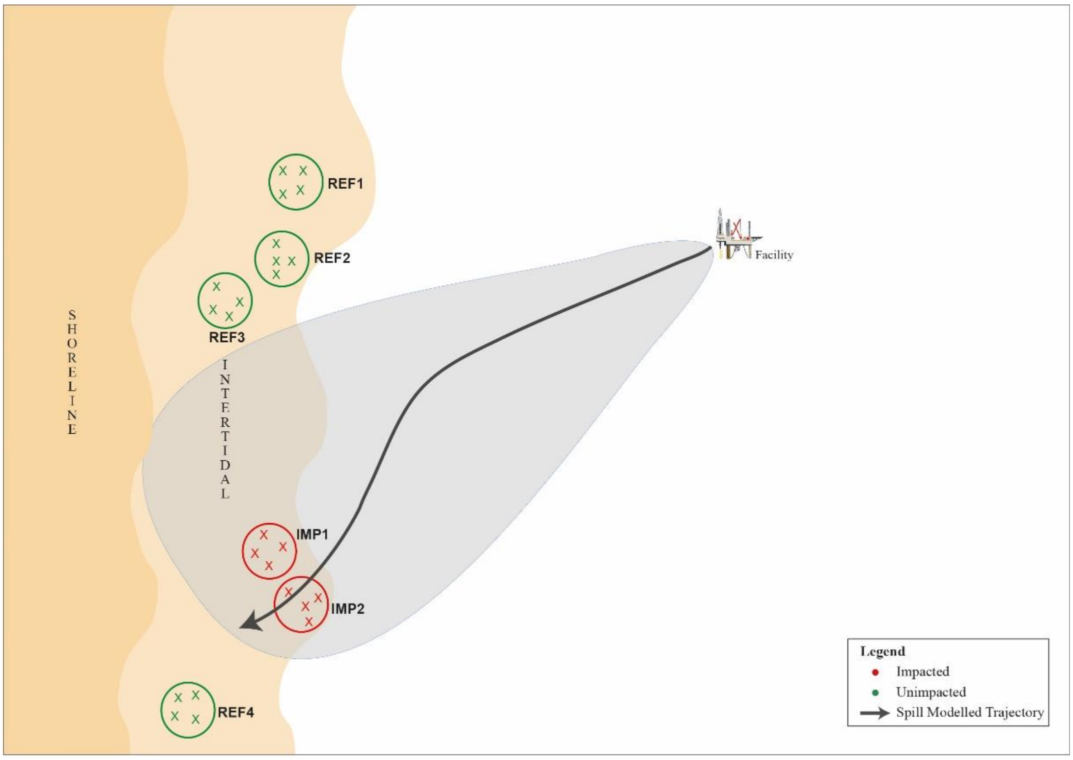
Note: data collection can depend on several constraints (as outlined above) and on access given logistical and safety constraints applicable to a particular spill event. Therefore, the survey designs recommended within the implementation guides for each scientific monitoring module, may not be able to be implemented exactly as intended. For example, there may be inadequate number of control sites because of the size of the spill and therefore data collected from an expected BACI design may need to be analysed as a gradient approach etc.

Before-After-Control-Impact (BACI) approach

Where appropriate baseline data are available, consideration should be given to developing a beyond BACI monitoring program design (Underwood 1991; 1994) or similar extended BACI design (mBACI), which monitors a range of control and impact sites, and can do so over time (Figure A-1). Where robust, appropriate baseline data for exposure sites are not available, pre-exposure sampling of locations that lie within the hydrocarbon spill trajectory should be prioritised to obtain baseline data prior to hydrocarbon exposure.

Exposure sites should be selected first, encompassing a representative selection of locations within the area affected by hydrocarbons. Where practicable, the monitoring program design may consider stratified sampling along environmental gradients (e.g. level of hydrocarbon exposure etc.). Comparable control sites beyond the area affected by hydrocarbons should then be selected, with monitoring conducted at all sites. Clearly obtaining control sites pre-exposure can be challenging and is heavily reliant on predicting the extent of hydrocarbon movement.

The suggested statistical analysis of data collected using the BACI approach includes a univariate or multi-factorial analysis of variance (ANOVA) and equivalent non-parametric tests, all of which will compare between treatment (impact versus reference) and time (before versus after). Components of variation may help partition a sum of squares into different sources and describe the importance of factors within tests.



Notes:

1. *A modification to the beyond BACI design, is known as an MBACI design. MBACI designs incorporate multiple impact locations, whereas beyond BACI designs include only one impact location.*
2. *The above design consists of four reference/control locations and two impact locations, with four nested sites in each. The number of replicates (e.g. quadrats or transects) per site should be set based on resourcing, and /or the results of the power analysis (if applicable).*
3. *The area affected by the spill is indicated by the grey shaded area, or the area of influence.*
4. *Design assumes the area of influence has been affected equally.*

Figure A-1: Example of an MBACI design for shoreline and/or intertidal communities

Impact versus Control (IvC) approach

For some locations and receptors, baseline data may not exist, may not be recent and applicable, or was collected using methods that are unrepeatable in the current study. If there is a lack of baseline information that can feed into a BACI design, an IvC approach can be used to assess impacts. However, due to the unknown status of the parameter before impact, there is a higher likelihood of encountering Type I error (falsely concluding that an impact has occurred) with this approach. For example, if the status of the parameter to be measured was already naturally lower at impact sites than control sites before the impact occurred, but this was not measured, a conclusion may be reached using the IvC approach that an impact has occurred when it may be natural variation. For this reason, sampling designs should always try to collect or use baseline data (i.e. aim for a BACI design), and if an IvC design is used, it is important to ensure that the control sites are comparable to the impact sites in every way possible except for the presence or absence of the studied effect (hydrocarbon). This may include, but not be limited to: site physical aspect, substrate, current regimes, and community composition.

Because of the higher likelihood of Type I error, it is also useful to collect additional data on relevant physical environmental parameters that are likely to be different at impact and control sites and may affect the conclusion of the assessment. Biological information may also be relevant, such as degree of sub-lethal and lethal impacts to populations. These parameters can be examined later for any potential co-variance with the observed changes in the parameter of interest, to understand whether hydrocarbons or natural variation affected the outcome. The physical and biological information can therefore augment and act as additional evidence to help interpret conclusions from any IvC analyses. As with the BACI approach, when using the IvC approach it is important to understand the scale of natural variation that may affect the outcome of the assessment by replicating sites within sampling locations and replicating samples within each site.

The suggested statistical approach for analysing the data collected using the IvC approach is a multi-factorial ANOVA (to account for nested data), including PERMANOVA and non-parametric tests, to test whether the level of variation among treatments (IvC) is greater than the level of variation within treatments. Components of variation may help partition variance into different sources and help infer whether the effect of hydrocarbons or spatial variation was responsible for any detected change in the receptors.

Gradient approach

The gradient approach can be used in some instances where a lack of suitable control sites prohibits using a BACI or IvC approach. Sampling should be established along a gradient of predicted effect (based on input of data from operational monitoring, surveillance or modelling), with sites established at various distances from the source of impact or along a gradient of magnitudes of concentrations of hydrocarbons. The gradient approach can also be used in combination with a BACI or IvC approach to help infer the cause of a detected impact and describe thresholds of impacts at which a response appears to have occurred. The gradient approach also provides a 'line of evidence' that the source of potential impact (hydrocarbons) was responsible for the observed effect, rather than natural variation. However, care should be taken to ensure awareness of any natural gradients in the parameter measured and take these into account when interpreting the data.

When designing a study using a gradient approach, relevant Oil Spill monitoring data (e.g. water and sediment quality), and modelling should be considered. Prior knowledge or prediction of the likely gradient of effect will greatly improve the efficiency of the sampling design by minimising the collection of data points that provide no additional information in the analysis (e.g. data points showing similar or no effects that do not help to characterise the gradient of effect), though noting these may aid in statistical power of gradient description so shouldn't necessarily be discouraged.

Typically, the level of observed impact will decline at distance from the source of a hydrocarbon release, with this decline likely to be exponential (i.e. large changes close to a release that quickly decrease in severity); therefore, sampling effort can be distributed along the gradient of effect in a way that best characterises the changes in the parameter measured.

If possible, multiple (> two) sites could be sampled at each distance along the gradient (if logistics and time permit) to provide an understanding of small-scale variation. Sites should also be sampled at distances where no environmental effect is predicted or observed, if possible, to characterise the full extent of the effect's gradient.

The suggested statistical analysis for the gradient approach includes correlation analysis between impact (measurements of hydrocarbon/stress; x-axis) and measurement parameter (biological response; y-axis), and associated regression analyses, may include least-squares regression line and hypotheses testing to determine if the trend is significantly different from zero.

Control chart approach

The control chart approach is applicable in the following circumstances:

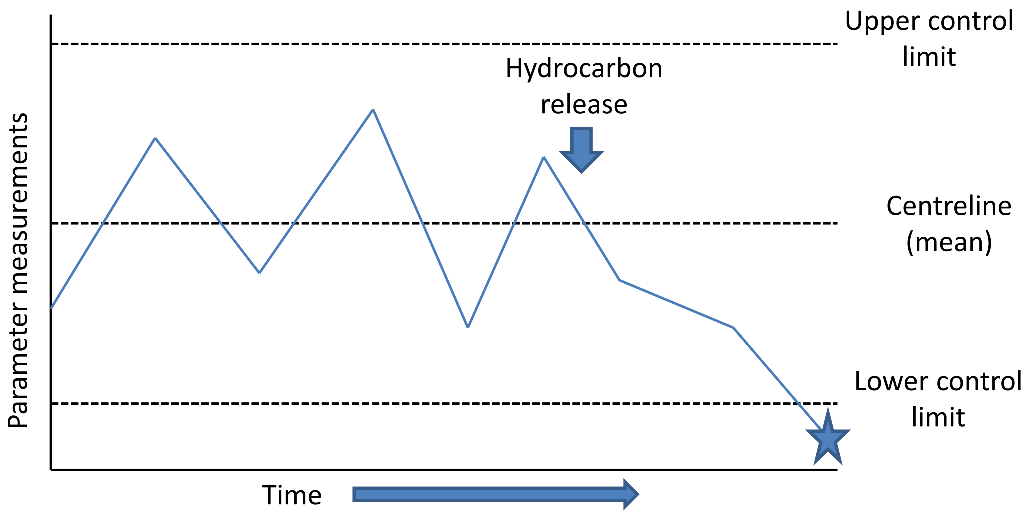
- When long-term (multi-year) datasets exist for the measured parameter;
- When a large amount of natural variation exists in the measured parameter;
- When predicting the expected range of outcomes from an impact.

One of the causal criteria described in the lines of evidence approach is 'strength of association' (Hill 1965), exemplified by a 'larger decline in individuals in areas affected by hydrocarbon than in control areas'. The control chart approach takes this causal criterion a step further and uses rules to establish whether a detected change in a parameter at impact sites is outside what would be expected to occur naturally. This technique requires tracking a parameter over time and determining whether an observed change is within the bounds of what has been observed to occur naturally at that impact site or at control sites.

A control chart has a central line for the mean, an upper control limit (UCL; e.g. typically 3 standard deviations [SD] above the mean), and a lower control limit (LCL; e.g. typically 3SD below the mean), which are typically all determined from historical data (Gotelli and Ellison 2004). The mean line can be constructed using data from i) historical data of an impact site prior to it being affected by hydrocarbons (i.e. what the mean used to be), or ii) control locations, whereby either historical or recent data is used for comparison to other sites (i.e. a control site historical data compared to impact site). The approach is then based on calculating the mean (ongoing) for an impact site to compare against the control chart. Any observations outside the UCL and LCL suggest that increased variation has been observed that are inconsistent with other data and may post a simple way to detect change in a system (Figure A-2).

In addition, if ongoing data collection is possible following a potential impact, the control chart approach can be used to examine the direction of change and whether this is consistent or inconsistent with other data. These data and interpretation may provide a weight of evidence of a directional change in a given parameter.

The control chart approach is only useful if there is an adequate knowledge of natural variability in a given parameter whether from historical sources or similar sites/locations. Control chart approaches can be a powerful tool for detecting impacts for systems that are naturally highly variable.



Note: The star represents a measurement beyond the likely anticipated variation, which needs to be investigated.

Figure A-2: Example Control Chart showing Centreline (mean), Upper Control Limit (3 SD above mean), Lower Control Limit (3 SD below mean), and Measurements

Lines of evidence approach

The lines of evidence approach is applicable in the following circumstances:

- Can be combined with any of the above monitoring designs to provide inferential evidence of an effect;
- Are useful to support evidence of effect if there are limited (or only one) impact locations;
- Are useful to support evidence of effect if the effect radiates outward from source;
- Are useful to infer cause of change if limited or no baseline data exist;
- Are useful to infer cause of change if limited or no control sites exist.

When a sampling design is suboptimal, or if conclusions from more formal tests are inconclusive, a lines of evidence approach can be used to help infer the cause of an observed change (i.e. attribute change to the hydrocarbon release or to other causes, such as natural variation). Within the lines of evidence approach, inference is developed based on carefully structured arguments. A weakness of this method is that the evidence may be largely circumstantial because it is based on correlations (Downes *et al*. 2002), which does not necessarily imply causation. Each causal argument may be weak when considered independently but combined they may provide strong circumstantial evidence and support for a conclusion (Downes *et al*. 2002).

This approach was originally developed in medicine (Hill 1965) but has been used more recently in ecological studies (e.g. Downes *et al*. 2002; McArdle 1996; Suter 1996; Beyers 1998; Fabricius 2004).

Causal criteria have been developed for categorizing arguments from studies on disease on humans (Hill 1965), and these can be applied to ecological arguments (Hill 1965). With lines of evidence, there is a need to seek evidence not only to support the impact prediction, but evidence to rule out plausible alternative predictions, such as that the observed difference was due to natural processes (Downes *et al*. 2002; Beyers 1998).

In the lines of evidence approach, a set of descriptions should be developed for all or some of the causal criteria listed in Table A-1 before the survey is undertaken (see Downes *et al*. 2002 for further criteria and examples). Data would then be collected that allows each line of evidence to be tested or objectively questioned. The final assessment of whether an impact is likely to have occurred should be based on the 'weight of evidence' from examining multiple lines of evidence.

Example generalised lines of evidence descriptions are provided in Table A-2. These should be modified and tailored to individual scientific monitoring module, as required and each parameter investigated.

Table A-1: Hills (1965) causal criteria and description in the context of ecological impact Assessment

Causal Criterion	Description
Strength of association	A large proportion of individuals are affected in the impact area relative to control areas
Consistency of association	The association was observed by other investigators at other times and places
Specificity of association	The effect is diagnostic of exposure
Temporality	Exposure must precede the effect in time
Biological gradient	The risk of effect is a function of magnitude of exposure
Biological plausibility	A plausible mechanism of action links cause and effect
Experimental evidence	A valid experiment provides strong evidence of causation
Coherence	Similar stressors cause similar effects
Analogy	The causal hypothesis does not conflict with existing knowledge of natural history and biology

Table A-2: Causal criteria and example lines of evidence descriptions that could be used to assess whether a change in a measured parameter was due to the effects of a hydrocarbon release

Causal Criterion	Evidence Supportive of a Hydrocarbon Release Impact	Evidence Unsupportive of a Hydrocarbon Release Impact
Strength of association	Larger decline in individuals in areas affected by hydrocarbon than in control areas	Similar declines in individuals in areas affected by hydrocarbon and control areas
Consistency of association	Consistent finding of declines in a range of biota in areas affected by hydrocarbon	Inconsistent declines in biota in areas affected by hydrocarbon (e.g. declines in one species but not in other similar species)
Specificity of association	Number of individuals affected correlates with hydrocarbon concentrations	No correlation between number of individuals affected and hydrocarbon concentration
Temporality	Decline in individuals immediately preceded by contact with hydrocarbon	Decline in individuals occurred before or long after hydrocarbon contact
Biological gradient	Changes in individuals aligned with exposure to hydrocarbon spills or concentrations	Decline in individuals occurs with increasing distance from a hydrocarbon spill or hydrocarbon concentrations
Biological plausibility	Evidence from literature of sensitivity to detected hydrocarbon concentration for species where declines are observed	Evidence from literature suggests lack of sensitivity to detected hydrocarbon concentration for species where declines are observed

Causal Criterion	Evidence Supportive of a Hydrocarbon Release Impact	Evidence Unsupportive of a Hydrocarbon Release Impact
Experimental evidence	A valid experiment provides strong evidence of causation	Not applicable (N/A)
Coherence	Evidence of a decline in species abundance, habitat, and food source with increasing hydrocarbon exposure	Evidence of a decline in species abundance, but no other evidence of expected declines associated with exposure
Analogy	Apparent declines in hatchling numbers despite no apparent decline in numbers of adults	Apparent declines in hatchling numbers associated with decreased numbers of adults

Appendix B: Baseline data

Rationale and approach

Scientific monitoring provides for the quantitative assessment of the environmental impacts associated with a Level 2 or Level 3 spill. The primary goal of the scientific monitoring program is to document the overall impact (short and long term) of the spill on habitats, species and ecosystems and the subsequent post spill recovery.

In the event of a Level 2 or Level 3 spill, scientific monitoring will be activated and individual modules selected and implemented appropriate to the nature, scale and duration of the spill. Activation of these scientific modules during the spill operational response phase may be required to collect pre-contact baseline data or spill impact data at identified receptors. The appropriate scientific modules will be implemented to assess the extent, severity and persistence of environmental impacts associated with the oil spill event.

Baseline monitoring provides information on the condition of ecological receptors prior to, or spatially independent (e.g. if used in control chart analyses) of, a spill event and is used for comparison with the post-impact scientific monitoring where required. This is particularly important for scientific monitoring where the ability to detect changes between pre-impact and post-impact conditions is necessary.

The design of the scientific monitoring program adopts the following framework:

- Where adequate and appropriate baseline data exists, then scientific modules for species and habitats will commence if and when initiation triggers are reached. In this instance given the adequacy of baseline, the scientific modules will not document the decline of the habitat or species, but will quantify impacts and monitor post-spill recovery;
- Where adequate and appropriate baseline data is not available, the options which will be considered include the following:
    - Collect baseline data prior to hydrocarbon contact and meet the requirements for a Before/After Assessment[1]; or
    - Collect environmental data during the spill event, if practicable, to determine potential impacts[2];
- In all cases, undertake post-spill scientific monitoring to determine the overall impact of the spill and document post-spill recovery.

An assessment of available baseline data for environmental receptors within the DA is contained in each of the scientific modules. Within each of those modules there is a description of the scientific monitoring approach which respect to baseline, obtaining data and determining impacts.

There are Oil Spill monitoring modules that are suited to pre-impact baseline monitoring. In the event of a spill to marine or coastal waters, reactive pre-impact monitoring should, where practicable, be implemented to gather additional data on the current state of the environment. Note: the collection of ongoing baseline data (i.e. under regular operational conditions) is not planned or considered to be practicable.

Understanding priority areas for reactive pre-impact baseline monitoring is important. Stochastic modelling may be used to determine areas likely to be contacted with fresh hydrocarbons above impact thresholds within a specified timeframe. For example, stochastic modelling may indicate a number of shoreline receptors have a high probability of contact with fresh hydrocarbons; these areas would then

[1] Application of the simple BACI sampling design and data analysis programs can be applied to the quantification of oil spill related impacts. See Appendix A

[2] Spill impact and post impact monitoring data will be collected following 'beyond-BACI' principles which is amenable to statistical techniques that can detect significant difference in recorded parameters (i.e. asymmetrical analysis of variance) following procedures described by Underwood (1994).

provide an initial focus for reactive pre-impact monitoring. A summary of activity specific modelling data identifying priority monitoring sites is provided in the OPEP Appendix D Quick Reference Information.

Control sites (i.e. similar to the impact or disturbance location) are sometimes more relevant than reference sites (undisturbed or natural sites) for determining the impact of a hydrocarbon spill as separate from other human or natural stressors (Downes *et al*. 2002). In the event of a spill, existing baseline information should be used to select relevant control sites outside the impact area of a single spill. It is expected that most control sites will be within the predicted environment that may be affected, but outside the impacted area for any given single spill. As all possible permutations or combination of sites cannot be realistically assessed in advance, control sites should be selected post-spill. The number of samples and/or sampling sites for a particular spill should depend on the extent of the spill, and the statistical power necessary to determine whether there is an impact and the ability of the monitoring program to determine recovery and termination criteria.

Baseline monitoring

Baseline information for the environment has been sourced from existing data and is summarised in each scientific monitoring module. In the event of a spill, where insufficient baseline exists information will be augmented with 'reactive' baseline studies at control sites or using pre-impact data at the receptor site where appropriate.

Control sites (i.e. similar to the impact or disturbance location) are often more relevant than reference sites (undisturbed or natural sites) for determining the impact of an oil spill as separate from other human or natural stressors (Downes *et al.* 2002). In the event of a spill existing baseline information will be used to select relevant control sites outside the impact area of a single spill. It is expected that most control sites will be within the DA, but outside the impacted area for any given single spill and will be selected post spill event on the basis of their representativeness to the potentially impacted site and their ability to provide a reliable comparison against which to compare the potentially impacted environmental values that are being measured.

The number of samples and/or sampling locations for a particular spill will depend on the extent of the spill, and the statistical power necessary to determine whether there has been an impact and the ability of the monitoring program to determine recovery and termination criteria.

Existing data

Baseline data characterises the existing environment and its variability both in affected sites and unaffected (control or reference) sites.

The EP contains desk study baseline environmental, social and economic values within the DA at a level deemed suitable for risk assessment and identification of mitigation and contingency planning measures as set out in the EP and OPEP. A summary of known baseline data from the Gippsland region and beyond, including New South Wales is shown in Table B-2.

In the event of a Level 2 or 3 spill relevant specific existing data will be obtained as the starting point to scientific monitoring, by the following process:

- Relevant scientific monitoring studies are catalogued for identified sensitive locations along with the custodian's contact details;
- The monitoring methodology, monitoring sites, and sampling duration and frequency of monitoring studies are provided when appropriate in a tabular format to identify methodological differences, and spatial and temporal gaps in accrued baseline data information;
- In the event of a spill data custodians will be contacted and datasets requested. As a contingency, 'data mining' from publically available information will occur simultaneously for baseline database establishment; and
- Data gaps will be used by the PI to refine the SAP to further optimise the design of the study.

Within each module is a summary of the available baseline information together with implementation strategy to address the assessment of impacts is provided.

The methods used to collect the existing baseline data will be assessed and, where possible, the methods used in the implementation of the monitoring will be consistent with the baseline data methods such that comparisons can be made. The design of the modules has already drawn upon the information contained within the existing baseline studies that were used to inform both the preparation of the EP and the OSMP and its modules, and as such there is already a degree of conformity between the methods proposed in the modules and that used for the collection of the published baseline data.

Monitoring survey type

Establishment of baseline is conducted according to Table B-1.

Table B-1: Baseline data types

Type	Description
Baseline field surveys	Field surveys undertaken in advance of the full implementation of the investigations in the modules where baseline information is required. Since the DA is very large and actual spill trajectory dependent on many variables, it is not possible to devise a study programme in advance of a spill that would provide a useful, representative baseline that would cover all spill scenarios.
Reactive baseline surveys	Monitoring surveys mobilised rapidly after a spill to assess baseline conditions at sensitive locations potentially affected by the spill but before spill contact. Esso recognises that reactive baseline monitoring surveys alone may not be sufficient to serve as a baseline dataset, but can provide an important contribution to augment existing ‘baseline’ with a ‘current pre-exposure’ condition.
Baseline studies at control sites	Monitoring at sites chosen from within the DA but where spill trajectory estimation predicts no contact.

Impact surveys

Impact surveys examine the immediate aftermath of a spill on specific receptors.

Recovery surveys

Recovery surveys examine the long term effects on specific receptors following the spill recovery.

Use of operational monitoring data

Findings of operational monitoring will be incorporated into the datasets gathered by scientific monitoring.

Monitoring methods

Survey and analytical methods are specific to the environmental value or receptor to be monitored. Methods selected for each module are set out in the relevant subsection of each module.

Monitoring sites

Reactive baseline monitoring sites may be required where there is insufficient existing baseline data against which to compare data collected following exposure to a hydrocarbon spill.

Selection of reactive baseline survey sites will need to be flexible and will depend on a range of site-specific, scientific criteria depending on the module. However in general sites must be:

- Representative of the area that is potentially impacted by the hydrocarbon spill;
- Coincide in proximity to locations with long-term (or recent) monitoring (notably in Victorian Marine Conservation Areas); and
- Be free from obvious anthropogenic impacts.

Reference sites

Reference sites are those that are representative of undisturbed / natural conditions of similar type, habitat, community etc. to those affected. Although reference sites for most types of affected environment will exist within the DA, control sites may be more representative in many cases.

Control sites

Control sites (i.e. unaffected sites similar to those affected by the spill) are used to determine the impact of an oil spill as separate from other human or natural stressors. In the event of a spill existing baseline information will be used to select relevant control sites outside the impact area of a single spill and must be selected post spill. Control sites will be selected and details of distribution and number of replicates will be decided after detailed appraisal of baseline data such that an understanding of the variability of the data can be obtained.

Monitoring indicators

Indicators are specific species, communities or habitats where changes reflect impacts on the wider environment. Indicators for scientific monitoring were identified and chosen based on the following criteria.

Typical – representative of ecological characteristics of the DA

Monitoring of spill impacts is focussed on species that are known to regularly occur within the DA and for which the DA provides vital habitat. This accords with the ecological principle of 'regularly supports' (United Nations 1971).

Sensitive – are sensitive to the impacts of oil spills

Species and communities can be impacted by both the oil spill and by associated response actions. The mechanisms and cumulative impacts to species and communities have been explored using a stressor model. This does not cover the entire myriad of complexities and pathways associated with oil and response actions in marine, coastal and estuarine environments but provides an overview of the main linkages (Gross 2003).

Determining impacts

Data on impacted sites will be compared with baseline data from reference or control locations to determine impacts. Multiple reference / control locations will be selected to provide a robust assessment of the impacts.

If there is sufficient statistical power in the data collected then post-impact monitoring will be analysed using statistical models such as Analysis of Variance (ANOVA). The data collected during the monitoring may be too variable to establish statistical trends. Such a situation is not uncommon in monitoring programs where limited 'before' data are available.

Generally determination of an impact involves an experimental approach with sampling before and after the purported impact at both potentially impacted and control (non-impacted) sites – the BACI (Before – After – Control – Impact) approach. The BACI approach allows for the detection of impacts that can be identified as statistically separable from the background natural variation that could be causing the observed phenomenon. The soundness of the approach stems from the ability to combine a range of design elements (an assessment of the before situation, replication, use of controls) to ensure the robustness of the assessment.

In many cases, and this situation pertains to an oil spill is one of them, where there is an inability to be able to collect information about the pre-impact situation. This may be as a result of adverse weather conditions not allowing a reactive baseline survey to be conducted safely. Thus a situation can arise there is insufficient information available as to what the before situation was and indeed what the situation was at any control location either before or after the action. There is also potentially no replication. In such cases an evaluation of the available evidence can be undertaken to see whether there is support for a particular hypothesis or not. Downes *et al*. (2002) in their book on monitoring of aquatic environments present a detailed review of this technique, the Weight (Levels) of Evidence approach. The use of multiple lines of evidence consistent with the integrated assessment philosophy of the revised ANZECC/ARMCANZ (2000a) guidelines as discussed in the CSIRO Handbook for

Sediment Quality Assessment (Simpson *et al*., 2005). A weight of evidence approach can be taken when there is no definitive experimental evidence available to support or not support a hypothesis.

Table B-2: Regional environmental studies and available baseline data

Reference	Description	Summary	Relevant Location/s	Relevant scientific module
AFMA	Reported landed annual catch from Commonwealth fisheries	This dataset shows the annual catch for Commonwealth fisheries managed by AFMA. The catch data is provided by fishery, by species and by calendar year.	Commonwealth fisheries	S6
Barton *et al.* (2012)	Marine Natural Values Study Marine Protected Areas of the Flinders and Twofold Shelf bioregions	An inventory of accessible knowledge about the natural (environmental) values of marine parks and sanctuaries located on the flinders and Twofold shelf bioregions. For each park area the following are described: Physical parameters, Marine habitat classes, marine ecological communities, biological processes, species distribution information, Shorebirds, marine mammals, knowledge gaps and existing research.	Wilsons Promontory, Ninety Mile beach, Point Hicks, Cape Howe marine parks and Beware Reef Marine Sanctuary.	S8
Birdata web portal	Access to BirdLife Australia data	Birdata includes data from the Australian Bird Atlas project and also from various dedicated monitoring projects including Shorebirds 2020.	Gippsland Lakes	S10
Birds Australia	Biennial beach nesting birds count reports	Every two years, all suitable ocean beach habitat for Hooded Plovers along the coasts of Victoria, South Australia and NSW, are surveyed across a weekend in mid-November. The aim is to achieve a best estimate of the population and assess the state of the bird's habitat.	Ninety Mile Beach	S5 S7
Blake *et al.* (2000)	Seagrass mapping of Victoria's minor inlets	Remote sensing and aerial photograph analysis of seagrass bed extent in six Victorian inlets.		S8
BMT WBM (2011)	Ecological Character Description	This report provides the Ecological Character Description (ECD) for the Gippsland Lakes Ramsar site, prepared in accordance with the National Framework and Guidance for Describing the Ecological Character of Australia's Ramsar Wetlands 2008.	Gippsland Lakes Ramsar Site	S10
Boon *et al* (2011)	Mangrove and saltmarsh habitat	• Victorian mangrove distribution and extent; • Victorian coastal saltmarsh distribution and extent; • Zonation; • Sedimentation and successional change in communities; • Relation between mangrove and saltmarsh communities and water and salt; • Floristics and structure of coastal vegetation; • Mapping of mangrove and coastal saltmarsh extent and current ecological condition;	Victoria	S9

Reference	Description	Summary	Relevant Location/s	Relevant scientific module
		• Pre-European distributions; and • Assessment of distribution under rising sea levels		
Butler *et al*. (2002)	Assessment of the conservation values of the Bass Strait sponge beds area	Assessment of the conservation / marine biodiversity values of sponge bed areas across the Bass Strait. Locations and extent unable to be identified by the assessment, however gives a comprehensive outline of the biodiversity values in sponge based, including broad-scale mapping.	Twofold shelf	S8
CEE 2003	Marine issues assessment (including benthos) for the Sole Gas Pipeline Extension	Assessment of marine environmental components including (but not limited to) subtidal infauna and epifauna. Field survey included a benthic video survey along the proposed Patricia Baleen pipeline.	Sole/Patricia Baleen	S8
DELWP	Victorian Biodiversity Atlas	The Victorian Biodiversity Atlas (VBA) is the collated information of flora and fauna sightings across Victoria.	Gippsland Lakes	S10
Edmunds *et al*. (2005)	Subtidal reef biota monitoring in marine protected areas in the Twofold Shelf region	Long-term Parks Victoria monitoring and mapping program of macroalgae, invertebrates and fish. Quantitative visual census method based on Edgar and Barrett 1997; Edgar et al. 1997) using transects. 18 sites monitored in total including seven (7) sites originally monitored in 2001. Site depth ranged between 4-10 m.	Twofold Shelf including: Beware Reef Marine Sanctuary, Point Hicks and Cape Howe Marine National Parks	S8
Edmunds et al. (2011)	Victorian Subtidal Reef Monitoring Program: The Reef Biota at Beware Reef Marine Sanctuary,	Inventory of subtidal reef biota at Beware Reef Marine Sanctuary offshore from the Gippsland Coast. Marine habitat classes, marine ecological communities, biological processes, species distribution information, Shorebirds, marine mammals, knowledge gaps and existing research.	Beware Reef Marine Sanctuary	S8
Fisheries Research and Development Corporation	Biological, catch and effort information for Australia's key wild catch fish stocks	fish.gov.au provides reports by jurisdiction or species.	Australia-wide	S6
Fullagar *et al*. (2005)	Historic population data for Little penguin colony at Gabo Island	A reconnaissance of Gabo Island to assess the feasibility of a Little Penguin breeding population survey.	Gabo Island	S5 S7
Henry & Lyle (2003)	2000 National Survey of Recreational and Indigenous Fishing (NRIFS)	The first and most comprehensive snapshot of recreational fishing in Australia.	Australia-wide	S6
Higgins & Davies (eds.) (1996)	Handbook of Australian, New Zealand and Antarctic Birds, Volume 3.	Pre-eminent scientific reference on birds in the region, which includes Australia, New Zealand, Antarctica, and the surrounding ocean and sub-Antarctic islands.	Rigby Island, Gippsland Lakes	S5 S7 S10

Reference	Description	Summary	Relevant Location/s	Relevant scientific module
Institute for Marine and Antarctic Studies (IMAS)	Fisheries and aquaculture reports	Current and past Fishery Assessment Reports conducted on behalf of DPIPWE for the following fisheries; • Scalefish • Rock Lobster • Abalone • Giant Crab • Other fisheries including recreational projects	Tasmanian fisheries	S6
Kirkwood *et al.* (2010)	Continued population recovery by Australian fur seals	Includes Victorian population data for Australian fur seal up to 2008. Pups were recorded at 20 locations: 10 previously known colonies, three newly recognised colonies and seven haul-out sites where pups are occasionally born.	Gabo Island, The Skerries	S5 S7
Littnan & Mitchell (2002)	Australian And New Zealand Fur Seals at The Skerries, Victoria: Recovery of A Breeding Colony	The population size of Australian fur seals Arctocephalus pusillus doriferus and New Zealand fur seals A. forsteri at The Skerries, Victoria was estimated in two consecutive breeding seasons, 1999-2000 and 2000-2001.	The Skerries	S5 S7
Monk *et al.* (2011)	Corner Inlet and Nooramunga Seagrass Mapping Project	Commissioned by Parks Victoria this study creates two updated habitat maps for Corner Inlet and Nooramunga Marine and Coastal Park.		S8
NSW DPI	Fisheries Spatial Portal	NSW revised its fisheries reporting requirements in 2009 so catch and effort data is now more spatially and temporally detailed and as such is likely to be more useful in the assessment of potential impacts from an oil spill.	NSW fisheries	S6
O'Hara *et al.* (2002)	Baseline monitoring of Posidonia seagrass beds in Corner Inlet, Victoria	• Obtain qualitative baseline data on Corner Inlet subtidal seagrass communities; • Obtain data characterising fish, invertebrate and plant communities of Corner Inlet; • Assess status of invertebrate species of conservation concern that occur in Corner Inlet/Nooramunga		S8
Overeem *et al.* (2007)	Contrasting genetic structuring between colonies of the Little Penguin	Includes summary of population data for various Little Penguin, Contrasting genetic structuring between colonies of the world's smallest penguin, Eudyptula minor, colonies.	Gabo Island	S5 S7
Parks Victoria 2006a	Management Plan for Beware Reef Marine Sanctuary	Management Plan developed to help protect and conserve the sanctuary's natural and cultural values, make the sanctuary more widely known and appreciated, and ensure visitors both enjoy and respect its importance for current and future generations. Provides description of species, communities and habitat, however,	Beware Reef	S8

Reference	Description	Summary	Relevant Location/s	Relevant scientific module
		mostly based on Edmunds et al. (2005)		
Parks Victoria 2006b	Management Plan for Point Hicks Marine National Park	Management Plan developed to help protect and conserve the sanctuary's natural and cultural values, make the sanctuary more widely known and appreciated, and ensure visitors both enjoy and respect its importance for current and future generations. Provides description of species, communities and habitat, however, mostly based on Plummer et al. (2003 and Edmunds et al. (2005)	Point Hicks	S8
Plummer *et al*. 2003	Marine Natural Values Study Victorian Marine National Parks and Sanctuaries	The "Marine Natural Values Study – Marine National Parks and Sanctuaries" is an inventory of accessible knowledge about the natural (environmental) values for all 24 of the newly declared Marine National Parks and Sanctuaries in Victoria. For each park area the following are described: Physical parameters, Marine habitat classes, marine ecological communities, biological processes, species distribution information, Shorebirds, marine mammals, knowledge gaps and existing research. Included Ninety Mile Beach Marine National Parka and Point Hicks Marine National Park.	Ninety Mile beach and Point Hicks	S8
Roob and Ball (1997)	Gippsland Lakes seagrass mapping	• Assessment of seagrass changes in the Gippsland Lakes through review of historical aerial photographs; and • Assessment of the spatial distribution of seagrass in the Gippsland Lakes.	Gippsland Lakes	S8 S10
Roob *et al.* (1998)	Corner Inlet and Nooramunga Seagrass Mapping	• Assessment of seagrass changes in Corner Inlet and Nooramunga through a review of historic aerial photographs; and • Assessment of the spatial distribution of seagrass in Corner Inlet and Nooramunga.	Corner Inlet Nooramunga	S8
Shorebirds 2020	Shorebird long-term data count	The Shorebirds 2020 database comprises the most complete shorebird count data available in Australia. The data have been collected by volunteer counters and BirdLife Australia staff for approximately 150 roosting and feeding sites, mainly in coastal Australia. The data goes back as far as 1981 for key areas.	Gippsland Lakes, Ninety Mile Beach	S5 S7
Taylor & Roe (2005)	Study on the Little tern population on Rigby Island, Gippsland Lakes	A study of the feeding ecology of Little terns Sterna albifrons sinensis breeding on Rigby Island, Gippsland Lakes. Includes data from the Victorian Little Tern Task Force on	Rigby Island, Gippsland Lakes	S5 S7 S10

Reference	Description	Summary	Relevant Location/s	Relevant scientific module
		Little tern numbers and breeding success between 1977 and 2002.		
VFA	Commercial Fish Production Information Bulletin	Victorian catch and effort data extends back to 1978/79.	Victorian fisheries	S6
Warry & Hindell (2012)	Fish Assemblages and Seagrass Condition of the Gippsland Lakes	Following a bloom of the blue-green alga in the Gippsland Lakes in 2007 - 2008, there was a widespread decline of seagrass over the same period. The Gippsland Lakes and Catchment Taskforce were concerned at the potential decline in seagrass within the lakes, and undertook an assessment of the condition of seagrass (and associated fish assemblages).	Gippsland Lakes	S8 S10
Warry *et al*. (2013)	Seagrass and Fish of the Gippsland Lakes	A summary presentation for the Gippsland Lakes Ministerial Advisory Committee	Gippsland Lakes	S10
West *et al.* (2015)	Survey of Recreational Fishing in New South Wales and the ACT, 2013/14	A state-wide survey in NSW to measure changes that had occurred since the NRIFS.	NSW	S6
NSW DPI online resources	Online marine environment resources tool	Access to NSW online data with respect to environmental clues for the marine and coastal habitats of NSW	NSW	S5 S6 S7 S8
Creese *et al* (2009)	Mapping of the habitats of NSE Estuaries	Detailed habitats mapping for all NSW estuaries with data collected as part of the state-wide estuary management program	NSW	S7 S8
Birch *et al.* (2018)	Benthic assemblages in southern NSW estuaries	Includes an extensive biological and chemical data set from southern NSW estuaries with descriptions of the relationships between the two.	NSW	S7
Taylor *et al* (2018)	Mangroves and fisheries in southern NSW estuaries	Mangroves and fisheries in southern NSW estuaries	NSW	S5 S8
Davis *et al.* (2016)	Classification scheme for subtidal habitats in NSW estuaries.	Allows for a comparison between the before and after situation with respect to subtidal benthic habitats in NSW estuaries.	NSW	S7
West *et al* (2016)	Estuarine fisheries data for recreational angling	Long term data set with regard to recreational fisheries in southern NSW that can be sued to compare with past spill data.	NSW	S5

Reference	Description	Summary	Relevant Location/s	Relevant scientific module
AFMA (2019)	Commonwealth catch data for Commercial fisheries in Australia https://data.gov.au/dataset/reported-landed-annual-catch-from-commonwealth-fisheries	Long term data set with regard to Commercial fisheries in Australia.	All areas	S5
VFA (2019)	Victorian commercial Fisheries Catch Data https://vfa.vic.gov.au/commercial-fishing/commercial-fish-production	Commercial catch data for the state of Victoria covering all fisheries and broken down by fishery and region.	VIC	S5
NSWDPI (2019)	NSW Commercial catch and effort reporting https://www.dpi.nsw.gov.au/fishing/commercial/catch-effort	Commercial catch data for the state of New South Wales covering all fisheries and broken down by fishery and region	NSW	S5
IMAS (2019)	Tasmanian Commercial Fishery Catch and Effort Data http://www.imas.utas.edu.au	Commercial catch data for the state of Tasmania covering all fisheries and broken down by fishery and region	TAS	S5
SEED (2019)	NSW government shared resource for environmental data https://www.seed.nsw.gov.au/	Detailed mapping of NSW biological and environmental data	NSW	S5 S6 S7 S8
TAFI (2019)	Mapping of Tasmania's marine environments	Detailed mapping and datasets for Tasmania's marine and coastal environments. Includes a fisheries, subtidal vegetation and habitats, intertidal areas and megafauna and shorebirds.	Tas	S5 S6 S7 S8
UTAS (2019)	Mapping of Tasmania's marine environments	Detailed mapping and data on Tasmania's marine environments	Tas	S5 S6 S7 S8
Lucieer *et al* (2007)	Survey of marine habitats by SeaMap Tasmania	Detailed mapping and data on Tasmania's marine environments	Tas	S5 S6 S7 S8
Edyvane (2016)	Mapping of Tasmanian Coastal Waters: Marine Habitat Mapping	Marine Habitat Mapping	Tas	S6 S7 S8

Appendix C: Environmental Values and Sensitivities

Environmental values and sensitivities

The monitoring program responding to a spill is dependent on the types of environmental, social and economic values potentially affected by a spill. Those sensitivities identified by in the Environment Plan (EP) as being present in the Potentially Exposed Area (PEA) are summarised in Table C-1. Linkages between environmental sensitivities, their location, oil spill response options for spill scenarios and OSMP studies are also shown in this table.

Scope of the monitoring program

The OSMP modules provide for the rapid assessment of the extent of spread of hydrocarbons from a Level 2 or Level 3 spill and effects on the environment of the spilt hydrocarbons as well as any spill response activities that may be used in the clean-up of the spill. The modules provide for the rapid assessment of impacted and potentially affected wildlife including those listed as Matters of National Environmental Significance (MNES) und the EPBC Act (1999). These modules were based on the spill impact assessment in the EP and probable exposure pathways and the likelihood of contact with the identified sensitive receptors.

Table C-1: Sensitivities within Level 3 Hydrocarbon Spill PEA with Monitoring Strategies and Potential OSMP Response Measures to be adopted

Environment	Legislative category	Location	Marine Receptors											Coastal Receptors														
			Marine Open Water	Cetaceans/Dugongs	Seals	Turtles	Seabirds (Protected)	Other Birds	Protected Sharks/Fish or Rays	Other Sharks, Fish of Rays	Sub-tidal Invertebrates	Plankton	Commercial and Recreational Fisheries	Inter-tidal Invertebrates	Macrophytes (Kelp/Giant Kelp)	Seal s (Marine) Colonies/Haul-out (Shoreline)	Shoreline and Wetland Birds	Penguin Colonies	Corals	Mangroves	Saltmarsh	Emergent/Sub-tidal Vegetation (Seagrass)	Sheltered Inter-tidal Flats	Rip-Rap	Sand Beaches	Inter-tidal Rocky Platforms	Sub-tidal Reefs	Exposed Rocky Headlands
		Scientific Module (SM)	**01 02**	**04 06**	**04 06**	**04 06**	**04 06**	**04 06**	**07**	**07**	**07**	**02**	**04 05**	**07**	**07**	**04 06**	**04 06**	**04 06**	**04**	**08 09**	**08 09**	**04**	**01**	**01**	**01**	**01**	**04**	**07**
OFFSHORE	COMMONWEALTH Reserves	Australian Whale Sanctuary	X	X	X	X	X	X	X	X	X	X	X														X	
		East Gippsland Australian Marine Park (AMP)	X	X			X	X		X		X																
		Beagle AMP	X	X	X		X	X		X	X	X															X	
		Flinders AMP	X	X			X		X	X	X	X																
		Freycinet AMP	X	X			X			X		X																
		Jervis AMP	X	X						X		X															X	
		Hunter AMP	X	X			X		X	X		X															X	
		Cod Grounds AMP	X	X			X		X	X		X																
		Solitary Islands AMP	X	X			X		X	X		X																
		Central Eastern AMP	X	X			X		X	X		X																
		Lord Howe AMP	X	X		X	X	X	X	X		X							X									
		Zeehan AMP	X	X			X			X		X																
		Apollo AMP	X	X			X			X		X																
		Boags AMP	X				X	X		X		X																
		Franklin AMP	X				X			X		X																
		Huon AMP	X	X	X		X			X		X																
	STATE Reserves	Wilsons Promontory MP & MNP (VIC)[3]	X	X		X	X	X	X	X	X	X				X	X	X				X				X	X	X
		Ninety Mile Beach MNP (VIC)	X	X	X	X	X	X	X	X	X	X					X								X			
		Beware Reef MS (VIC)	X	X			X	X	X	X	X	X			X	X	X									X	X	X
		Point Hicks MNP(VIC)	X	X		X			X	X	X	X			X		X								X	X	X	X
		Cape Howe MNP (VIC)	X	X	X	X	X	X		X		X		X			X								X	X	X	
		Bunurong MNP (VIC)	X							X	X	X		X			X								X		X	X
		Cape Byron MP (NSW)	X	X		X	X	X	X	X	X	X					X		X						X		X	
		Solitary Islands MP (NSW)	X	X		X	X		X	X	X	X					X								X	X	X	
		Batemans MP[4] (NSW)	X	X		X	X	X	X	X	X	X			X		X			X	X	X				X	X	X
		Jervis Bay MP (NSW)		X	X	X	X	X	X	X	X	X		X	X		X			X		X			X		X	
		Port Stephens-Great Lakes MP (NSW)	X	X		X	X		X	X	X	X			X					X	X	X				X	X	

[3] This includes the Anser, Kanowna and Glendinnie Groups of Islands which lie off Wilsons Promontory and the terrestrial National Park Component to the high water mark (i.e. inter-tidal zone). This is common for ALL Victorian National Marine Parks & Sanctuaries

[4] Includes shoreline estuaries and creeks to the limit of tidal influence between Bawley Point and Wallaga Lake.

Environment	Legislative category	Location	Marine Receptors											Coastal Receptors														
			Marine Open Water	Cetaceans/Dugongs	Seals	Turtles	Seabirds (Protected)	Other Birds	Protected Sharks/Fish or Rays	Other Sharks, Fish of Rays	Sub-tidal Invertebrates	Plankton	Commercial and Recreational Fisheries	Inter-tidal Invertebrates	Macrophytes (Kelp/Giant Kelp)	Seal s (Marine) Colonies/Haul-out (Shoreline)	Shoreline and Wetland Birds	Penguin Colonies	Corals	Mangroves	Saltmarsh	Emergent/Sub-tidal Vegetation (Seagrass)	Sheltered Inter-tidal Flats	Rip-Rap	Sand Beaches	Inter-tidal Rocky Platforms	Sub-tidal Reefs	Exposed Rocky Headlands
		Scientific Module (SM)	**01 02**	**04 06**	**04 06**	**04 06**	**04 06**	**04 06**	**07**	**07**	**07**	**02**	**04 05**	**07**	**07**	**04 06**	**04 06**	**04 06**	**04**	**08 09**	**08 09**	**04**	**01**	**01**	**01**	**01**	**04**	**07**
		Lord Howe MP & World Heritage Area (NSW)	X	X	X	X	X	X	X	X	X	X			X				X	X	X	X			X	X	X	X
OFFSHORE	STATE	NSW Aquatic Reserves (Sydney Area)						X	X	X	X	X			X		X					X			X		X	X
		Kent Group Marine Reserve (TAS)	X	X	X		X	X		X	X	X				X											X	X
		Maria Island Marine Reserve & National Park (TAS)	X												X										X		X	X
SHORELINE	International	Gippsland Lakes (RAMSAR)[5]					X	X						X			X			X	X	X		X	X			
		Gippsland Lakes Coastal Park (VIC)[6]		X	X		X	X	X	X	X	X	X	X			X								X			
		Corner Inlet MNP, MCP & Nooramunga MCP (RAMSAR)							X	X				X			X			X	X	X	X		X			X
		Towra Point Nature Reserve RAMSAR (NSW)															X			X	X	X						
		Hunter Estuary Wetlands RAMSAR (NSW)															X			X	X				X			
		Elizabeth & Middleton Reef RAMSAR	X	X		X	X			X									X			X						
		Moulting Lagoon RAMSAR (TAS)															X				X	X	X					
		Lavinia Nature Reserve RAMSAR															X				X							
		Flood Plain Lower Ringarooma River RAMSAR															X				X							
	TERRESTRIAL PARKS	Croajingalong Biosphere Reserve and NP[7]					X	X									X	X			X	X	X		X	X		X
		Wilsons Promontory Biosphere and NP							X								X	X							X			X
		Cape Conran Coastal Park (VIC)[8]					X	X	X					X			X					X			X			X
		Gabo Island Harbour SMA & Light Station Reserve (VIC)								X						X	X	X									X	X
		Mallacoota SMA (VIC)							X					X			X				X	X	X		X			X
		The Skerries SMA														X	X									X		X
		Ben Boyd NP/ Nadgee Nature Reserve (NSW)															X			X	X	X			X			X
		Bournda NP (NSW)															X				X	X		X	X			X
		Mimosa Rocks NP (NSW)															X				X	X			X			X
		Montague Island Nature Reserve (NSW)	X				X		X							X		X										X
		Eurobodalla NP (NSW)															X			X	X	X			X			X
		Murramarang NP (NSW)															X								X			X

[5] This includes Lakes Entrance and Lakes Tyers Estuary System

[6] The northern section of Gippsland Lakes Coastal Park is part of the Gippsland Lakes RAMSAR site. RAMSAR site extends to the adjacent coastline. Adjacent marine sensitivities to the Coastal Park (i.e. white shark BIA, seabird BIA, Southern Right Whale BIA) are also included in this listing.

[7] Park includes the Skerries (excluded from this listing and included in Skerries SMA), Wingan Inlet, Tamboon Inlet, Mallacoota Inlet Special Management Area (excluded from this listing and included in Mallacoota SMA), Bekta River, Cape Howe and Nadgee Wilderness Area

[8] Cape Conran Coastal Park includes Sydenham Inlet and Yeerung River Estuary.

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SHORELINE	TERRESTRIAL PARKS	Meroo NP (NSW)															X								X			X
		Conjola NP (NSW)															X				X				X			X
		Jervis Bay NP (NSW)															X								X	X		X
		Seven Mile Beach NP (NSW)															X						X		X			X
		Royal NP (NSW)									X						X			X		X			X			X
		Botany Bay/Kamay NP (NSW)									X						X				X							
		Sydney Harbour NP (NSW)																X			X				X	X		X
		Ku-ring-gai Chase NP																X										X
		Bouddi NP (NSW)																		X	X	X			X			X
		Wyrrabalong NP (NSW)								X							X					X			X	X		X
		Worimi NP (NSW)															X								X			X
		Tomaree NP (NSW)															X			X	X	X			X	X		X
		Myall Lakes NP (NSW)					X										X			X	X	X	X		X			
		Booti NP (NSW)																		X	X	X	X		X			X
		Saltwater NP (NSW)					X										X			X	X	X			X			
		Crowdy Bay NP (NSW)															X			X	X				X			X
		Limeburners Creek NP (NSW)															X			X	X				X		X	
		Goolawah NP (NSW)															X								X	X		X
		Hat Head NP (NSW)															X								X			X
		Kent Group National Park & Judgment Rocks NR (TAS)					X									X									X			X
		Strezlecki NP (TAS)					X										X											X
		Mt William NP (TAS)					X										X								X			X
		Narawntapu NP (TAS)															X								X			X
		West Moncoeur Island Nature Reserve and East Moncoeur Island (TAS)					X									X												X
		Curtis Island Nature Reserve and Devils Tower Nature Reserve (TAS)																										
		Hogan Island Group (TAS)																										