# Stag Field Operations Oil Pollution Emergency Plan

## GF-70-PLN-I-00001

**Rev 9**

| | |
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**UNCONTROLLED WHEN PRINTED**
Please refer to the Jadestone Energy MIS for the latest revision.

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| Stag OIM | Australian Maritime Safety Authority |
| AMOSC | WA Department of Transport |

**CONTENTS**

**KEY DOCUMENTS** ..... **8**

**Quick Reference Information** ..... **10**

**Part A – Regulatory** ..... **12**

**1. PURPOSE** ..... **12**

**2. OBJECTIVES** ..... **12**

**3. SCOPE** ..... **12**

**4. SPILL SCENARIOS AND CONTEXT** ..... **13**

**4.1 Marine Diesel** ..... **13**

**4.2 Stag Crude Oil** ..... **14**

**5. PREDICTED SPILL TRAJECTORY AREA, SENSITIVITIES AND RESPONSE PRIORITIES** ..... **16**

**5.1 The Influence of Chemical Dispersant Use on Projected Spill Trajectory Area** ..... **17**

**6. APPLICABILITY OF RESPONSE STRATEGIES** ..... **18**

**6.1 Operational NEBA** ..... **23**

**6.2 Response Resource Planning** ..... **23**

**7. RESOURCES REQUIRED FOR A WCS SPILL EVENT AT STAG** ..... **25**

**8. SOURCE CONTROL STRATEGY** ..... **32**

**8.1 Initiation and Termination Criteria** ..... **32**

**8.2 Tasks for Process Incident** ..... **32**

**8.3 Tasks for Vessel Collision** ..... **33**

**9. OPERATIONAL MONITORING STRATEGY** ..... **34**

**9.1 Common Operating Picture (COP)** ..... **34**

**9.2 Operational Monitoring Plan** ..... **34**

**9.3 Initiation and Termination Criteria** ..... **34**

**9.4 Tactics** ..... **35**

9.4.1 Tracking Buoy Deployment ..... 35

9.4.2 Vessel Surveillance ..... 35

9.4.3 Aerial Surveillance ..... 36

9.4.4 Oil Spill Trajectory Modelling ..... 37

9.4.5 Satellite Imagery ..... 37

9.4.6 Fluorometry ..... 38

9.4.7 Shoreline and Coastal Habitat Assessment ..... 38

9.4.8 Resource Rationale for Operational Monitoring ..... 39

**10. CHEMICAL DISPERSION STRATEGY** ..... **40**

**10.1 Initiation and Termination Criteria** ..... **40**

**10.2 Chemical Dispersant Action Plan** ..... **41**

**10.3 Dispersant Selection** ..... **41**
**10.4 Tasks for Mobilising Chemical Dispersants** ..... **41**
**10.5 Tasks for Aerial Application of Chemical Dispersants** ..... **43**
**10.6 Tasks for Vessel-Based Application of Chemical Dispersant** ..... **43**
**10.7 Chemical Dispersant Application Area and Timing** ..... **44**
**10.8 Dispersant Effectiveness Monitoring** ..... **44**
**10.9 Use of Dispersant in WA State Waters** ..... **45**
**10.10 Resource Rationale for Chemical Dispersant Application** ..... **45**
10.10.1 **Calculations** - Volume of oil to be treated ..... 46
10.10.2 **Calculations - Volume of dispersant required** ..... 46
10.10.3 **Assumptions - Fixed wing aerial dispersant (Air Tractor) operations** ..... 46
10.10.4 **Assumptions - Vessel based dispersant operations** ..... 46
10.10.5 **Dispersant budget** ..... 46
**11. CONTAINMENT AND RECOVERY STRATEGY** ..... **48**
**11.1 Initiation and Termination Criteria** ..... **48**
**11.2 Tactics** ..... **48**
**11.3 Tasks for Containment and Recovery** ..... **48**
**11.4 Tasks for Offshore Waste Storage and Collection** ..... **49**
**11.5 WA DoT Requirements for Offshore Decanting of Waste Water** ..... **49**
**11.6 Resource Rationale for Containment and Recovery** ..... **50**
11.6.1 Amount of oil available to recover ..... 50
11.6.2 Containment of oil ..... 50
11.6.3 Resources ..... 51
**12. PROTECTION AND DEFLECTION STRATEGY** ..... **52**
**12.1 Initiation and Termination Criteria** ..... **52**
**12.2 Tactics** ..... **52**
**12.3 Priority Receptors** ..... **53**
**12.4 Resource Rationale for Protection and Deflection** ..... **54**
**13. SHORELINE CLEAN-UP STRATEGY** ..... **55**
**13.1 Initiation and Termination Criteria** ..... **55**
**13.2 Tactics** ..... **55**
**13.3 Tasks** ..... **55**
**13.4 Resource Rationale for Shoreline Clean-Up** ..... **57**
**13.5 Priority receptors** ..... **57**
**13.6 Shoreline Clean-up Waste** ..... **58**
13.6.1 Accessible shorelines ..... 59
13.6.2 Remote Locations/Islands Waste Management ..... 59

14. OILED WILDLIFE RESPONSE ..... 62
14.1 Initiation and Termination Criteria ..... 63
14.2 Wildlife Priority Protection Areas ..... 63
14.3 Magnitude of Wildlife Impact and Oiled Wildlife Response ..... 65
15. REVIEW OF OPEP ..... 66
16. CONTROLS ..... 67
Part B – Response ..... 79
17. INITIAL INCIDENT ACTION PLANS ..... 79
17.1 Level 1 Initial Incident Action Plan ..... 79
17.2 Level 2 Initial Incident Action Plan ..... 80
17.3 Notification and Activation ..... 83
17.4 Source Control Action Plan ..... 85
17.5 Operational Monitoring Plan ..... 86
17.6 Surface Chemical Dispersant Action Plan ..... 95
17.7 Containment and Recovery Action Plan ..... 106
17.8 Protection and Deflection Action Plan ..... 110
17.9 Shoreline Clean-up Action Plan ..... 115
17.10 Oiled Wildlife Plan ..... 123
18. REFERENCES ..... 128
19. ABBREVIATIONS ..... 130
20. APPENDICES ..... 132
APPENDIX A1 – Observer Logs ..... 133
APPENDIX A2 - Bonn Agreement Oil Appearance Code ..... 143
APPENDIX A3 – Shoreline Assessment Form ..... 152
APPENDIX A4 – Diesel properties ..... 156
APPENDIX A5 – Stag Crude Assay ..... 158
APPENDIX A6 – Regulatory Notifications ..... 160
APPENDIX A7 - Incident Management Guidance ..... 164
1. Purpose ..... 164
2. Scope ..... 164
3. Principles ..... 164
4. Define the spill level ..... 165
5. Interface with External Plans ..... 166
5.1 AMOSPlan ..... 167
5.2 National Plan ..... 167
5.3 WA DoT & State Hazard Plan (MME) ..... 168

5.4 Western Australia Oiled Wildlife Plan (WAOWRP) ..... 170
5.5 Western Australia Oiled Wildlife Manual (WA OWR Manual) ..... 170
6. Risks ..... 170
7. Incident Management Structure ..... 171
7.1 Incident Response Team– Tactical Level ..... 171
7.2 Incident Management Team – Operational Level ..... 172
7.3 Group Crisis Team – Strategic Level ..... 172
8. Incident Management ..... 172
8.1 IMT Activation Process ..... 175
8.2 Forward Operating Base (FOB) ..... 176
8.3 IMT and FOB External Support Arrangements ..... 176
8.4 Cost Recovery ..... 177
9. IMT Roles and Responsibilities ..... 178
DUTY CARD 1: IMT LEADER ..... 178
DUTY CARD 2: OPERATIONS ..... 181
DUTY CARD 4: LOGISTICS ..... 183
DUTY CARD 3: PLANNING ..... 185
10. Incident Assessment & Orientation ..... 190
10.1 Understand & Assess the Situation ..... 190
10.2 Initial Briefing ..... 190
10.3 Notifications ..... 191
11. Oil Spill Response Cycle ..... 191
11.1 Gaining Situational Awareness ..... 191
11.2 Assess Appropriate Strategies ..... 191
11.3 OPEP Actions Tables ..... 192
11.4 Incident Action Plan ..... 192
11.5 Monitoring Performance of IAP ..... 193
11.6 Net Environmental Benefit Analysis (NEBA) ..... 193
12. Further IMT Management Guidance ..... 194
13. IMT Training and Competency ..... 194
13.1 IMT Exercise and Testing Program ..... 196
14. Scientific Monitoring ..... 196
14.1 Objectives ..... 196
14.2 Industry Guidelines ..... 196
14.3 Monitoring Background ..... 196
14.4 Revision of Monitoring Programs ..... 197
14.5 Scientific Response Monitoring Service Providers ..... 198

**14.6 Consultation.....198**

## TABLE OF FIGURES

Figure 3-1: Schematic of the Stag Field Facilities..... 12
Figure 5-1: Location of Sensitive Receptors Used in Spill Modelling..... 16
Figure 10-1: Effective and Ineffective Dispersant Application..... 45

## TABLE OF TABLES

Table 3-1: Stag CPF and the CALM Buoy Coordinates..... 13
Table 3-2: Distances from Stag Facility to Key Regional Features..... 13
Table 4-1: Identified Scenarios for Hydrocarbon Releases to the Marine Environment..... 14
Table 6-1: Applicability of Oil Spill Response Strategies..... 19
Table 6-2: Oil Spill Response Equipment..... 24
Table 7-1: Worst-case Oil Spill Scenario Response Needs Assessment..... 25
Table 9-1: Resource Rationale for Shoreline Assessment Personnel..... 39
Table 10-1: Initiation and Termination Criteria Chemical Dispersant Tactics..... 40
Table 10-2: Chemical Dispersant Inventory as at March 2023..... 42
Table 10-3: Dispersant application budget..... 47
Table 11-1: Containment and Recovery Plan Calculation..... 50
Table 12-1: Shoreline protection resource requirements for priority receptors based on stochastic modelling..... 54
Table 13-1: Shoreline clean-up techniques..... 56
Table 13-2: Resource Rationale for Shoreline Clean-up Personnel..... 58
Table 13-3: Shoreline Clean-up Selection Factors by Shoreline Type, Oil Type and Degree of Oiling..... 60
Table 14-1: WAOWRP Guide for rating the wildlife impact of an oil spill (DBCA, 2022a)..... 62
Table 14-2: Initiation and Termination Criteria..... 63
Table 14-3: Wildlife Priority Protection Areas..... 63
Table 16-1: Operational Performance Standards and Measurement Criteria..... 67

# KEY DOCUMENTS

*Company-wide:*

| | |
|---|---|
| **JADESTONE ENERGY INCIDENT MANAGEMENT TEAM RESPONSE PLAN (IMTRP)**<br><br>JS-70-PLN-F-00008 | • Risks and Hazards<br>• Incident Management Structure<br>• Incident Management Process<br>• Incident Management Team<br>• Incident initial assessment and orientation<br>• Information management<br>• Stand down and debrief<br>• Administration<br>• Statutory requirements<br>• Defining the spill level<br>• Oil spill response cycle<br>• Termination and recovery<br>• Oiled Wildlife Response<br>• Scientific Monitoring<br>• Waste Management |

*Facility-specific:*

| | |
|---|---|
| **[This document]**<br><br>**STAG FIELD OPERATIONS OIL POLLUTION EMERGENCY PLAN (OPEP)**<br><br>JS-70-PLN-I-00001 | • Incident Action Plan (First 48-hour operational period)<br>• Stag Facility Operations and oil spill risks<br>• Sensitivities and Response Priorities<br>• Resource Requirements<br>• Response Strategies:<br>  ○ Source Control<br>  ○ Operational Monitoring<br>  ○ Chemical Dispersant<br>  ○ Containment and Recovery<br>  ○ Protection and Deflection<br>  ○ Shoreline Clean-up<br>  ○ Oiled Wildlife Response |

| | |
|---|---|
| | • Enviornmental Performance Standards and Measurement Criteria<br>• Appendices:<br>  ○ Observation logs<br>  ○ Shoreline Assessment Form<br>  ○ Oil on Water Classification<br>  ○ Diesel fuel properties<br>  ○ Stag Crude Assays<br>  ○ Regulatory Notifications<br>  ○ Incident Management Guidance |

## QUICK REFERENCE INFORMATION

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

| Parameter | Information | | Further Information |
|---|---|---|---|
| **Facility Name** | Stag Field Production and Export Facility (Stag Facility) | | Section 3 and Section 1.2 and 3 of EP |
| **Location (Lat/Long and Easting Northing)** | Refer to Table 3-1 | | |
| **Title/s (Block/s)** | Permit area WA-15-L | | N/A |
| **Water Depth** | 49 m | | Section 1.4 of EP |
| **Hydrocarbon Type/s and International Tanker Owners Pollution Federation (ITOPF) Classification** | Marine Diesel Oil (MDO): Group 2<br>Stag Crude Oil: Group 3 | | Section 4 |
| **Worst Case Spill Scenario Reference Number** | **Scenario** | **Worst case spill volume** | Section 4 |
| *Level 1* | | | |
| **3** | Surface release of Stag Crude from MBC activation during offtake activity at floating hose | 0.07 $m^3$ | |
| *Level 2* | | | |
| **1** | Subsea release of Stag Crude from the underbuoy hose at the CALM buoy (30 min release) | 86.5 $m^3$ | |
| **2** | Pinhole leak of Stag Crude - subsea pipeline or flowline from damage or corrosion (12 hour release) | 85 $m^3$ | |
| **4** | Surface release of Stag Crude from damage to the floating hose between the CALM buoy and third-party tanker (30 mins) | 17.2 $m^3$ | |
| **5** | Surface release of MDO from support vessel due to a vessel collision/ Loss of integrity | 80-250 $m^3$ | |

| Parameter | Information | | Further Information |
|---|---|---|---|
| **6** | Subsea release of Stag Crude due to loss of pipeline integrity (12 hour release) | 120 $m^3$ | |
| **Weathering Potential** | **Stag Crude** is a moderately persistent hydrocarbon with a density slightly lower than seawater. Weathering under low (5 knots) and constant wind indicates that approximately 14% of the oil volume would evaporate within 12 hours. The remaining oil would weather at increasingly slower rate as the mixture becomes proportionally enriched by compounds with longer carbons chains, hence higher boiling points. Once all volatile compounds have evaporated, only the residual compounds will remain and weathering rates would slow significantly. After one day approximately 40 to 80% is predicted to remain on the sea surface (% dependent upon wind variability). This reduces to approximately 32 to 68% of the crude remaining on the surface after seven days.<br>**MDO** is a mixture of volatile and persistent hydrocarbons with low viscosity. It will spread quickly and thin out to low thickness levels, thereby increasing the rate of evaporation. Up to 60% will generally evaporate over the first two days. Approximately 5% is considered "persistent hydrocarbons", which are unlikely to evaporate and will decay over time.<br>MDO has a strong tendency to entrain into the upper water column (0–10 m) (and consequently reduce evaporative loss) in the presence of moderate winds (> 10 knots) and breaking waves. MDO re-surfaces when the conditions calm. It does not form mousse. | | Section 4 |
| **Priority Receptors** | • Dampier Archipelago;<br>• Montebello Islands;<br>• Lowendal Islands;<br>• Barrow Island; and<br>• Eighty Mile Beach. | | Section 5 |

# PART A – REGULATORY

## 1. PURPOSE

The purpose of this Oil Pollution Emergency Plan (OPEP) is to detail Jadestone Energy's oil pollution preparedness and response arrangements for the Stag Field Operations Environment Plan (EP) (GF-70-PLN-I-00002) (the Stag Field Operations EP).

## 2. OBJECTIVES

The objectives of this OPEP in relation to the unplanned release of hydrocarbons arising from activities within the Stag Field are:

- To safely limit the adverse environmental effects to the marine environment;
- To define the capability requirements for response activities;
- To demonstrate arrangements for sufficient capability to respond in a timely manner and for the duration of the oil pollution incident; and
- To provide guidance to the IMT in relation to spill response implementation.

## 3. SCOPE

This OPEP applies to oil spill risks associated with operational activities at the Stag Field described in Section 8.4 to 8.6 of the Stag Field Operations EP. Oil spill risks associated with drilling activities are not within the scope of this plan. A schematic of the Stag Field is provided in Figure 3-1.

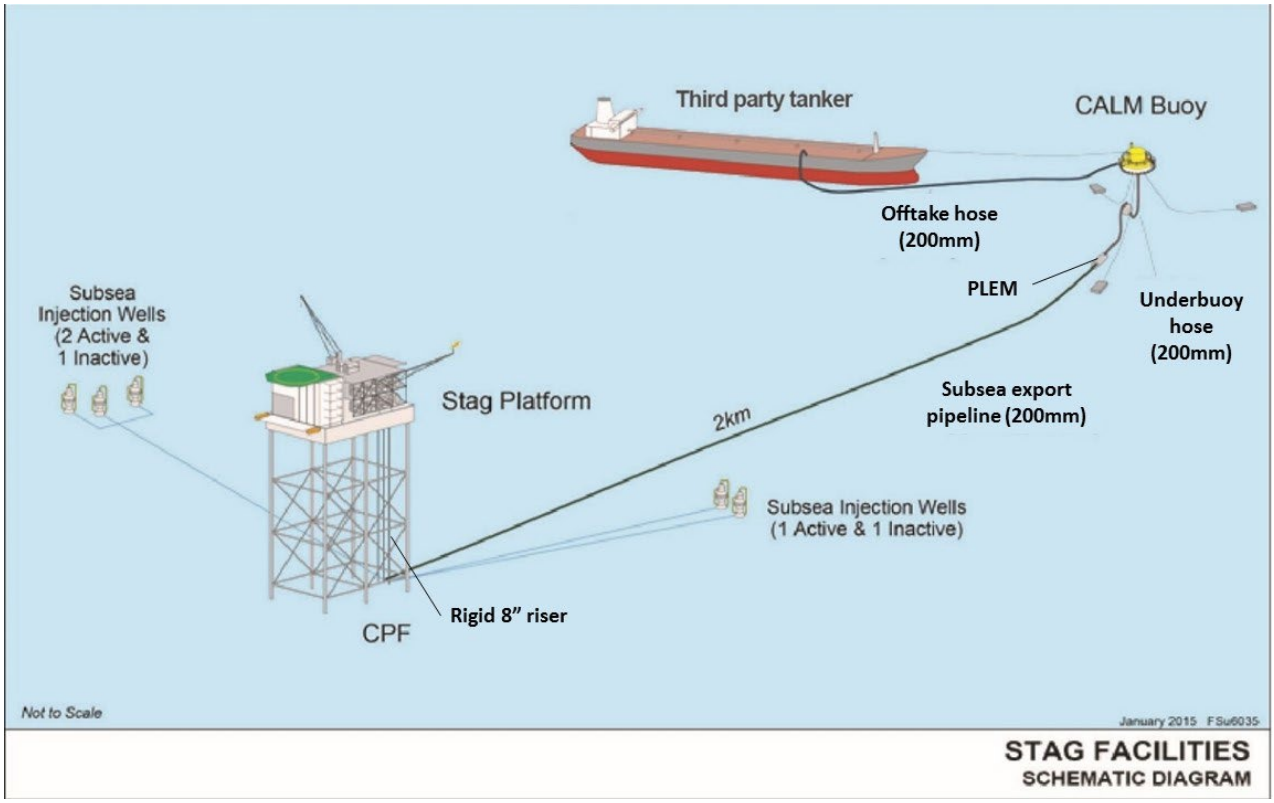



**Figure 3-1: Schematic of the Stag Field Facilities**

The Stag Field is located approximately 32 km northwest of the Dampier Archipelago and 82 km northeast from Varanus Island, in approximately 49 m water depth. Latitude and Longitude of Stag Central Processing Facility (CPF) and the CALM buoy are provided in Table 3-1.

**Table 3-1: Stag CPF and the CALM Buoy Coordinates**

| Facility | Latitude | Longitude |
|---|---|---|
| Stag CPF | 20° 17.413' South | 116° 16.517' East |
| CALM Buoy | 20° 16.315' South | 116° 16.571' East |

The geographical scope of this OPEP, which effectively covers the greatest area identified by stochastic spill modelling, extends approximately 500 km north, 500 km west, 350 km north-east, 300 km south-west and 40 km south of the Operational Area.

Section 5 of the Stag Field Operations EP (GF-70-PLN-I-00002) includes a comprehensive description of the existing environment in the Operational Area and the potential spill trajectory area (as predicted by spill fate modelling). A list of the nearest regional features is provided in Table 3-2.

**Table 3-2: Distances from Stag Facility to Key Regional Features**

| Regional Feature | Distance from Stag CPF |
|---|---|
| Dampier Archipelago | 32 km (17.3 Nm) |
| Closest Montebello Island | 75 km (40.5 Nm) |
| Varanus Island | 82 km (44.3 Nm) |
| Barrow Island | 96 km (51.8 Nm) |

## 4. SPILL SCENARIOS AND CONTEXT

An environment risk assessment (ERA) was undertaken as part of the Stag Field Operations EP. Workshops were conducted that identified possible hazards with the potential for routine or non-routine (unplanned) loss of hydrocarbons to the marine environment. Each of these hazards has been assessed with selected control measures to reduce the likelihood of hydrocarbon losses to the marine environment to ALARP.

This OPEP has been prepared for the spill scenarios as summarised in Table 4-1 with a focus on the Level 2 scenarios. The scenarios modelled represent most likely and worst-case scenarios as defined by the National Plan for Maritime Emergencies (AMSA, 2020), however Jadestone understands that other scenarios are possible, such as a Level 1 spill, and as such Jadestone has made provisions in spill response to guide decision makers for all types of hydrocarbon spillages, at any Level.

During the Stag operations activities, the following hydrocarbons may be unintentionally released to the marine environment: oily water, marine diesel, hydraulic oils and lubricating fluids, or crude oil. The following sub-sections describe the spill modelling parameters.

### 4.1 Marine Diesel

In the marine environment, marine diesel will behave as follows:

- Will spread rapidly to low thickness levels in the direction of the prevailing wind and waves;
- Evaporation is the dominant process contributing to the fate of spilled diesel from the sea surface and will account for 60 to 80% reduction of the net hydrocarbon balance within 48 to 72 hours;
- The evaporation rate of diesel will increase in warmer air and sea temperatures such as those present around Stag platform; and

- Due to the low specific gravity of marine diesel, it does not sink and accumulate on the seafloor as pooled or free oil unless adsorption occurs with sediment. However, it is possible for the diesel oil that is dispersed by wave action to form droplets that are small enough to be kept in suspension and moved by the currents.

ITOPF (2023) categorises diesel as a light group II hydrocarbon. In the marine environment, a 5% residual of the total quantity of diesel spilt will remain after the volatilisation and solubilisation processes associated with weathering. For details on the properties of marine diesel, refer to Appendix A4. Refer to Section 8.6.2 of the EPs for a further description of marine diesel properties, modelling and impact.

### 4.2 Stag Crude Oil

Stag oil is a medium crude composed of hydrocarbons that have a wide range of boiling points and volatiles at atmospheric temperatures, and which will begin to evaporate at different rates on exposure to the atmosphere. Change in the mass balance calculated for Stag crude weathering under low (5 knots) and constant wind indicates that approximately 14% of the oil volume would evaporate within 12 hours. The remaining oil would weather at increasingly slower rate as the mixture becomes proportionally enriched by compounds with longer carbons chains, hence higher boiling points. Once all volatile compounds have evaporated, only the residual compounds will remain, and weathering rates would slow significantly. After one day approximately 40 to 80% is predicted to remain on the sea surface (% dependent upon wind variability). This reduces to approximately 32 to 68% of the crude remaining on the surface after seven days.

Further detail on Stag Crude oil is provided in Appendix A5.

**Table 4-1: Identified Scenarios for Hydrocarbon Releases to the Marine Environment**

| Scenario Level; Spillage Type and National Plan Defined Level | Scenario No. | Hydrocarbon Type | Source / Cause | Total Potential Volume |
|---|---|---|---|---|
| **Level 1 / Most Likely Spill (MLS)** | | | | |
| An incident which will not have an adverse effect on the public or the environment which can be controlled using resources normally available at the facility or vessel concerned without the need to mobilise the Jadestone Incident Management Team or other external assistance. | 3 | Stag Crude | MBC activation during offtake activity at floating hose (30 mins) | 0.07 $m^3$ |
| **Level 2 / Most Likely Spill (MLS)** | | | | |
| An incident that cannot be controlled using facility resources alone and requires external support and resources to combat the situation;<br>or<br>An incident that can be controlled by the facility, but which may have an adverse effect on the public or the environment. | 1 | Stag Crude | Subsea release from the underbuoy hose at the CALM buoy (30 min release) | 86.5 $m^3$ |
| | 2 | Stag Crude | Pinhole leak in subsea pipeline or flowline from damage or corrosion (12 hour release) | 15 $m^3$ |
| | 4 | Stag Crude | Surface release from damage to the floating hose between the CALM | 17.2 $m^3$ |

| Scenario Level; Spillage Type and National Plan Defined Level | Scenario No. | Hydrocarbon Type | Source / Cause | Total Potential Volume |
|---|---|---|---|---|
| | | | buoy and third-party tanker (30 mins) | |
| | 5 | Diesel fuel | Vessel collision/ Loss of integrity: surface release from maintenance support vessel | 80-250 $m^3$ |
| | 6 | Stag Crude | Subsea release due to loss of pipeline integrity (12 hour release) | 120 $m^3$ |

## 5. PREDICTED SPILL TRAJECTORY AREA, SENSITIVITIES AND RESPONSE PRIORITIES

Results from hydrocarbon spill modelling were compared against the location of key sensitive receptors with high conservation valued habitat or species or important socio-economic/heritage value within the Environment that May be Affected (EMBA). Section 5.6.5 of the Stag Operations EP outlines the criteria for selecting protection priorities.

The five shoreline locations that were identified as priority protection areas based on modelling thresholds described in the Stag Field Operations EP, as shown in Figure 5-1 are:

- Dampier Archipelago;
- Montebello Islands;
- Lowendal Islands;
- Barrow Island; and
- Eighty Mile Beach.

The response strategies identified in this OPEP will be adopted in the IAP process as required to protect the environmental values of this area.

Refer to the Stag Field Operations EP for protection priorities and spill modelling summary including impact descriptions of sensitive locations from surface oil, entrained oil and dissolved aromatic threshold concentrations. Section 5 of the Stag Operations EP describes the existing environment at the operational area and within the potential spill trajectory area, and identifies the protected areas and fauna that may be impacted by a spill.

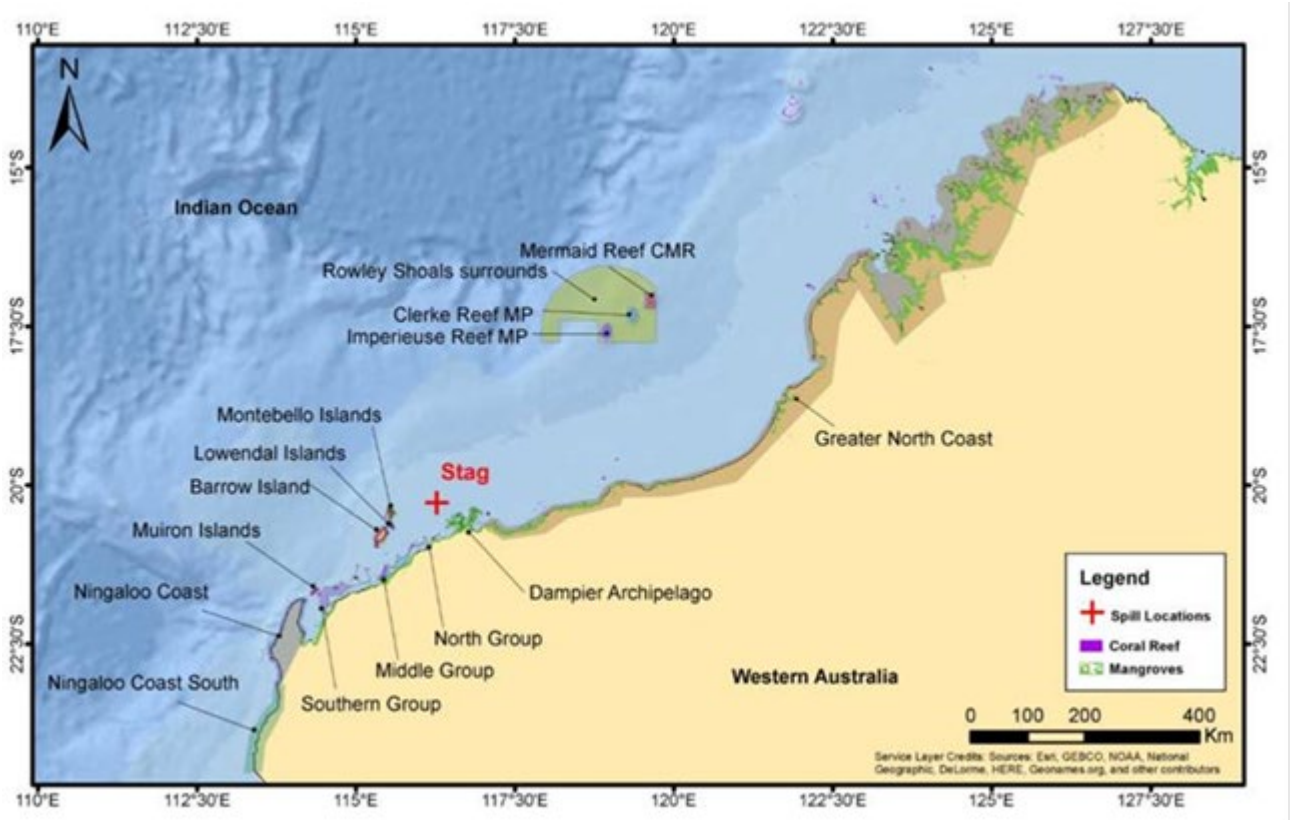



**Figure 5-1: Location of Sensitive Receptors Used in Spill Modelling**

### 5.1 The Influence of Chemical Dispersant Use on Projected Spill Trajectory Area

APASA was commissioned by Quadrant Energy to prepare a report, the Net Environmental Benefit Analysis for the Use of Dispersants (APASA, 2012), to assess whether the application of chemical dispersants reduced the probability of contact to shorelines. Key findings of this report at the time included a reduction in the predicted probabilities for shoreline accumulation exceeding the 100 g/m$^2$ threshold, and greater prediction times to sensitive locations following the application of chemical dispersant, particularly effective during the summer months.

Jadestone commissioned APASA to reanalyse the 2012 study (APASA, 2017) to further assess the effects of hydrocarbon dispersant application for the WCS spill scenario and the proposed dispersant treatment plan (refer Section 10 of the OPEP for the plan). Mass balance distribution results show that the application of the proposed dispersant treatment is predicted to reduce the proportion of released oil that would remain floating on the surface. Therefore, the proportion of oil predicted to be entrained in the water column slightly increases with dispersant application, while the proportion of oil that evaporates is slightly reduced. For the modelling replicate with maximum oil accumulation on shorelines a reduction of the proportion of oil ashore is predicted in some locations.

## 6. APPLICABILITY OF RESPONSE STRATEGIES

The response strategies outlined in this OPEP have been developed by Jadestone utilising risk assessments to identify credible worst case spill scenarios, expected/calculated release rates, known information of hydrocarbon types and behaviour, and expected partitioning of the hydrocarbon within the marine environment with an estimate of the volume of persistent oil.

This information has been modelled to give a theoretical zone of spread that is used to identify potential sensitive receptors and response strategies required to reduce the consequences of a spill to ALARP. The response strategies are assessed using a NEBA process so the most effective response strategies with the lowest environmental consequences can be identified, documented and prepared for.

Table 8-13 in the Stag Field Operations EP describes the decision to adopt or not a spill response strategy, and the potential environmental benefit of that strategy for Stag crude. An ALARP discussion regarding each oil spill response strategy is provided in the Stag Operations EP.

Table 6-1 shows the operational considerations for response strategies and applicability to the two potential oil types that could be spilled, and operational considerations for incident action plans (IAPs).

The response strategies described in Sections 8 to 14 contain both a description of the response strategy and decision-making criteria; and guidance for implementation of the response strategy.

Action Plans and mobilisation of resources to respond to the spill is presented in Part B of this OPEP.

Appendix A7 (Incident Management Guidance) of this document provides a summary of Jadestone Energy's Incident Management Team and guidance on the incident response and management. The response and management is fully detailed in Jadestone's Incident Management Team Response Plan (JS-70-PLN-F-00008).

**Table 6-1: Applicability of Oil Spill Response Strategies**

| OSR strategy | Scenario No. | | | Operational Considerations |
|---|---|---|---|---|
| | 1, 2, 6 (Subsea release Stag Crude) | 3,4 (Surface release Stag Crude) | 5 (Surface release MDO) | |
| Source Control | Primary response strategy | Primary response strategy | N/A | *Scenarios 1,2,3,4,6*<br>Emergency Shutdown Devices will be activated to isolate and control the source of the spill<br>The Stag Incident Response Plan (GF-00_PR-F-00041) will be activated.<br>Implementation of Emergency Pipeline Repair Plan (GF-09-PLN-L-00039) (Pipeline leak scenario).<br>*Scenario 5 - Vessel collision*<br>In the event of a vessel spill, the Vessel Master would revert to the Ship Oil Pollution Emergency Plan (SOPEP), which is a MARPOL requirement for applicable vessels.<br>The SOPEP may include guidance for securing cargo via transfer to another storage area on-board the vessel, transfer to another vessel, or through pumping in water to affected tank to create a water cushion (tank water bottom). Trimming the vessel may also be used to avoid further damage to intact tanks. |
| Operational Monitoring | Primary response strategy | Primary response strategy | Primary response strategy | Surveillance actions are used to monitor and evaluate the dispersion of the released hydrocarbon, and to identify and report on any potential impacts to flora and fauna that may occur while the spill disperses. This strategy has several tactics (e.g. tracking buoys, aerial surveillance, shoreline assessment) and is scalable according to the nature and scale of a spill.<br>There are clear benefits in maintaining situational awareness throughout the duration of a spill event and little or no environmental impact associated with its implementation.<br>Operational monitoring results can also be used to assist in escalating or de-escalating response strategies as required. |
| Chemical Dispersion (Surface) | Secondary response strategy | Secondary response strategy | Not recommended | **Stag Crude:** Modelling results (RPS, 2020) indicate the largest extent of actionable oil (floating oil >10 g/m$^2$) for any scenario (scenario 1) was 35 km from the spill source. Surface chemical dispersants are most effective on hydrocarbons that are at a thickness |

| OSR strategy | Scenario No. | | | Operational Considerations |
|---|---|---|---|---|
| | 1, 2, 6 (Subsea release Stag Crude) | 3,4 (Surface release Stag Crude) | 5 (Surface release MDO) | |
| | | | | of 50-100 g/m$^2$ on the sea surface. Thin layers of spilled hydrocarbons should not be treated with dispersant (EMSA, 2010) as spraying thin sheens can result in an overdose of dispersant.<br>Therefore, the actionable oil area likely to reach the desired thickness of 50-100 g/m$^2$ for effective surface dispersant application will be localised to the spill location. Operational monitoring would be required to help determine if the desired thickness close to the spill location may be achieved. This information would be required to help inform the Operational NEBA which would determine if surface chemical dispersant application would result in a net environmental benefit (Section 17.6).<br>Semi-Quantitative Effectiveness Test (SQT) results for Stag crude, referenced to the analysis of the crude in its present state from reservoir (Stag crude is significantly degraded from reservoir), indicate that chemical dispersants would be best applied (Window of Opportunity) within the first 72 hours (three days) of a spill before the crude becomes too weathered for effective application. The SQT method applied to the Stag crude has shown an average 40% effectiveness of the three types of chemical dispersant available through AMSA and AMOSC on the NWS with the maximum effectiveness of 60%.<br>**MDO:** is not considered a persistent hydrocarbon, and has high natural dispersion rates in the marine environment. Chemical dispersant application is not recommended as a beneficial option for MDO as it has a low probability of increasing the dispersal rate of the spill while introducing more chemicals to the marine environment. |
| Containment and Recovery | Primary response strategy | Primary response strategy | Not recommended | **Stag Crude:** Applicable for Stag Crude as it is a more persistent hydrocarbon and has a relatively slow rate of weathering. The drawbacks of this strategy include production of significant volumes of waste due to the collection of water with floating oil, however this can be mitigated to some extent if decanting is permitted.<br>If metocean conditions are favourable, this strategy would result in the removal of floating hydrocarbons from the environment.<br>**MDO:** Given the fast spreading nature of MDO, and the expected moderate to high sea |

| OSR strategy | Scenario No. | | | Operational Considerations |
|---|---|---|---|---|
| | 1, 2, 6 (Subsea release Stag Crude) | 3,4 (Surface release Stag Crude) | 5 (Surface release MDO) | |
| | | | | states of the area causing the slick to break up and disperse, this response is not considered to be effective in reducing the net environmental impacts of an MDO spill. The ability to contain and recover spreading MDO on the ocean water surface is extremely limited due the very low viscosity of the fuel and the inability to corral the hydrocarbon to a sufficient thickness for skimmers to be effective at removal. |
| Nearshore and Shoreline Protection and Deflection | Secondary response strategy | Secondary response strategy | Not recommended | **Stag Crude**: Deployment will be considered under an Operational NEBA if post-spill operational monitoring data predicts contact with sensitive shorelines. Operational NEBA shall consider if resources can be deployed effectively, safely and will not result in more harm than if the product was left to degrade naturally.<br>Given tidal influences, lack of access, lack of anchoring points and subsequent distance for effective placement, this strategy would be unsuitable in many locations. This is not considered to be a primary response strategy.<br>If selected, preparations for this strategy should be made as soon as predictions indicate a possible shoreline impact. Department of Transport (DoT) Incident Controller (IC) (as Control Agency) approval is required before commencing protect and deflect activities in State waters.<br>**MDO**: Modelling indicates no shoreline accumulation above moderate shoreline accumulation thresholds (>100 g/m$^2$). |
| Shoreline Clean-up | Secondary response strategy | Secondary response strategy | Not recommended | **Stag Crude**: Intrusive response that requires careful site-specific planning in order to reduce secondary impacts of physical disturbance and secondary contamination to intertidal and shoreline habitats. Flushing may be considered if the oil enters high priority/slow recovery habitats such as mangroves. Natural dispersion will occur as the hydrocarbon is remobilised from rock shelves and hard substrates, while residual oil will biodegrade.<br>Due to these disturbances, this response has potential to cause more harm than light oiling, so must be carefully considered under a shoreline assessment and NEBA.<br>If selected, preparations for this strategy should be made as soon as predictions indicate a |

| OSR strategy | Scenario No. | | | Operational Considerations |
|---|---|---|---|---|
| | **1, 2, 6 (Subsea release Stag Crude)** | **3,4 (Surface release Stag Crude)** | **5 (Surface release MDO)** | |
| | | | | possible shoreline impact. DoT IC (as Control Agency) approval is required before commencing clean-up activities in State waters.<br>**MDO**: Modelling indicates no shoreline accumulation above moderate shoreline accumulation thresholds (>100 g/m$^2$). |
| Oiled Wildlife Response | Primary response strategy | Primary response strategy | Primary response strategy | **Stag Crude and MDO**: Applicable for marine animals that come close to the spill when on the water and shorelines.<br>Targeted wildlife surveillance/reconnaissance with planning taking into consideration the time of year and key biological activities such as breeding, mating, nesting, hatching or migrating. |
| Scientific Monitoring (See IMTRP Appendix A) | Primary response strategy | Primary response strategy | Primary response strategy | **Stag Crude and MDO**: Applicable for marine environment contacted by hydrocarbons either by floating, dissolved or entrained. |

### 6.1 Operational NEBA

Following implementation of the initial (first strike) response, the information in Table 6-1 will aid in the development of the initial Operational NEBA. The Action Plan tables in Section 17 include considerations to help complete the Operational NEBA.

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

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

### 6.2 Response Resource Planning

Spill response planning to identify a suitable combination of response strategies involves estimating required resources and an assessment of the capability required to support the response. Capability to support the minimum resources required has been planned for and is presented in Table 7-1.

Some spill scenarios are predicted to contact shorelines. The remoteness and nature of the shorelines contacted places a priority on offshore response strategies that reduce the volume of oil to shore. The primary response strategies will be:

- Source Control will reduce the length of time the oil is released into the marine environment;
- Operational monitoring is the first response strategy implemented to enable Jadestone to gain and maintain situational awareness;
- Surface chemical dispersant application implemented because of the predicted benefit demonstrated through efficacy testing;
- Containment and recovery operations complement the dispersant strategy by being able to target areas of floating oil that have not dispersed;
- Oiled Wildlife Response including rapidly initiating wildlife surveillance/ reconnaissance to ascertain the type of wildlife impacted and the magnitude of impact in order to assist with the development of appropriate response strategies; and
- Scientific Monitoring enables the detection and quantification of environmental impact and recovery to sensitive receptors from an oil spill.

The mix of resources presented in Table 7-1 provides a basis from which complementary response strategies can be undertaken for protection priorities with a reasonable prospect for positive outcomes.

Spill response planning assumptions take into consideration:

  - The weathering properties of Stag Crude are well understood however this does not negate the influence of real time variables on the rate of evaporation and emulsification.
  - Approximately 32 to 68% of the volume of Stag oil spilled is expected to evaporate over the first seven days (% dependent upon wind variability).

An overview of the equipment and dispersant available to Jadestone from national stocks is provided in Table 6-2.

**Table 6-2: Oil Spill Response Equipment**

| Agency | Stockpile Locations | Equipment |
|---|---|---|
| **Jadestone** | • Supply vessel | Computerised Management Maintenance System (CMMS) provides up-to-date equipment lists for the various stockpile locations |
| **AMOSC** | • Broome<br>• Exmouth<br>• Fremantle<br>• Geelong<br>• Industry Mutual Aid register | AMOSC equipment and dispersant lists are available via the Member Login webpage:<br>• AMOSC website: https://amosc.com.au/member-login/<br>AMOSC can arrange for transport of their equipment and dispersant to Dampier Forward Operating Base (FOB). |
| **AMSA** | • ACT<br>• Adelaide<br>• Brisbane<br>• Dampier<br>• Darwin<br>• Devonport<br>• Fremantle<br>• Gladstone<br>• Horn Island<br>• Karratha<br>• Melbourne<br>• Sydney<br>• Townsville | AMSA equipment and dispersant lists are available on the AMSA website via the following links:<br>• Equipment: https://amsa-forms.nogginoca.com/public/equipment.html?loc=%2Fapi%2Fv1%2Fasset%2F2616201<br>• Dispersant: https://amsa-forms.nogginoca.com/public/dispersant.html?loc=%2Fapi%2Fv1%2Fasset%2F2544502<br>• Fixed Wing Aircraft: https://amsa-forms.nogginoca.com/public/aircraft-avilability.html |
| **Waste Management Contractor** | • Darwin<br>• Broome<br>• Port Hedland<br>• Karratha<br>• Perth | Waste management contractor's waste management equipment are summarised in its Waste Management Plan. |

## 7. RESOURCES REQUIRED FOR A WCS SPILL EVENT AT STAG

The worst-case spill scenarios for Stag Operations are shown in Table 4-1. This worst-case response needs assessment is based on the Stag Crude spill of 120 $m^3$ over 12 hours. Table 7-1 assumes all response strategies may be deployed simultaneously. However, in a real spill event, deployment of response strategies will be based on an operational NEBA, and consequently it is unlikely that all response strategies would be deployed at the same time. This needs assessment is provided for capability assessment purposes only, to ensure adequate resources are available for response strategy implementation.

The personnel numbers in Table 7-1 represent the operational requirements and include allowance for an additional 50% of personnel to cover shift changes and manage responder fatigue. Trained response personnel would be delegated to field team leader or supervisor tasks, whereas team members and crews would be sourced from a combination of the following:

- Ad-hoc training for labour-hire personnel for specific response strategy needs on a just-in-time basis; and
- Where skilled personnel are required (e.g. for vessel crews to support containment and recovery), team members would be sourced from marine service provider contracts but work under the guidance of trained team leaders/supervisors.

**Table 7-1: Worst-case Oil Spill Scenario Response Needs Assessment**

| Response Strategy and Tactic | Capability | Response Need Requirement | | | Capability Providers and Sources | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Week 1 | Week 2 | Week 3 onwards | Jadestone | AMOSC MSA (equipment) + AMOSC Personnel | AMOSC Industry Core Group | OSRL | Mutual aid, National Response Team (NRT), Contractors and Service Providers |
| Incident Management Team (IMT) | | | | | | | | | |
| IMT personnel | Trained personnel | 38 | 38 | 38 | 21 | 7 | - | 9 | 10 |
| IMT personnel for WA DoT (as per IGN) | Trained personnel | 11 | 11 | 11 | 3 | - | - | - | 8 |
| Operational Monitoring | | | | | | | | | |

| Response Strategy and Tactic | Capability | Response Need Requirement | | | Capability Providers and Sources | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Week 1 | Week 2 | Week 3 onwards | Jadestone | AMOSC MSA (equipment) + AMOSC Personnel | AMOSC Industry Core Group | OSRL | Mutual aid, National Response Team (NRT), Contractors and Service Providers |
| Satellite tracking buoys | Buoys | 2 buoys | 4 buoys | 4 buoys | 2 buoys Stag Facility | 2 buoys | - | - | - |
| Oil Spill Trajectory Modelling | Spill Model | 7 trajectory and weathering models | 7 trajectory and weathering models | 7 trajectory and weathering models per week | - | RPS via AMOSC Master Services Agreement (MSA) | - | - | - |
| Aerial surveillance | Aircraft | 1 aircraft | 1 aircraft | 1 aircraft | - | - | - | - | 1 aircraft – Jadestone aviation contract |
| | Aerial observers | 2 observers | 2 observers | 2 observers | | 1 observer | 1 observer | | |
| | Flight crew | 1 crew | 1 crew | 1 crew | - | - | - | - | 1 flight crew - Jadestone aviation contract |
| Vessel surveillance | Vessels | 1 vessel | 1 vessel | 1 vessel | - | - | - | - | 1 vessel via Jadestone marine contracts |
| | Observer | 1 observer | 1 observer | 1 observer | - | 1 observer | - | - | - |
| Fluorometers | Towable fluorometers | 5 fluorometers | 5 fluorometers | 5 fluorometers | - | - | - | 7 x C3 fluorometers | - |
| Unmanned Aerial Vehicles (UAVs) | Short range UAVs with cameras/video | 2 UAVs | 2 UAVs | 2 UAVs | - | 2 x pilots and UAVs | - | 2 x pilots and UAVs (3rd party, best endeavours) | - |

| Response Strategy and Tactic | Capability | Response Need Requirement | | | Capability Providers and Sources | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Week 1 | Week 2 | Week 3 onwards | Jadestone | AMOSC MSA (equipment) + AMOSC Personnel | AMOSC Industry Core Group | OSRL | Mutual aid, National Response Team (NRT), Contractors and Service Providers |
| Shoreline and coastal habitat assessment | Trained team leaders and team members[1] (One team consists of 1 team lead and 2 team members) | 2 team leaders, 4 team members (total 6 people) | 3 team leaders, 6 team members (total 9 people) | 5 team leaders and 10 team members (total 15 people) | - | - | - | 5 team leaders | 10 people from Jadestone labour hire contracts |
| Surface Chemical Dispersant | | | | | | | | | |
| Vessel based surface application | Spray vessel | 1 vessels | Not required | Not required | - | - | - | - | 1 vessel via Jadestone marine contracts |
| | Spray systems | 2 systems per vessel | Not required | Not required | 1 Afedo<br>2 roof mounted systems | 2 spray systems | - | - | - |
| | Trained personnel - 1 per vessel | 1 trained person | Not required | Not required | - | - | 1 trained person | - | - |
| Aerial surface application | Fixed Wing Aerial Dispersant aircraft | 1 spray aircraft | Not required | Not required | - | 1 spray aircraft | - | - | - |
| | Dispersant (volume required = 7.2 m3) | 20 m3 | Not required | Not required | 11 m3 | 10 m3 | - | - | AMSA 10 m3 |
| | Air attack supervisor (AAS) | 1 aircraft<br>1 AAS | 1 aircraft<br>1 AAS | 1 aircraft<br>1 AAS | - | 1 AAS (via AMOSC/AMSA) | - | - | - |

[1] Team members may be sourced from contracted labour hire company and provided training prior to being deployed. Team members will work under the guidance of trained Team Leads.

| Response Strategy and Tactic | Capability | Response Need Requirement | | | Capability Providers and Sources | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Week 1 | Week 2 | Week 3 onwards | Jadestone | AMOSC MSA (equipment) + AMOSC Personnel | AMOSC Industry Core Group | OSRL | Mutual aid, National Response Team (NRT), Contractors and Service Providers |
| | Search and Rescue | 1 aircraft and crew | 1 aircraft and crew | 1 aircraft and crew | - | - | - | - | Contract with aviation services provider |
| Containment and Recovery | | | | | | | | | |
| Containment and Recovery Systems | Vessels | 2 vessels | 2 vessels | Not required | - | - | - | - | Jadestone marine contracts |
| | Containment and recovery system | 2 systems | 2 systems | Not required | - | 2 systems | - | - | - |
| | Trained spill responders (team leaders) – 1 vessel master, 1 supervisor | 2 vessel masters<br>2 supervisors | 2 vessel masters<br>2 supervisors | Not required | - | - | 2 supervisors | - | Vessel contracted:<br>2 vessel masters |
| | Containment and recovery deployment crew – 4 members per team | 8 deployment crew | 8 deployment crew | Not required | - | - | - | - | Vessel contracted:<br>8 deployment crew |
| | Waste storage | 56.4 $m^3$/day | - | - | - | IBCs, bladders, inflatable storage bags of varying capacity | - | IBCs, bladders, inflatable storage bags of varying capacity | Waste Service Provider – 300 $m^3$ within 48 hours, building over first week |
| Protection and Deflection | | | | | | | | | |

| Response Strategy and Tactic | Capability | Response Need Requirement | | | Capability Providers and Sources | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Week 1 | Week 2 | Week 3 onwards | Jadestone | AMOSC MSA (equipment) + AMOSC Personnel | AMOSC Industry Core Group | OSRL | Mutual aid, National Response Team (NRT), Contractors and Service Providers |
| Protection and Deflection Packages | Shoreline protection package – Consists of nearshore booms and ancillary equipment | 2 packages | 3 packages | 5 packages | - | 5 packages via AMOSC MSA (including access to AMSA equipment) | - | - | - |
| | Vessels, including shallow draft vessels and crew | 2 vessels | 3 vessels | 5 vessels | - | - | - | - | 5 vessels via Jadestone marine contracts |
| | Trained spill responders (team leaders) – 2 leads per team | 4 team leaders | 6 team leaders | 10 team leaders | - | - | 10 trained team leads | - | - |
| | Protection and deflection team members – 5 members per team | 10 team members | 15 team members | 25 team members | - | - | - | - | 25 people from Jadestone labour hire contracts |
| Shoreline Clean-up | | | | | | | | | |
| Shoreline Clean-up Packages | Trained spill responders (team leader) - 1 per team | 2 team leaders | 3 team leaders | 5 team leaders | - | - | 5 trained team leads | 10 trained team leads | |
| | Clean-up team members – 10 members per team | 20 team members | 30 team members | 50 team members | - | - | - | - | 50 people from Jadestone labour hire contracts |
| | Clean-up equipment (hand tools, shoreline flushing equipment, | 2 packages (make-up will be dependent upon | 3 packages (make-up will be dependent upon | 5 packages (make-up will be dependent upon | - | 5 packages | - | - | - |

| Response Strategy and Tactic | Capability | Response Need Requirement | | | Capability Providers and Sources | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Week 1 | Week 2 | Week 3 onwards | Jadestone | AMOSC MSA (equipment) + AMOSC Personnel | AMOSC Industry Core Group | OSRL | Mutual aid, National Response Team (NRT), Contractors and Service Providers |
| | decontamination equipment) | location contacted) | location contacted) | location contacted) | | | | | |
| | Waste storage | Waste storage bins, skips, containers, bags | Waste storage bins, skips, containers, bags | Waste storage bins, skips, containers, bags | - | - | - | - | Waste Management Contractor |
| Oiled Wildlife Response | | | | | | | | | |
| Oiled Wildlife Response | Trained OWR responders<br>OWR equipment | - | - | - | - | AMOSC Equipment<br>AMOSC – 1 x OWR advisor<br>AMSA – 4 OWR containers / washing facilities<br>Call off contract with DWYERtech Response NZ<br>MOU with Phillip Island National Park (best endeavours) | 60 x OWR strike team | 1 x Technical Advisor (via Sea Alarm)<br>Global Oiled Wildlife Response Service (best endeavours) = 4 wildlife response experts | DoT – 1 OWR container/ washing facility |
| Scientific Monitoring | | | | | | | | | |
| Scientific Monitoring | Vessels – monitoring platform (Suitable vessels for on-water monitoring & | 4 vessels | 4 vessels | Dependent on the extent of the area impacted, the | - | - | - | - | 4 vessels via Jadestone marine contracts |

| Response Strategy and Tactic | Capability | Response Need Requirement | | | Capability Providers and Sources | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Week 1 | Week 2 | Week 3 onwards | Jadestone | AMOSC MSA (equipment) + AMOSC Personnel | AMOSC Industry Core Group | OSRL | Mutual aid, National Response Team (NRT), Contractors and Service Providers |
| | transfer of personnel to islands/ remote areas) | | | number of SMPs activated, and the monitoring sites determined | | | | | |
| | Aircraft – monitoring platforms (Suitable air platforms for reconnaissance) | 1 aircraft and crew | 1 aircraft and crew | | | | | | 1 aircraft – Jadestone aviation contract |
| | Monitoring personnel and Monitoring equipment | Scientific monitoring equipment as detailed in the relevant SMPs | | | | | | | Monitoring Services Provider |
| Response need (personnel) | | | | | 26 | 10 | 19 | 25 | 111 |
| Response need including + 50% for shift changes and fatigue management | | | | | 39 | 15 | 29 | 38 | 167 |
| Total personnel available | | | | | 40 | 15[2] | 84[3] | 18 + 80[4] | As per contracts |

[2] As per AMOSC training and competency matrix. Includes technical, incident management and operational advice and assistance available under AMOSPlan. March 2023 AMOSC report indicated 15 AMOSC Staff were available (AMOSC members website).

[3] Target to maintain at least 84 members (Ref.: AMOSC Core Group Program and Policies). February 2023 Core Group report indicated an average of 33 personnel were available (AMOSC members website).

[4] As per OSRL training and competency matrix. 18 responders guaranteed; 80 responders may be approved under best endeavours available under OSRL SLA. June 2022 OSRL audit confirmed exceedance of these numbers globally.

## 8. SOURCE CONTROL STRATEGY

The initial and highest priority response to an oil spill incident is to prevent or limit further oil loss into the marine environment, if safe to do so. In most circumstances, the net benefit of source control outweighs impacts of further oil being released into the marine environment. However, further risks may arise due to increased vessels and rigs and the associated increased health and safety risks for the team involved in the response.

### 8.1 Initiation and Termination Criteria

| Tactics | Initiation criteria | Termination criteria |
|---|---|---|
| Emergency shutdown | Notification of spill | Release of oil ceased, spilled oil that has been contained is cleaned up and disposed of |
| Implementation of SOPEP | | |

The IMT will gather surveillance information from those involved in preventing further release of hydrocarbons to the marine environment and ensure that the appropriate source control actions are being undertaken.

### 8.2 Tasks for Process Incident

In the event of a process incident such as loss of integrity, process upset, failure or damage, the pump will be stopped upon detection of the leak and relevant operations will cease as per the Stag Incident Response Plan (GF-00_PR-F-00041). For incidents involving the Marine Breakaway Coupling, 'petals' would be activated that would seal the leak in ~11 seconds. The hydrocarbon remaining in the transfer line may escape to the environment as well as any hydrocarbon released prior to the transfer operation being stopped. For bunker transfer this has been estimated at a maximum volume of 5 $m^3$ (representing a 60 $m^3$/h pump rate and a worst-case release duration of up to five mins) as bunkers are taken with a watchman on deck of the supply vessel and a pump stop at the bunker station. For a subsea pipeline leak the worst-case release volume is estimated at 15 $m^3$ Stag crude. Should a pipeline leak occur, the system will be shutdown and the Emergency Pipeline Repair Plan (GF-09-PLN-L-00039) will be implemented.

If a rupture or leak occurs in the topside processing equipment, the wellhead and topside valves will automatically close and production will cease in accordance with the Safety Critical Elements Performance Standards Report (GA-70-REP-F-00007). Shut off valves are regularly serviced and tested to ensure they will work properly if required. Released oil will be captured in the CPF's bunds, which have closed drainage systems that deliver drainage water (which may contain hydrocarbon contamination) to a designated storage tank. The third-party tanker and support vessels also have closed drainage systems for capture of onboard leaks.

The spilt hydrocarbons contained onboard the third-party tanker or support vessels will be controlled and cleaned up in accordance with each vessels Shipboard Oil Pollution Emergency Plan (SOPEP), which is compliant with MARPOL 73/78 Annex 1- Prevention of Pollution by Oil under the Protection of the Sea (Prevention of Pollution from Ships) Act 1983. The mitigation measures within each SOPEP include:

- Pumping operations ceased immediately following the spill;
- Valve/s closed;
- System receiving product is immediately shut down following a spill;
- Drainage network is closed as soon as practicable following the spill to prevent discharge/ spillage to the ocean;
- Make necessary repairs to pipe to prevent further leakage;

- Use spill kit to clean-up spills on platform and/or vessel; and
- Store any clean up waste in bunded area for onshore disposal.

Collected fluids are processed and treated to meet the OIW content specification of <30 mg/l prior to discharge. Areas used for the permanent or temporary storage of bulk fuels and/ or chemicals are either fully bunded by sealing deck drains or secondary containment is provided to prevent accidental discharges to the ocean. Bunding is also located beneath the refuelling hose connections, operational equipment, and fuel tanks on the supply vessel. Closed drains on the platform and third-party tanker will isolate a spill that falls in these areas from the marine environment.

In the event hydrocarbon is spilt onto the decks of the vessel/ platform, the relevant SOPEP, or Jadestone's Stag Incident Response Plan (GA-90-PR-F-00041) in the case of the CPF, will be implemented. Sorbent materials are used from spill kits onboard the vessel/ platform to mop up hydrocarbon on deck. Soiled sorbent materials are bagged and disposed to shore. Before washing down the deck after excess oil has been cleaned up, the OIM/ Vessel Master will confirm that the drainage network is closed and will not discharge to the ocean.

Section 8 of Stag EP describes the environmental risks and management for unplanned events associated with the operational activities.

### 8.3 Tasks for Vessel Collision

Accidental release of hydrocarbons from support vessels to the marine environment is managed by the Vessel Master in accordance with MARPOL 73/78 Annex 1 – *Prevention of Pollution by Oil under the Protection of the Sea (Prevention of Pollution from Ships) Act* 1983.

## 9. OPERATIONAL MONITORING STRATEGY

A combination of methods have been identified as appropriate to characterise the released hydrocarbon, estimate the extent of the spill, measure oil volume and concentration on or in the water and locate oil along shorelines.

Understanding the behaviour and likely trajectory of an oil spill is critical to evaluate the appropriate response strategy. In some situations, after operational monitoring activities have been employed, leaving the oil to naturally dissipate and degrade may be considered the most appropriate option if any further response is a risk to increasing the environmental impact, or presents a significant safety risk.

### 9.1 Common Operating Picture (COP)

The ability of the IMT to manage and coordinate response operations will be heavily reliant on being able to compile and effectively manage all the information and data provided as part of the operational monitoring strategy. To achieve this a Common Operating Picture (COP) will be utilised, consisting primarily of geographical and geospatial information.

### 9.2 Operational Monitoring Plan

The IMT will coordinate the operational monitoring requirements, and ensure that all monitoring activities are conducted safely and effectively.

### 9.3 Initiation and Termination Criteria

| Tactic | Initiation Criteria | Termination Criteria |
|---|---|---|
| Tracking buoys | Immediately once Level 2 oil spill is confirmed | Tracking buoy no longer required to inform common operating picture. |
| Vessel surveillance | Immediately once Level 2 oil spill is confirmed | Vessel surveillance reports no longer required to inform common operating picture |
| Aerial surveillance | Immediately once Level 2 oil spill is confirmed | IAP no longer requires aerial surveillance to inform common operating picture; and<br>Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response |
| Oil Spill Trajectory Modelling (OSTM) | Immediately once Level 2 oil spill is confirmed | Modelling no longer required to inform common operating picture; and<br>Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response |
| Fluorometry | Dispersant application has occurred | Dispersant application no longer being undertaken; and<br>Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response |
| Shoreline and coastal habitat assessment | Immediately once Level 2 oil spill is confirmed | When all shoreline segments have reached status of no further action be taken (NFA); and<br>Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response |
| UAV deployment | OSTM predicts shoreline impact to inaccessible area not able to be covered by aerial or vessel surveillance tasks. | UAV surveillance no longer required to inform common operating picture. |

### 9.4 Tactics

The following tactics are sufficient for supplying all required information to inform response decisions to reduce impacts resulting from the worst-case potential spill, from the Stag Operations, to ALARP:

- Vessel surveillance;
- Aerial surveillance;
- Tracking buoys;
- Satellite imagery;
- Spill fate modelling;
- Fluorometry;
- Shoreline and coastal habitat assessment using Shoreline Clean-up Assessment Technique (SCAT) surveys; and
- UAVs.

#### 9.4.1 Tracking Buoy Deployment

Satellite tracking buoy deployment is to be initiated within one hour of spill notification and placed within or as close as is safely allowable to the plume to follow the movement of a surface spill in the marine environment.

**Note:** Buoys are not to be dropped from a height of greater than 10m to water surface.

Satellite tracking buoys can be deployed directly from the Platform (below 10m) or mobilised via available support vessels as directed by the OIM. There are two tracking buoys available on the Stag Facility.

The time taken to deploy the tracking buoys will depend on the location they are sourced from and transit time for the vessels to deploy or retrieve. After initial deployment additional buoys will be deployed on a regular basis as determined by the IMT to best support the building and maintenance of situational awareness.

Tracker buoys are deployed under the direction from the IMT Leader, by following the appropriate standard operating procedure (SOP). Once deployed it is essential that confirmation of a successful deployment is provided back to the IMT.

Deployed buoys will be tracked online by the IMT and spill fate modelling service provider. On completion of spill monitoring using tracking buoys, the buoys are to be retrieved by a vessel.

Normal procedure will be for the deployment of a single tracking buoy on Day 1 and the second approximately 24 hours later. On being deployed all buoys will be checked to be operational through the online website. All buoy data will be used to assist with understanding the local metocean conditions. Additional buoys will be sourced as part of the response, however if required buoys can be collected and redeployed.

#### 9.4.2 Vessel Surveillance

Direct observations from the field support vessels or other vessels can be used to assess the location and visible extent of the spill from hydrocarbon incidents, to verify modelling predictions and trajectories, and to support other response strategies.

**Note**: Vessel-based surveillance is only effective if sea state conditions are calm and the spill is observable.

A decision on the suitability of the metocean conditions will be made (OIM / Vessel Master / IMT) and direction provided to available vessels. Vessel surveillance is to be instructed by the OIM (Level 1) or IMT (Level 2). Vessel surveillance observations will be used by the IMT in conjunction with all other operational monitoring information (Level 2) to confirm location and extent of the spill, which will in turn assist with the development of appropriate response strategies.

The nearest support vessel to the release location will be mobilised upon notification of incident. Vessels currently on hire to Jadestone will be initially selected for vessel surveillance duties with other vessels provided from Jadestone's contracted vessel providers.

Reporting requirements will be as follows:

- Information to be provided to the OIM (Level 1) or IMT (Level 2);
- Essential information to be reported will include:
    - Spill location (latitude & longitude);
    - Length and width of slick;
    - Visual appearance of the slick (colours, emulsification etc);
    - Associated weather conditions in vicinity of the spill (wind speed/direction, sea state, swell);
    - Any marine fauna or other activities observed; and
    - Photographic images.

All information is to be compiled into a Vessel Surveillance Log (refer Appendix A1) which will be sent to the OIM/IMT within an hour of the observations being taken.

### 9.4.3 Aerial Surveillance

Direct observations from aircraft can be used to assess the location, estimated volume and visible extent of the spill from hydrocarbon incidents, in order to verify modelling predictions and trajectories, and to support other response strategies.

Trained Aerial Observers will be sourced through the AMOSPlan arrangements and deployed to the response location, however, should a delay in their arrival be anticipated, a surveillance flight will be conducted utilising available aircraft crew.

A decision on the suitability of the meteorological conditions will be made by the aircraft captain, who will relay this decision to either the OIM (Level 1) or IMT (Level 2) to receive appropriate tasking. Aerial surveillance observations will be used by the IMT in conjunction with all other operational monitoring information (Level 2) to confirm location and extent of the spill, which will assist with the development of appropriate response strategies or modification to existing strategies.

**Note**: Specific meteorological limits will vary depending on the type of aircraft being flown.

Reporting requirements will be as follows:

- Information to be provided to the OIM (Level 1) or IMT (Level 2);
- Essential information to be reported will include:
    - Spill location (latitude & longitude);
    - Length and width of slick;

- Visual appearance of the slick (colours, emulsification etc) using the Bonn Oil Appearance Code (refer to Appendix A2);
- Associated weather conditions in vicinity of the spill (wind speed/direction, sea state, swell);
- Any marine fauna or other activities observed; and
- Photographic images.

All information is to be compiled into an Aerial Surveillance Log (refer Appendix A1) which will be sent to the OIM/IMT within an hour of the aircraft returning to its operating base. Where possible, a verbal report via radio/telephone en-route providing relevant information should be considered if the aircraft has long transits from the spill location to base.

Flight Schedules are to be developed in support of response operations. The frequency of flights will be sufficient to ensure the information collected during each flight (i.e. observer log and spill mapping) meets the information needs of the IMT to validate spill location, dispersion and the information needs of fate modelling.

**Note:** Flights will only take place during daylight under visual flight rules (VFR).

A recording of the spill extent is made by outlining the approximate two-dimensional extent of the slick(s) on a map template, including GPS coordinates of extent, the time observations were made and date noted on the map template.

The trained Aerial Observer or the IMT will make estimations of thickness based on visual sighting or the photographic images respectively. Thickness estimates are to be based on the Bonn Agreement Oil Appearance Code.

Photographic or video records taken by the Aerial Observers for each fauna sighting and the location and details of each sighting are recorded with a cross-reference to photographic imagery captured. The Aerial Surveillance Marine Fauna Sighting Record Sheet is provided in Appendix A1.

### 9.4.4 Oil Spill Trajectory Modelling

OSTM provides a simulated trajectory of the spill based on historic and actual metocean data. This modelling will be provided in the form of a geospatial information system (GIS) format so that it can be easily integrated into the COP.

OSTM will be provided by RPS APASA via AMOSC. The IMT will contact AMOSC and confirm request of modelling services. OSTM will start within two hours of submission of the request.

On a daily basis, RPS APASA will provide three-day forecast outputs Jadestone. More frequent updates can be provided if weather conditions are highly variable or change suddenly. Data from aerial surveillance is to be provided to RPS APASA who are contracted to undertake modelling 24/7 to verify and adjust fate predictions of the spill and improve predictive accuracy.

### 9.4.5 Satellite Imagery

Satellite imagery uses Synthetic Aperture Radar (SAR) to detect oil spills by emitting a radar pulse and measuring the ‘backscatter’ from the earth. It is a cost effective and proficient surveillance technique, as it is not reliant on daylight, cloud cover and can survey large areas of ocean in a single satellite pass. It is a useful surveillance tactic to help quantify data received from other optical-based surveillance tactics (e.g. aerial and vessel surveillance).
Satellite imagery can be obtained through AMOSC via AMOSPlan arrangements. OSRL also provides access to this service. Satellite data is available within 24 hours, then every 6 to 24 hours thereafter depending on satellite positions.

### 9.4.6 Fluorometry

Fluorometry surveys are used to inform of presence of oil in water near sensitivities. Surveys will be run across the expected plume extent, as well as vertically through the water column. This allows a far greater area of coverage than discrete sampling, aiding in the detection and delineation of entrained oil.

This will allow continuous monitoring of entrained oil covering a large area and will provide near real-time three-dimensional data on the distribution of entrained oil to enable decision making within the IMT. Similarly, other sources of monitoring data (e.g. spill fate modelling) can be used in near real-time to inform the path of the sub surface glider.

In the event that sub surface fluorometers are unavailable or cannot cover the required scale of operation, towed fluorometers towed behind vessels will be used as an alternative or complementary approach. Sub surface gliders with fluorometer sensors for the monitoring of entrained oil will be deployed through Jadestone's monitoring service provider. If required, within 24-48 hours, 2-5 fluorometers could be mobilised to support monitoring of chemical dispersant program.

### 9.4.7 Shoreline and Coastal Habitat Assessment

Shorelines are highly variable and some (i.e. non-rocky shores and medium- to high-energy shorelines) can be quite dynamic. To assist in determining which clean-up methods are most appropriate for those areas exposed to hydrocarbons, it is necessary to obtain information about shoreline character (topography, complexity, exposure etc.), source oil characteristics and distribution, and shoreline processes and redistribution of any oil.

Shoreline clean-up assessment technique (SCAT) surveys provide a mechanism by which to record shoreline exposure to stranded oil (see Appendix A3 for shoreline assessment forms). The outcome of SCAT surveys is to provide a rapid assessment of:

- Shoreline character;
- Distribution of coastal habitat/fauna;
- Level of oil contamination and oil characteristics (if oil present); and
- Any constraints to responding to shoreline (e.g. access and safety constraints).

The information collected through SCAT surveys is used to inform appropriate shoreline response strategies, in particular termination criteria for response actions.

A shoreline assessment comprises the following tasks:

- Assessment of shoreline character, habitats and fauna including:
  - shoreline structured biotic habitats;
  - distribution of fauna;
  - shoreline energy and processes;
  - shoreline substrate;
  - shoreline form; and
  - access/ safety constraints.
- Assessment of shoreline oiling (if present):
  - surface distribution and cover;
  - subsurface distribution;

- oil type, thickness, concentration and physical character; and
- sampling of oil for laboratory analysis.

### 9.4.8 Resource Rationale for Operational Monitoring

Aerial surveillance, tracking buoys and oil spill trajectory modelling are the primary operational monitoring tactics used to determine the extent of the spill. They are designed to provide real time observational data for the IMT and to validate response planning. Resources allocated for these tasks are sufficient to provide observations and predictions to the IMT within a reasonable timeframe. Vessel surveillance, UAVs and fluorometry are secondary tactics which can be used to complement the information gathered through the primary tactics.

SCAT is made up of 3 members per team and are assumed to be able to cover at least 10 km per day. This distance may be more, especially if UAVs are employed to cover shorelines that have access limitations. Jadestone has used the OSTM data for shoreline accumulation to plan worst case shoreline and habitat assessment personnel requirements (Table 9-1). No priority receptors are predicted to have more than 10 km of shoreline length contacted at accumulation concentrations greater than 100 g/m$^2$.

Dampier Archipelago has the longest length of shoreline accumulation (10 km) and presents the greatest resource requirement of 3 personnel (1 team of 3 members each) and Montebello Islands presents the minimum contact time. Team leaders will be sourced from AMOSC and will be trained in shoreline assessment techniques. Team members can include personnel who have completed basic training prior to mobilisation.

It should be noted that a single spill will not contact all shorelines listed in Table 9-1. In preparing for this capability, Jadestone will be able to meet lesser shoreline assessment requirements for other locations.

**Table 9-1: Resource Rationale for Shoreline Assessment Personnel**

| Receptor | Minimum time to shoreline oil at >100g/m$^2$ (days) | Oiled shoreline at concentrations >100 g/m$^2$ in worst replicate simulation (km) | Number of SCAT teams required[5] |
|---|---|---|---|
| Dampier Archipelago | 7 | 10 | 1 |
| Montebello Islands | 1.4[6] | 8 | 1 |
| Lowendal Islands | 26 | 4 | 1 |
| Barrow Island | 26 | 2 | 1 |
| Eighty Mile Beach | 14 | 4 | 1 |

[5] SCAT numbers are not cumulative as spill will not contact all receptors modelled. Number required would be based on direction of spill and timeframes to contact.

[6] All results presented in this table are from Scenario 1 (subsea release of 86.5 m3) for the period September to February, with the exception of Montebello and Lowendal Islands which are the same scenario but the period of March to August.

## 10. CHEMICAL DISPERSION STRATEGY

Dispersants are chemicals sprayed onto oil spills from aircraft or vessels to accelerate the process of natural dispersion. They are designed to separate the oil particles on surface waters and help dispersion in the water column (as small droplets) to speed up the process of natural biodegradation. Chemical dispersants can be used to:

- Decrease floating oil;
- Reduce the impact to shorelines; and
- Reduce the quantity of waste created.

Jadestone will apply chemical dispersants to Stag Crude as soon as practically possible to maximise the application rate over 72 hours from release to be within the Window of Opportunity. Due to the variability in effectiveness, Jadestone will monitor the effectiveness to assess whether to continue application through the NEBA process.

Chemical dispersants can decrease the risk of oil impact to shorelines but can increase the risk to pelagic wildlife through entrained oil. NEBA will be used to assist in assessing the exchange of one risk to another. The Planning Team will be required to complete the Risk Assessment step in the IAP process and consider:

- Is it safe to conduct chemical dispersant operations?
- Is the oil dispersible? (existing understanding of Stag Crude)
- Is the environment suitable for chemical dispersant operations? (water depth, weather)
- Does the oil texture allow for chemical dispersant operations? (thickness, appearance)
- Are the resources available for deployment?
- Is the mobilisation time within the Window of Opportunity?
- Has the approval for chemical dispersant spraying been granted by the appropriate authorities?
- The geographic constraints listed in Section 10.7

### 10.1 Initiation and Termination Criteria

**Table 10-1: Initiation and Termination Criteria Chemical Dispersant Tactics**

| Tactic | Initiation criteria | Termination criteria |
|---|---|---|
| Mobilising dispersant | Immediately when Level 2 spill incident (Stag Crude) is confirmed | When there is no net environmental benefit of continuing dispersant application; and<br>Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response |
| Aerial application of dispersant | Immediately when Level 2 spill incident (Stag Crude) is confirmed | When there is no net environmental benefit of continuing dispersant application<br>Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response |

| Tactic | Initiation criteria | Termination criteria |
|---|---|---|
| Vessel based application of dispersant | Immediately when Level 2 spill incident (Stag Crude) is confirmed | When there is no net environmental benefit of continuing dispersant application<br>Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response |
| Dispersant efficacy testing | Assessment commences immediately when a Level 2 spill incident (Stag Crude) is confirmed | When dispersant is no longer being applied. |

### 10.2 Chemical Dispersant Action Plan

The following tactics are considered for surface chemical dispersant operations are:

- Aerial application of dispersant; and
- Vessel based application of dispersant.

The Surface Chemical Dispersion Action Plan (Section 17.6) is activated at the initial stage of the incident so that resources can be mobilised and ready for use. As the incident progresses, chemical dispersant use is continually reassessed through the NEBA and IAP processes.

### 10.3 Dispersant Selection

Critical to performance and effectiveness of the chemical dispersant is the weathering state of the oil it is being applied to. Semi-Quantitative Effectiveness Test (SQT) results for Stag crude, referenced to the analysis of the crude in its present state from reservoir (Stag crude is significantly degraded from reservoir), indicate that chemical dispersants would be best applied (Window of Opportunity) within the first 72 hours (three days) of a spill before the crude becomes too weathered for effective application. The SQT method applied to the Stag crude has shown an average 40% effectiveness of the three types of chemical dispersant available through AMSA and AMOSC on the NWS with the maximum effectiveness of 60%.

Given these results, Jadestone has prioritised the use of Dasic Slickgone NS and Corexit 9500. There are sufficient stockpiles of Slickgone NS and Corexit 9500 to sustain dispersant application for the three days of application.

### 10.4 Tasks for Mobilising Chemical Dispersants

Access to the National Plan stockpiles is via AMOSC and AMSA. The IMT will request the delivery of chemical dispersant stocks to the Dampier Port (vessel-based application) and Karratha airport (FWADC application) from AMOSC and AMSA stockpiles. AMSA chemical dispersant located in Dampier will begin arriving at Dampier Port for initial loading onto dispersant application vessels within 6 hours of mobilisation activation. AMOSC dispersant stocks located in Exmouth are to be road transported from Exmouth to Dampier Port and Karratha airport within 18 hours.

There are sufficient dispersant stocks in Exmouth and Dampier (Table 10-2) to last duration of application (three days). Refer to Table 10-3 for the dispersant application budget.

Under the National Plan arrangements, AMSA will provide all resources available through the National Plan in support of a Jadestone spill response. All stockpiles are deliverable to locations in Australia within 48 hours.

**Table 10-2: Chemical Dispersant Inventory as at March 2023**

| Owner | Stockpile Locations | Dispersant Volume ($m^3$) | Dispersant Type[7] | Total Volume ($m^3$) |
|---|---|---|---|---|
| **Jadestone** | Darwin Supply Base and Truscott | 11 | Slick Gone NS | 11 |
| **AMSA** | Adelaide | 10 | Slick Gone EW | 355 |
| | | 10 | Slick Gone NS | |
| | Brisbane | 10 | Slick Gone NS | |
| | | 10 | Slick Gone EW | |
| | Townsville | 10 | Slick Gone EW | |
| | | 15 | Slick Gone NS | |
| | Dampier | 10 | Slick Gone EW | |
| | | 10 | Slick Gone NS | |
| | Darwin | 10 | Slick Gone EW | |
| | | 10 | Slick Gone NS | |
| | Devonport | 10 | Slick Gone NS | |
| | | 10 | Slick Gone EW | |
| | Fremantle | 48 | Slick Gone NS | |
| | | 52 | Slick Gone EW | |
| | Horn Island | 10 | Slick Gone NS | |
| | Melbourne | 10 | Slick Gone EW | |
| | | 10 | Slick Gone NS | |
| | Sydney | 45 | Slick Gone NS | |
| | | 55 | Slick Gone EW | |
| **AMOSC** | Broome | 14 | Ardox 6120 | 511 |
| | Exmouth | 75 | Slick Gone NS | |
| | Fremantle | 8 | Slick Gone NS | |
| | | 27 | Corexit 9500 | |
| | | 500 (SFRT stockpile[8] 50%) | Slick Gone NS | |
| | Geelong | 75 | Slick Gone NS | |
| | | 62 | Corexit 9500 | |
| **TOTAL (access agreements in place)** | | | | **877** |

[7] All dispersants listed above are on the AMSA Oil Spill Control Agents (OSCA) list. Corexit is in Transitional Acceptance meaning that it is deemed to be OSCA registered on the basis that it has met previous acceptance requirements and is available for use for National Plan responses until used or disposed of.

[8] As per the AMOSPlan, there is a provision made by the SFRT Steering Committee to provide up to 250m³ of dispersant into a surface spill response, given certain provisions are met in the first instance by AMOSC (AMOSC, 2017).

### 10.5 Tasks for Aerial Application of Chemical Dispersants

Fixed Wing Aerial Dispersant Contract (FWADC) – notification and activation are made through AMOSC (on behalf of industry) who will liaise directly with AMSA with respect to the activation of the contract and associated aircraft. When triggered, the FWADC provides the following:

- Air Tractor AT802;
- Pilot;
- Aerotech First Response Liaison Officer;
- Air Attack Supervisor;
- Aircraft Loading Officer; and
- Transportation for all personnel to the nominated location.

An Air Attack Supervisor platform (helicopter or fixed wing) will be supplied by Jadestone when acting as the Control Agency. Aerotech First Response also have the capability to source this capability, if required.

Arrival time of the aircraft will depend on flight time and will include a four-hour lead time for 'wheels up' from initial request. Aerial chemical dispersant application will commence within 24 hours (using worst case response time) of initial AMSA notification (daylight and weather condition dependent). Aerotech 1st Response can have three FWADC aircraft at Karratha airport 18 hours after activation and another three aircraft to Karratha within 48 hours after activation, although due to the size of the spill, only one aircraft is required.

AMOSC, with support from the IMT, is to develop an "Air Operations Plan" in accordance with the Aerial Operational Plan For Marine Oil Spills Off The Western Australian Coastline which is to be submitted to AMSA prior to commencement of any National Plan Fixed Wing Aerial Dispersant Contract (FWADC) aircraft operations.

### 10.6 Tasks for Vessel-Based Application of Chemical Dispersant

Vessel based chemical dispersant application is activated within 120 mins of Level 2 confirmation. Jadestone uses a contracted offshore support vessel (OSV) as the Stag operations supply vessel, to assist with vessel dispersant application. The trained crew aboard can mobilise to Dampier (depending on location, the vessel may be in field or in transit to/from Dampier) for pick-up of dispersant and equipment. This is likely to be the first vessel on-site applying dispersants.

The key steps in mobilising this response are:

- Mobilise supply vessel to Dampier Port to receive dispersant, load and ship to the dispersant spray vessels at the spill location (if required); and
- Maintain chemical dispersant supplies to dispersant application vessels at spill location until dispersant application terminated.

Spraying systems deliver chemical dispersant uniformly to the floating oil to maximise dispersant/ oil mixing and minimise wind drift. As such, if mixing is evident in sea surface waters, this will improve the effectiveness of chemical dispersant applied to floating oil. Where sea surface conditions are calm, agitation of the sea surface will be undertaken by vessels to create mixing. Where this is not successful, a reduction in oil/ water mixing will result and containment and recovery operations are to be implemented instead.

Vessel based dispersant operations require two afedo spray systems per vessel. Spray arms need to be secured to vessel by welding or chains as determined by the vessel master. One spray system consumes approximately 500 L/hr of dispersant meaning that for four vessels spraying for eight hours per day (daylight

10 hours operation to include travel to site), with two spray systems per vessel, and dilution of dispersant as applied means 4 $m^3$ of dispersant per day will be required for one vessel.

One AMOSC Core Group Responder is to be dispatched to each vessel to oversee operations. These personnel have been trained in the operation of vessel-based dispersant systems and are competent in the setup of dispersant spraying systems.

The effectiveness of the vessel based chemical dispersion strategy is communicated to the IMT via Core Group Responders on-board the vessels with spray equipment. The Operations Lead is responsible for terminating application when chemical dispersants are no longer effective.

### 10.7 Chemical Dispersant Application Area and Timing

All chemical dispersant operations will occur during daylight hours only.

At no time, can chemical dispersant be applied:

- In waters shallower than 20 m (LAT);
- Within 10 km of water shallower than 20 m;
- Within exclusion zones for offshore facilities;
- Within a Marine Park boundary or its buffer; and/or
- Within State Waters unless approved by the State Marine Pollution Coordinator (SMPC).

The application of chemical dispersants will occur as soon as possible to ensure that chemical dispersant is applied to freshest oil. The WCS scenario for Stag is an instantaneous spill meaning that there is finite volume of oil to treat and ongoing release of oil is not occurring.

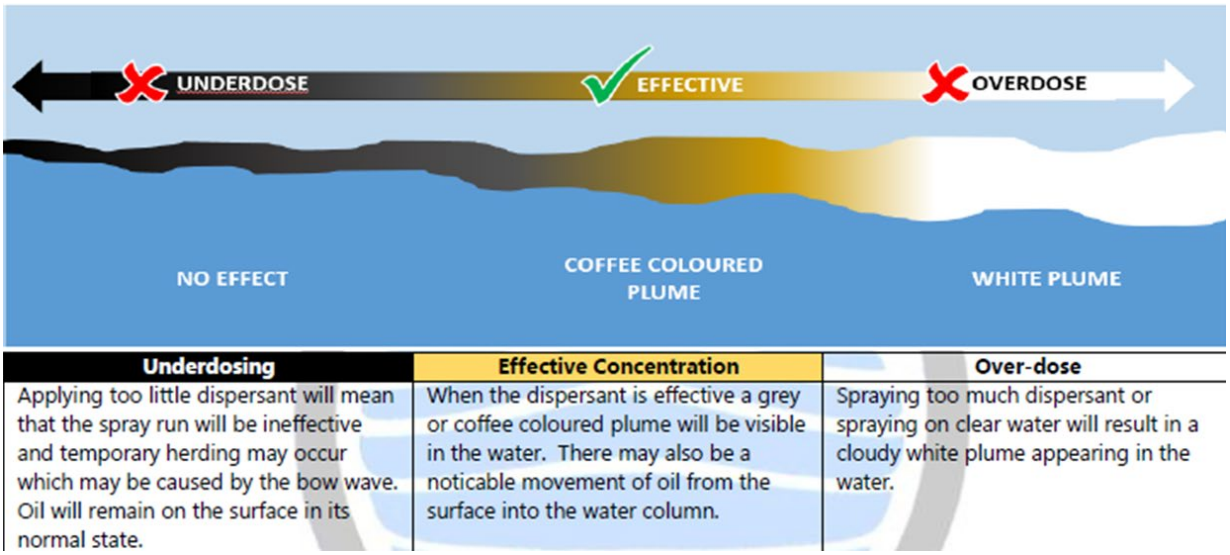
During ongoing operations, if the currents are directed toward the shallow parts of the coast, the application area must be far enough away to allow for sufficient chemical dispersal before contact with the 20 m contour. This is to be evaluated through RPS modelling requests for chemical dispersion characteristics throughout the application operation. The SMPC will be notified of dispersant operations and predicted application area by the Planning Team Lead so that an assessment of movement of dispersed oil into State Waters can be made.

Small breakaway patches of Stag Crude identified by surveillance operations are ideally treated by vessel-based chemical dispersant systems, whereas the larger slicks of oil are more suitably targeted by the aerial application systems.

### 10.8 Dispersant Effectiveness Monitoring

Chemical dispersant effectiveness is shown in Figure 10-1. The effectiveness of the aerial based chemical dispersion strategy is communicated to the IMT via the Air-Attack Supervisors, who are supplied by AMSA through the FWADC. Air-Attack Supervisors will advise the IMT if chemical dispersant application operations are to be terminated.

Ongoing chemical dispersant application is to be determined using the IAP process which involves a NEBA assessment, through the visual monitoring of the effectiveness of chemical dispersant applied, oil characteristics, predicted fate of the plume (updated daily), environmental conditions (sea state and weather) and surrounding environmental/ social/ cultural sensitivities. The NEBA will be re-evaluated daily during an incident to assess varying net benefits and impacts. Chemical dispersants are only to be applied if there is net benefit to the highest-ranking priority resources.




| Underdosing | Effective Concentration | Over-dose |
|---|---|---|
| Applying too little dispersant will mean that the spray run will be ineffective and temporary herding may occur which may be caused by the bow wave. Oil will remain on the surface in its normal state. | When the dispersant is effective a grey or coffee coloured plume will be visible in the water. There may also be a noticable movement of oil from the surface into the water column. | Spraying too much dispersant or spraying on clear water will result in a cloudy white plume appearing in the water. |

**Figure 10-1: Effective and Ineffective Dispersant Application**

### 10.9 Use of Dispersant in WA State Waters

During a response to either a shipping or offshore petroleum activity marine hydrocarbon pollution incident in State waters, regardless of source, the use of dispersants requires the written consent of the HMA. Where the application of dispersant in adjacent waters could impact State waters, the DoT requests early notification. This notification is to be provided to DoT through the HMA (or SMPC) if activated.

In seeking the consent of the HMA/SMPC to use dispersants in State waters, the Incident Commander is expected to have had the option assessed by a panel formed within the IMT. This panel should be chaired by the Incident Controller and include the participation of the State Environmental Scientific Coordinator (ESC). The involvement of the CSIRO or other subject matter experts on the panel should also be considered. In formulating its position on the potential use of dispersants, the panel is to use the decision-making process outlined in the AMSA Protocol for Obtaining Approval for the Application of Oil Spill Control Agents to Oil at Sea or on Shorelines. This process must be documented, and a record retained within the IMT.

The HMA/SMPC will confirm the recommendation of the ESC, who may grant or refuse consent for the use of dispersants in State waters. In granting consent, the HMA/SMPC may attach conditions to the consent. It should be noted that the consent can be removed by the HMA/SMPC at any time. It should also be noted that other restrictions on dispersant use may still apply, such as:

- The dispersants must be listed on the National Oil Spill Control Agent Register administered by AMSA and consistent with the Protocol for Obtaining Approval for the Application of Oil Spill Control Agents to Oil at Sea or on Shorelines (March 2013)
- Once consent is provided, the DoT Incident Controller will direct the actual use of the dispersant in accordance with the operational situation at the time
- Consent may be specific to geographic boundaries, times or weather conditions.

### 10.10 Resource Rationale for Chemical Dispersant Application

An estimation of the resources required for the chemical dispersant strategy was undertaken and an analysis is provided below.

10.10.1 **Calculations** - Volume of oil to be treated

Based on the weathering properties of the oil being in the range of ~17% to 65% in the first 12 hours and ~20 to 53% in the first 24 hours, the amount of oil available to be dispersed is conservatively considered to be **75%** of the released volume (75% of 86.5 $m^3$ = 65 $m^3$).

10.10.2 **Calculations - Volume of dispersant required**

- The Dispersant to Oil Ratio (DOR) can range from 1:10 through to 1:50 or even less depending on the oil and dispersant types; and
- For planning purposes, a DOR of 1:25 is used because it is an accepted ratio to start with and can be adjusted depending on effectiveness.

10.10.3 **Assumptions - Fixed wing aerial dispersant (Air Tractor) operations**

- Operations will be conducted out of Dampier to the Stag Facility. Based on standard aircraft endurance of 4 hours;
- All dispersant required will be mobilised to Dampier in support of ALL aerial dispersant operations;
- Two hours (approx.) required to complete each flight operation (dispersant loading/aircraft refuelling/transit to-from spill location);
- Operations to be conducted during daylight hours only – therefore based on an estimated 10 hours daylight each aircraft will conduct approximately three sorties each day; and
- Various aircraft types are included under the provision of the FWADC. For planning purposes, a minimum payload of 3,000 litres (3 $m^3$) will be used with respect to aircraft to be mobilised in support of the response.

10.10.4 Assumptions - Vessel based dispersant operations

- Vessels fitted with two spray systems = 1,000 L/hr spray rate (dispersant diluted with sea water);
- Dispersant operations to be conducted during daylight hours only – based on an estimated 8 hrs spraying = 8,000 L/vessel (sea water and dispersant); and
- One vessel will require 8 $m^3$ dispersant.

10.10.5 **Dispersant budget**

The total amount of dispersant required for surface application over three days is 7.2 $m^3$.

This volume can be met using the dispersant stock available in Dampier. Additional stocks can be brought in from Exmouth, if required.

Table 10-3 shows additional stocks being mobilised to Dampier as a contingency.

A combination of delivery systems was assessed and the optimum to meet the need most efficiently was by utilising:

- One FWADC air tractor; and
- One vessel.

Jadestone can meet daily dispersant requirements from Day 2.

The FWADC aircraft and vessels are considered the primary platform for dispersant application operations because of the ability to treat specific areas of oil with dispersant at the required dosage and droplet size.

Table 10-3 provides a dispersant budget, noting application requirements via vessel and air can easily meet demand by Day 2 due to the relatively small volume of the spill.

**Table 10-3: Dispersant application budget**

| Day | Volume of oil ($m^3$) available for treatment by dispersant (after weathering) | Maximum volume of dispersant required ($m^3$) based on volume of oil released and DOR | Arrival of dispersant in Dampier ($m^3$) | Aerial application capability ($m^3$) | Vessel application capability ($m^3$) |
|---|---|---|---|---|---|
| **1** | 65 | 2.6 | 10 | 0 | 0 |
| **2** | 60 | 2.4 | 10 | 9 | 8 |
| **3** | 55 | 2.2 | Not required | 9 | 8 |

## 11. CONTAINMENT AND RECOVERY STRATEGY

Booms and skimming equipment can be used to create physical barriers on the water surface to contain and recover the oil spill where information and predictive spill fate modelling indicate a likely threat to environmental, social and cultural sensitivities. Effective containment and recovery provides significant environmental benefit by removing floating oil and thereby decreasing the likelihood of oiling wildlife and reducing the amount of oil reaching shorelines.

Containment is the name for using booms (inflatable or solid) to corral oil usually in the offshore environment near the hydrocarbon source. Once contained, an attempt to recover the hydrocarbons from the surface waters can be undertaken. The response is only feasible in certain conditions that include:

- Weather and sea state: containment and recovery equipment is only effective in calm conditions. Effectiveness is variable depending on equipment type, but is generally only considered effective below 20 knots of wind, wave heights less than 1.5 m and currents less than 2 knots (Stevens & Aurand, 2008);
- Adequate surface thickness of hydrocarbons: containment and recovery is more effective when a sufficient oil thickness can be achieved by the containment booms (minimum of 50 g/$m^2$), which is often limited to Group 3 and 4 (ITOPF) hydrocarbons; and
- Suitable oil type and characteristics: containment of fresh, volatile oil should not be attempted due to its low flash point. No attempt should be made until the safety of the area has been established. Containment of lighter oils such as diesel is often not viable because they evaporate and dissipate quickly.

If this option is deemed suitable through assessments and situational awareness (NEBA, trajectory to sensitivities, weather, seas state, oil type), significant logistical support will be required that will include suitable vessels, experienced crew, booms and skimmers, pumps, on-board storage for recovered oil and aircraft to direct the vessel to the areas with the thickest floating oil. In addition to logistical support requirements, containment activities are inherently inefficient due to the spreading characteristics of oil on water.

### 11.1 Initiation and Termination Criteria

| Tactic | Initiation criteria | Termination criteria |
|---|---|---|
| Offshore containment and recovery | Immediately when Level 2 spill incident (Stag Crude) is confirmed. | When boom encounter rate (BER) is less than 10 $m^3$ per hour |
| Offshore waste storage and collection | When offshore containment and recovery is initiated. | When all oily waste water temporarily stored offshore has been transferred to intermediate waste storage on land. |

### 11.2 Tactics

- Offshore containment and recovery

### 11.3 Tasks for Containment and Recovery

In the initial response, Jadestone will mobilise ocean booms and hydraulic power pack equipment from AMSA Dampier, then from AMOSC in Exmouth. This provides the shortest timeframe for implementation. Requirements for additional resources can be assessed during the spill. If conditions and equipment are proving successful, then further activity will be implemented with vessels on contract to Jadestone using equipment (booms and pumps) from AMOSC and (AMSA) National Plan equipment, and personnel from the

AMOSC core group and National Response Team personnel through AMSA and State Response Team personnel through WA DoT.

Each vessel conducting containment and recovery is to be manned with a team of trained (minimum two) AMOSC Core Group Oil Spill Responders who will be tasked with controlling the operations and implementing in a safe and responsible method. The Team Leader has the responsibility of evaluating the effectiveness of the containment and recovery operations and communicating the information to the IMT. The IMT has the authority to demobilise or stand vessels off in the event of ineffective operations.

### 11.4 Tasks for Offshore Waste Storage and Collection

Activation of the Jadestone waste management contract will enable waste to be collected, stored and disposed of. Waste management is also discussed in the Jadestone Incident Management Team Response Plan (JS-70-PLN-F-00008).

Assuming favourable conditions, containment and recovery vessels operating offshore will collect floating oil using booms and skimmers. Skimmers will pump collected oily waters to IBCs or Iso-containers, where oily water will be allowed to settle such that the water phase will be suitable for over board discharge (decanting, if permitted) back into the collected oil behind the boom (to prevent secondary impacts of low concentration oil in water).

Oily waste water recovered through skimming can be up to 40 $m^3$ per team per day. Decanting into boomed areas has the potential to reduce the volume of waste water collected. Depending on storage configuration, waste collected may be collected by vessels transiting the operational area, or may return to Dampier for offloading.

### 11.5 WA DoT Requirements for Offshore Decanting of Waste Water

During offshore containment and recovery operations there is generally a large amount of water that is collected with the oil. This water can be decanted back into a boomed area to reduce waste and create more valuable storage area. The reduction of overall waste in some circumstances can create an environmental benefit which outweighs the minimal impact caused by the release of water with very low concentrations of oil.

Under the POWBONS Act; s. 8 allows for decanting for combating specific pollution incidents. Additionally, Annex 1 of MARPOL (Regulation 9) allows for decanting for combating specific pollution events to minimize the damage from pollution. Under both MARPOL and POWBONS decanting must be approved by the government in whose jurisdiction the discharge will occur. In WA State waters this is DoT (as the Hazard Management Agency under the Emergency Management Act 2005) and in Commonwealth waters this is the Australian Maritime Safety Authority (AMSA).

To minimise the potential for recovered oil being released while the water is decanted, the following practices are recommended (IPIECA/OGP, 2013):

- The temporary storage device should, prior to use, be checked to ensure that it is not contaminated with residues from any products or substances that may previously have been stored in that device, to ensure no unauthorised discharges occur;
- Appropriate settling time should be allowed to enable gravity separation to occur prior to decanting. Settling times will vary depending on the oil type. Studies have shown that settling times for different oil types ranges from 30–60 minutes;
- Where possible, employ the use of internal baffles in the temporary storage device to help speed up the separation and prevent re-mixing of the oil and water;

- Water should be discharged either into a secondary storage container (if available) or within a boomed area with a recovery device (skimmer) so that any residual oil can be recovered;
- Visual monitoring should be undertaken at the discharge point whilst decanting to ensure that only water is released. If possible, the oil/water interface in the storage container should be monitored to ensure that only the water is being drawn; and
- Dependent on the environmental and socio-economic sensitivity of the area affected by the spill, and any other response activities that are taking place, it is advised to identify the area(s) that decanting will be undertaken.

## 11.6 Resource Rationale for Containment and Recovery

This strategy will mobilise containment and recovery teams available to Jadestone by arrangements with AMOSC. Worst case spill modelling indicates that these teams would initially be deployed from Dampier for rapid response close to the spill site.

Boom encounter rate (BER) is a concept used in response planning to estimate the amount of oil that may be encountered by booming arrays and contained ready for recovery by skimmers. Formula for estimating BER is described in the Technical Guideline for the Preparation of Marine Pollution Contingency Plans for Marine and Coastal Facilities (AMSA, 2015).

### 11.6.1 Amount of oil available to recover

Table 11-1 is used for planning purposes to identify the number of containment and recovery systems likely to be required. This information should be used as a guide only, as the amount of oil available to recover may vary from the volumes provided below.

The weekly volumes provided in Table 11-1 are based on the weathering rates provided in Section 4.2.

**Table 11-1: Containment and Recovery Plan Calculation**

| Day | Oil available to recover ($m^3$) after weathering and recovery | C&R Systems needed (assume 1 system = 28.2 $m^3$ oily waste water per day recovered) | C&R systems Jadestone can access | Potential volume of oil recovered ($m^3$) per day |
|---|---|---|---|---|
| 1 | 65 | 2 | 0 | 0 |
| 2 | 60 | 2 | 1 | 28.2 |
| 3 | 15 | 2 | 2 | 56.4 |
| As required | Fragmented windrows | 2 | 2 | 56.4 |

### 11.6.2 Containment of oil

Containment calculations have been made using the AMSA Boom Encounter Rate formula:

$$\mathbf{BER} = (\mathbf{LB} \times \mathbf{0.3}) \times \mathbf{V} \times \mathbf{T}$$

Where:

- BER is the boom encounter rate (BER);
- LB is the length of boom deployed (200 m);
- 0.3 represents the opening of boom array (also called the swathe) and is considered to be 30% of the total boom length;
- V is the velocity of the vessel and is assumed for planning purposes to be 1 knot ; and

- T is the average thickness of oil (mm) from indicative planning targets table. Assuming 50 g/$m^2$ (0.047).

Therefore:

- BER = (200 x 0.3) x 1 x 0.047 = 2.82 $m^3$;
- 2.82 $m^3$ is the amount of oil 1 system can encounter in 1 hour @ 50 g/$m^2$; and
    - For planning purposes one "Containment & Recovery" system equates to over a 10 -hour day:
    - One vessel with 200 m offshore boom, 1 x offshore skimmer @ min. 2.82 $m^3$/hour = 28.2 $m^3$/day.
- Two Containment and Recovery Packages equates to 56.4 $m^3$ per day.

### 11.6.3 Resources

Jadestone has the ability to mobilise one containment and recovery system by Day 2 and two systems by Day 3. Two systems have the ability to recover more than the estimated volume of oil available by Day 3. However, containment and recovery systems will be retained after this period to recover any fragmented sections of the spill. If the trajectory modelling indicates that shoreline accumulation will occur, containment and recovery vessels can be directed towards protecting those shorelines and priority receptors.

The vessels and crew are accessed from a combination of companies that Jadestone currently holds MSA's with, call-off contracts and in consultation with Jadestone's approved marine broker. Trained supervisors will be sourced from AMOSC core group.

Active booming systems are deployed to allow containment and recovery operations without the need for an additional skimming system (where deployed). This allows for greater effectiveness and continued skimming operations. Active booming systems are available through AMOSC and would be prioritised for mobilisation. Rapid sweep systems are also deployed, which allow containment and recovery operations to be undertaken at speeds of up to 3 knots. This allows for greater encounter rates and surface coverage.

For planning purposes, the vessel speed of 1 knot was chosen as this allows for more manoeuvrability and targeting of oil windrows. In support of containment and recovery operations it is intended to establish a Logistics Base in Dampier utilising support provided by the current contracted Jadestone logistics support service provider.

## 12. PROTECTION AND DEFLECTION STRATEGY

Booms can be used to create physical barriers to protect sensitive receptors. This option is often used in nearshore environments in close proximity to the area requiring protection. It can be installed in deeper water further from the protection priority with the intent of taking the oil off its trajectory path to the sensitive receptor.

This strategy involves a combination of nearshore booming using vessel-based operations ('nearshore operations') while the spill remains on a predicted shoreline impact trajectory, and the placement of shoreline boom around areas to:

- Protect sensitive shorelines;
- Deflect the oil back to ocean or to easier locations for shoreline clean-up;
- Reduce the volume of oil impacting sensitive shoreline habitats to ALARP; and
- Align the response strategy with NEBA.

Much of the potential deployment locations are characterised with large tidal movements (>10m), which would result in tidal currents exceeding boom capabilities. Protection booms will only be installed in areas where the tidal currents are below 0.75 knots.

Protection and deflection activities are advised for slicks greater than 100 g/m$^2$. Modelling shows that the oil decreases below the 100 g/m$^2$ threshold rapidly when the oil is at the surface, thereby constraining minimum arrival times to relatively low values or no accumulation above this threshold (i.e. low oil persistence at concentrations >100 g/m$^2$ due to evaporative losses and spreading).

It should be noted that operationally the effectiveness of this strategy will vary depending on the level of accumulation at different locations. Operational monitoring data will provide important information for response decision making. If a tangible, positive outcome is demonstrated, and if health and safety risks are not disproportionate to the environmental benefit achieved in mobilising the response, a protect and deflect operation may be possible. Jadestone have provided guidance within this OPEP in the event the IMT is required to mobilise equipment and personnel to potentially contacted shorelines, prior to that identified in the oil spill modelling.

### 12.1 Initiation and Termination Criteria

| Tactic | Initiation criteria | Termination criteria |
|---|---|---|
| Nearshore booming | When OSTM indicates shoreline accumulation may exceed the >100 g/m$^2$ threshold | When shoreline receptors no longer able to be protected by nearshore booming. |

### 12.2 Tactics

Given the remoteness and nature of the shorelines potentially contacted, Jadestone has prepared a protection and deflection response that caters for the priority receptors and can move to other locations as required. Deployment is subject to safety concerns of operations in high tidal influence and shallow waters; and possible grounding issues of small vessels, so must therefore be assessed under a NEBA.

The locations for initial nearshore protection and deflection operations will be evaluated by the IMT through observations and modelling during the incident response. Locations identified for potential shoreline impact are to be cross-referenced with the shoreline sensitivity and feature mapping data available through the DoT Oil Spill Response Atlas (OSRA).

As deflection and protection operations will occur in State Waters, the SMPC will direct the response operations to locations identified in the Jadestone OPEP or as determined by real time data and State/Territory priorities receptors.

If deployment of protection and deflection booms is considered feasible and effective, inspections and maintenance of the booms are to be timed based on tidal cycles and are to be undertaken by response personnel to ensure locations and formations are maintained so that they remain effective in achieving objectives.

The range of protection and deflection methods include nearshore booms (beach guardian, zoom boom, short curtain boom and sorbent boom) anchored close to the identified priority receptor areas, or open water booms (deep curtain ocean boom) placed at significant distances from shorelines to deflect the open water pathway of the oil to force the oil to miss the predicted shoreline requiring protection.

Operational monitoring and Incident Action Planning will guide the response to prioritise protection of sensitive key features. The protection and deflection response are to be scaled to be commensurate to the risk posed by an actual incident. The results of spill fate modelling will provide the accumulated oil information which will enable calculation of the required amount of protection and deflection equipment.

Deployment of equipment and personnel is to be from AMOSC. Depending on actual conditions and possible responses to the reduce impacts to ALARP, further deployments of resources can be implemented through Jadestone's OSRL SLA and AMSA National Plan shoreline response equipment stockpiles and NRT personnel, as agreed with by AMSA and Jadestone and implemented by the relevant Incident Management Team.

While equipment and personnel mobilisation are occurring, operational monitoring is continuing and the results sent to the IMT within two hours of teams returning to their operating base. The most up-to-date information will then be communicated to the protection and deflection teams to guide the selection of the operational locations.

The SMPC will advise on priority receptors aided by the oil spill trajectory modelling to locations with the most likely impact. Deployment locations will be selected from the closest facilities to where priority receptors are identified.

The effectiveness of the protection and deflection strategy to achieve performance objectives against the IAP objectives is to be communicated to the IMT by a nominated Shoreline Response Team Leader. The IMT has the responsibility to extend or terminate the response in consultation with the SMPC.

### 12.3 Priority Receptors

In locations along the Pilbara Coastline, shoreline access is often restricted and much of the coastline is only accessible via vessel, making it difficult to access suitable locations to install protection booms. For these areas the removal of oil using offshore Containment and Recovery, together with the application of dispersants, is the key strategy for preventing shoreline impacts.

In some offshore locations the water may be sufficiently calm to install fixed booms in deep water to assist in the protection of highly sensitive areas where shoreline clean-up may be very difficult to effectively achieve. This will be considered to protect large mangrove stands that are difficult to access, however, the large tidal range will result in high velocity water and may exceed the operating parameters of booms.

The minimum time for oil contact at a priority receptor at >100 g/m$^2$ is 1.4 days (Table 12-1) with most areas on a scale of more than 2 weeks.

This provides time for pre-assessment of shoreline areas for which oil may accumulate, noting sensitive receptor locations, fauna presence (e.g. nesting turtles and birds) and morphology of shorelines/creek systems. These aspects change seasonally, and a pre-assessment window provides the ability for up to date information to be considered when formulating a specific plan for shoreline protection.

### 12.4 Resource Rationale for Protection and Deflection

OSTM outputs assisted in identifying priority receptors and to help determine the number of shoreline protection and deflection operations required for each location. The resource rationale presented in Table 12-1 is for capability analysis only and would be revisited should a spill occur.

Table 12-1 presents resourcing requirements using the stochastic modelling results for shoreline accumulation >100 g/m². It should be noted that not all of the receptors listed in Table 12-1 may be contacted by one single spill. These results are presenting the range of possible worst-case timeframes for accumulation and length contacted based on all runs that make up the stochastic model. Jadestone will use initial operational monitoring data (e.g. trajectory modelling and aerial surveillance) to determine where resources should be allocated. This may include directing resources to conduct shoreline assessment at locations not identified as protection priority areas, to determine if protection and clean-up activities may be required at these receptors.

For planning purposes, **one protection and deflection operation** consist of:

- Boom (shore sealing, self-inflating and solid flotation);
- Ancillary equipment and vessels (if required);
- 2 trained oil spill responders; and
- 5 personnel / labour hire to deploy the booms.

Jadestone will access shoreline protection equipment via AMOSC and personnel via AMOSC Core Group and labour hire contracts.

**Table 12-1: Shoreline protection resource requirements for priority receptors based on stochastic modelling**

| Priority receptor | Minimum time to shoreline oil accumulating >100g/m² (days) [9] | Oiled shoreline length at concentrations >100 g/m² in worst replicate simulation (km) | Number of shoreline protection and deflection operations recommended |
|---|---|---|---|
| Dampier Archipelago | 7 | 10 | 1 |
| Montebello Islands | 1.4 | 8 | 1 |
| Lowendal Islands | 26 | 4 | 1 |
| Barrow Island | 26 | 2 | 1 |
| Eighty Mile Beach | 14 | 4 | 1 |

[9] All results presented in this table are from Scenario 1 (subsea release of 86.5 m³) for the period September to February, with the exception of Montebello and Lowendal Islands which are the same scenario but the period of March to August.

## 13. SHORELINE CLEAN-UP STRATEGY

Shoreline clean-up in State Waters is managed by the SMPC. Jadestone will undertake first-strike activations as required. The SMPC will direct resources provided by Jadestone for the purposes of shoreline clean-up. Jadestone shall provide all necessary equipment and personnel via its OSRO contracts.

The information obtained from operational monitoring (refer to Section 9), will be used to identify possible impact areas, and by the IMT in the development of the operational NEBA. The operational NEBA will assess if shoreline clean-up activities will be beneficial in accelerating the return of the shorelines to baseline conditions.

### 13.1 Initiation and Termination Criteria

| Tactic | Initiation criteria | Termination criteria |
|---|---|---|
| NEBA of shoreline response strategies | When SCAT surveys recommend shoreline clean-up activities. | When SCAT surveys recommend no further action be taken (NFA). |
| Shoreline clean-up and waste management | When NEBA of shoreline strategies recommends shoreline clean-up activities. | When SCAT surveys recommend no further action be taken (NFA).<br>Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response |

### 13.2 Tactics

- Undertake a NEBA of shoreline response strategies utilising findings from SCAT surveys; and
- Implement shoreline clean-up and waste management

### 13.3 Tasks

For planning purposes, Jadestone uses a minimum threshold of 100 g/m$^2$ (concentration of accumulated hydrocarbons on shorelines) to determine the lower limit for effective clean-up operations.

Once SCAT surveys (Section 9.4.7) of key shorelines have been completed, the results would help inform an operational NEBA and suitable response tactics for that location. Response tactics may include manual bagging of stranded oil where access can be gained, surf washing where wave action and sandy beaches are accessible by machinery, tilling and turning the sand to aid bioremediation where wave action is not strong enough to drive surf washing, rock flushing with high volume low pressure sea water, or leaving the weathered oil in-situ to breakdown where access for man or machinery is not possible.

Shoreline habitats in the region predominantly comprise of high relief rocky shoreline, sandy beaches, inter-tidal reefs, and mudflats/mangrove habitats. Macroalgal and seagrass beds will be avoided when assessing shoreline clean-up response tactics and the less intrusive options of natural attenuation and bioremediation will be preferred.

Information on shoreline type obtained from SCAT surveys will contribute toward the NEBA process. Each likely shoreline impact will be evaluated through observations and modelling, and shoreline response teams will be deployed and positioned as per those observations. Through information gathered and assessed by the IMT and SMPC, the movement of floating oil towards shorelines is to be identified and clean-up tactics implemented to reduce the consequences to shoreline habitats to ALARP. A summary of shoreline clean-up techniques is provided in Table 13-1.

Intrusive shoreline clean-up techniques have the potential to damage sensitive shorelines. Given that the majority of the mainland shoreline contacted consists of tidal mangroves and saltmarshes, and the islands predicted to be contacted are also inhabited by tidal mangroves and sensitive species, the appropriateness of clean-up will be determined as opposed to natural attenuation. Selection of the shoreline clean-up

methods and controls to prevent further damage from the clean-up activities are to be undertaken in consultation with the SMPC and selected based on NEBA.

Jadestone will have an agreed process which allows for stakeholder input into the termination criteria as per AMSA Guidance NP-GUI-025 2015 (AMSA, 2022a). The degree of damage from shoreline clean-up activities is to be managed to ALARP, considering net environmental benefit of the clean-up activity.

**Table 13-1: Shoreline clean-up techniques**

| Method | Description |
|---|---|
| Mechanical clean-up | Mechanical clean-up techniques may utilise several equipment types. It is best to use equipment in the way for which it was designed. Front end loaders, bulldozers and elevating scrapers can all be used to rework beach sediment (e.g. cobble, pebble, and boulder) or to push such sediments into the shoreline for cleaning by waves.<br>**Note**: Vehicles should not be allowed to pass over oiled sediment since this tends to result in the burial of oil into sediment. |
| Manual clean-up | Manual clean-up is the preferred option for cleaning inaccessible shorelines or those where mechanical clean- up is undesirable. Manual clean-up is slower than mechanical clean-up but generally results in the removal of much less sediment. Hence disposal requirements are reduced. Equipment is usually basic and consists of wheelbarrows, rakes, buckets, shovels, plastic bags (industrial strength) or other temporary storage. The requirements for manual beach clean-up are highly variable but generally a 10-person team, plus 1 supervisor is required to recover 10 $m^3$ of oil in one day. |
| Low pressure flushing | Low pressure flushing can be used, with care, to remove surface oils from most beach type surfaces. It is important that refloated oil is collected in booms or other containment devices and recovered using skimmers or sorbents. Generally low pressure flushing does not result in the emulsification of oils and so sorbents may be used. It is preferable to check the condition of refloated oil and choose a suitable skimming device and pump. It is important also that refloated oil does not pass over clean sediment. |
| High pressure flushing | High-pressure washing is to be used only on artificial surfaces such as wharves, jetties etc. This method tends to emulsify oil and consequently the use of sorbents to collect refloated oil is not recommended. Oil, which is removed from surfaces, can be collected within light inshore booms or onshore using Shore Guardian or a similar boom. Oil can be recovered using vacuum systems or skimmers. Material and labour requirements are highly variable and will depend on the extent of oiling, the speed with which cleaning is expected to proceed, the type of substrate and the ease with which containment can be achieved. |
| Enhanced bioremediation (sediment reworking) | Machinery is used to breakup large paddies of stranded oil on beaches and to till and turn the oiled sands to aerate the sandy sediment and enhance the biological breakdown of the oil. This can be applied to oil that has deposited on sands above the normal high-tide area, typically during large storms, and there is little likelihood of the water reaching the stranded deposits. |
| Monitoring of natural attenuation and bioremediation | By implementing shoreline clean-up methods described above, the amount of oil remaining stranded on shorelines will be reduced to ALARP; the remaining oil will be very difficult to access or remove and the activity is no longer preferred under NEBA when compared to the impacts of the intrusive clean-up methods. In addition, and assessed under NEBA, some areas of coastline will not be subjected to any clean-up methods due to access issues or possible impacts from the clean-up activities. It's at this point that monitoring of natural attenuation and bioremediation become the selected clean-up methods under a NEBA assessment. These areas will be monitored until no visible oil is remaining in the impacted area. |
| *Supplementary equipment* | |

| Method | Description |
|---|---|
| Sorbents | Two types of sorbent materials can be used; (1) loose, powdered or granular sorbents, or (2) solid, pads, rolls or sheets. Each of these may be either of synthetic or natural fibre. As a general rule, loose sorbent materials are not used because they are difficult to recover. However, there are occasions when this is not considered to be a problem, such as in high-energy areas where oily sorbent materials can be expected to be washed from surfaces and dissipated to sea. Of course, oil too is likely to be washed off such shorelines, to dissipate. Solid sorbents may be used in the form of sorbent booms to recover light oil films or as pads or rolls to absorb free oil from the surface of sediments in cases where vacuum systems cannot gain access or where oil is too fluid for manual recovery. |
| Vacuum systems | Vacuum systems may be portable hand operated systems or vacuum trucks. Vacuum systems tend to pick up large volumes of water with the oil and so it is preferable to use them on oil pooled on the sediment surface or to remove oil from containers or dams in which the water has been decanted. One method to minimise the amount of water removed from the beach is to use light, portable vacuum systems to deposit oil-water into temporary storage containers on the beach, allow settling time and to decant the water. Large units can then be used to collect the oil from these containers and transport oil to storage sites. Vacuum systems can also be used in association with deflection booms to recover oil from the sea surface. It is advisable in this case to fit the hose with a broad Manta Ray head. |

### 13.4 Resource Rationale for Shoreline Clean-Up

The combination of machinery for mechanical removal of oil (bulldozers/ scrapers/ front end loaders) and personnel requirements have been considered for each protection priority area based on opportunities for use and sensitivity of shoreline (i.e. may not be used for small offshore islands or for remote rocky or mangrove lined shorelines). Therefore, it is the opportunity for use rather than the availability of machinery and personnel which is considered the limiting factor.

Analysis of the worst replicate simulation for the greatest number of shoreline clean-up responders required, and highest probability for shoreline accumulation > 100 g/m$^2$ has been used to inform the personnel and waste requirements for shoreline clean-up. It is assumed that planning for the greatest number of teams will meet these requirements. Jadestone has planned for a trained oil spill responder and 9 personnel in each shoreline clean-up team and assume that each team can recover 10 m$^3$ per day. Actual personnel numbers will vary according to the shoreline clean-up techniques recommended by SCAT teams during their field assessment of affected shorelines and the operational NEBA assessment, which will be performed prior to a Shoreline Clean-up Plan (IAP Sub-plan) (Refer to Section 17.9) being developed. The locations and numbers below are presented for capability analysis only and will be revisited should a spill occur.

### 13.5 Priority receptors

A number of the priority receptors predicted to be contacted at concentrations >100 g/m$^2$ under the worst-case replicate simulation includes tropical environments with extensive mangrove communities, deltas and tidal wetlands. The tidal ranges in this region are large (7-10 m) and much of the coastline is remote and inaccessible via road, making many of the shoreline clean-up techniques described unsuitable (e.g. mechanical removal, enhanced bioremediation, vacuum trucks, high pressure flushing) and their use is likely to result in greater environmental impacts than the oil itself. In addition, the remote nature, presence of dangerous fauna (i.e. Saltwater crocodiles and Irukandji jellyfish) present significant safety risks to responders working in these environments.

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

shoreline profile and adverse impacts to shoreline invertebrate communities which provide an array of ecosystem services (Michel, et al., 2017).

Given the safety constraints and ecological sensitivities of these shorelines, shoreline clean-up operations should be conducted by smaller teams (max 10 people/team) for a longer period. Intermittent manual treatment (<20 visits/month) and use of passive recovery booms is likely to be more effective than intrusive methods (e.g. intrusive manual removal >20 visits/month). Although this may take longer to undertake the clean-up, it is considered that the benefits outweigh the impacts as smaller teams are more targeted, recovering more oil and less sand and debris, reducing trampling of oil into the shore profile and will minimise ecological impacts on the shorelines and their sensitive species.

Table 13-2 presents the maximum daily accumulated oil ($m^3$) and a worst-case bulking factor for waste for the identified priority receptors. The number of shoreline clean-up teams recommended to treat these shorelines is not based on extensive, intrusive and contiguous removal of oil and waste along all shorelines, but rather use of smaller teams and at lower frequency of visits. Where shoreline based manual removal is safe and deemed advantageous by SCAT teams and operational NEBA, this should be conducted via land access (if possible) or via suitable vessels. However, it should be noted that it is generally not feasible to move response equipment into and out of mangroves, tidal flats and delta environments without causing excessive damage. Even foot traffic must be minimised, either by laying down wooden walkways or relying on vessel-based activities as much as possible (API, 2020).

**Table 13-2: Resource Rationale for Shoreline Clean-up Personnel**

| Receptor | Minimum time to shoreline accumulation at or above 100 $g/m^2$ (days) | Accumulated oil on shoreline in worst replicate simulation at or above 100 $g/m^2$ ($m^3$) | Number of shoreline clean-up teams recommended (1 team per 10 $m^3$/day) | Number of shoreline clean-up responders required (10 per team) | Potential waste generated (worst replicate simulation) bulking factor of 10 ($m^3$) |
|---|---|---|---|---|---|
| Dampier Archipelago | 7 | 19 | 2 | 20 | 190 |
| Montebello Islands | 1.4[10] | 33 | 2 | 20 | 330 |
| Lowendal Islands | 26 | 7 | 1 | 10 | 70 |
| Barrow Island | 26 | 2 | 1 | 10 | 20 |
| Eighty Mile Beach | 14 | 7 | 1 | 10 | 70 |

## 13.6 Shoreline Clean-up Waste

Shoreline clean-up waste will consist of oil, oiled substrate (e.g. sand, pebbles), oiled debris, oiled sorbents, PPE and animal carcases. Activation of the Jadestone waste management contract will enable clean-up waste to be collected, transported, stored and disposed of. Waste management is also addressed in the IMTRP.

[10] All results presented in this table are from Scenario 1 (subsea release of 86.5 $m^3$) for the period September to February, with the exception of Montebello and Lowendal Islands which are the same scenario but the period of March to August.

Jadestone's waste management contractor has sufficient onshore temporary waste storage in the form of different volume skip bins, lift bins and hook lift bins, all of which can be mobilised and made available in Dampier within 24-48 hours of activation. Jadestone can also access temporary onshore storage tanks, bladders and containers through its membership with AMOSC.

### 13.6.1 Accessible shorelines

Along the affected accessible shorelines, temporary waste storage will be distributed by telehandlers and readily accessible by clean-up crews. Wastes will then be either collected by operating mobile plant such as excavators, or through manual waste removal (bagged waste), and deposited into these bins.

Waste-related telehandlers will operate collection services along the hot zone, picking up filled bins while returning empty bins for further collection. Wastes collected will initially be consolidated into 10 $m^3$ skips located within the warm zone. These skips will then be removed from the warm-zone to the temporary holding facility located within the operational areas, for loading onto semi-trailers or road trains pending final disposal to landfill.

For accessible shorelines, the IMT will determine the most suitable method of shoreline clean-up (Refer to Table 13-3) through an Operational NEBA assessment.

### 13.6.2 Remote Locations/Islands Waste Management

As described in Section 13.5, the majority of shorelines predicted to be impacted from a worst-case credible spill are in areas with limited to no access. Manual removal is the preferred method of clean-up for these areas and will be supported using vessels capable of shoreline landings, smaller machinery (where appropriate) and helicopters to deliver equipment and personnel and remove collected waste.

Access and all clean-up activities will be conducted via vessels or helicopters in front of the primary dune of the impacted shoreline. Jadestone will not access any areas behind the primary dune of impacted offshore islands during any stage of the clean-up operation.

Equipment delivery - If the impacted shoreline can be accessed with a barge and landing craft, crew on the barge will deliver an appropriate number of clean-up packs (to cater for the number of response personnel defined in the IAP) onto the impacted shoreline above the high tide mark. A helicopter will deliver the appropriate number of clean-up packs if barge access is not possible.

Personnel - Response personnel may be transported to the impacted shoreline on a barge. If access is not possible by barge, helicopters may be used to transport personnel. Response personnel will not camp on the islands due to potential for additional impacts from this activity.

Initially, response personnel will shovel the oily waste into small manageable bags (weighing 20–30 kg when full) which will be stored in a lined, temporary storage area until they are removed from the island. The temporary storage area will be located at the bottom of the primary dune and above the Highest Astronomical Tide (HAT) mark.

Waste collection – Response personnel will transfer the small bags of solid oily waste and small drums of liquid waste from the temporary storage area to a container within the barge. All-Terrain Vehicles and bobcats may also be used for the same purpose where appropriate. The barge will then steam to the closest service wharf and transfer the waste onto a waste truck supplied by Jadestone's waste management contractor. In areas where a barge cannot access the shoreline, oily waste will be placed in an underslung load and transferred by helicopter to the closest land-based point that has vehicle access for onward movement.

**Table 13-3: Shoreline Clean-up Selection Factors by Shoreline Type, Oil Type and Degree of Oiling**

| Shoreline Type | Type of Oil | Degree of Oiling* | Shoreline Clean-up Tactic | | | |
|---|---|---|---|---|---|---|
| | | | Natural Recovery | Manual and Mechanical | Sediment Reworking | Flooding and Flushing |
| Exposed Rocky Shores | 1 | Light | ☑ | ☑ | ☑ | ☑ |
| | | Moderate | ☑ | ☑ | | ☑ |
| | | Heavy | ☑ | | | ☑ |
| | 2 | Light | ☑ | ☑ | ☑ | ☑ |
| | | Moderate | ☑ | ☑ | | ☑ |
| | | Heavy | ☑ | ☑ | | ☑ |
| | 3 | Light | | ☑ | | ☑ |
| | | Moderate | | ☑ | | ☑ |
| | | Heavy | | | | ☑ |
| Sandy Shores and Beaches | 1 | Light | ☑ | ☑ | ☑ | ☑ |
| | | Moderate | ☑ | | | ☑ |
| | | Heavy | | | | ☑ |
| | 2 | Light | ☑ | ☑ | ☑ | ☑ |
| | | Moderate | ☑ | ☑ | | ☑ |
| | | Heavy | | ☑ | | ☑ |
| | 3 | Light | | ☑ | | |
| | | Moderate | | ☑ | | |
| | | Heavy | | ☑ | | |
| Artificial Structures | 1 | Light | ☑ | ☑ | | ☑ |
| | | Moderate | ☑ | ☑ | | ☑ |
| | | Heavy | | ☑ | | ☑ |
| | 2 | Light | ☑ | ☑ | | ☑ |
| | | Moderate | ☑ | ☑ | | ☑ |
| | | Heavy | | ☑ | | ☑ |
| | 3 | Light | | ☑ | | ☑ |
| | | Moderate | | ☑ | | ☑ |
| | | Heavy | | ☑ | | ☑ |
| Sheltered Rocky Shores | 1 | Light | ☑ | ☑ | ☑ | ☑ |
| | | Moderate | ☑ | ☑ | ☑ | ☑ |
| | | Heavy | | | | ☑ |

| Shoreline Type | Type of Oil | Degree of Oiling* | Shoreline Clean-up Tactic | | | |
|---|---|---|---|---|---|---|
| | | | Natural Recovery | Manual and Mechanical | Sediment Reworking | Flooding and Flushing |
| | 2 | Light | ☑ | ☑ | ☑ | ☑ |
| | | Moderate | ☑ | ☑ | ☑ | ☑ |
| | | Heavy | | ☑ | | ☑ |
| | 3 | Light | ☑ | ☑ | ☑ | ☑ |
| | | Moderate | ☑ | ☑ | ☑ | ☑ |
| | | Heavy | | ☑ | | ☑ |
| Mud and Tidal Flats | 1 | Light | ☑ | ☑ | | ☑ |
| | | Moderate | ☑ | | | ☑ |
| | | Heavy | | | | ☑ |
| | 2 | Light | ☑ | ☑ | | ☑ |
| | | Moderate | ☑ | ☑ | | ☑ |
| | | Heavy | | | | ☑ |
| | 3 | Light | ☑ | ☑ | | ☑ |
| | | Moderate | ☑ | | | ☑ |
| | | Heavy | | | | ☑ |
| Mangroves and Wetlands | 1 | Light | ☑ | ☑ | | ☑ |
| | | Moderate | ☑ | | | ☑ |
| | | Heavy | | | | ☑ |
| | 2 | Light | ☑ | ☑ | | ☑ |
| | | Moderate | ☑ | ☑ | | ☑ |
| | | Heavy | | | | ☑ |
| | 3 | Light | ☑ | ☑ | | ☑ |
| | | Moderate | | ☑ | | ☑ |
| | | Heavy | | | | ☑ |

## 14. OILED WILDLIFE RESPONSE

The Department of Climate Change, Energy, and the Environment and Water (DCCEEW) are the designated Jurisdictional Authority for spills in Commonwealth waters, and Jadestone will act as the Control Agency and will be responsible for the wildlife response for a petroleum activity spill associated with Montara Operations activities.

If a spill occurs in WA State waters or enters State waters, DBCA is the Jurisdictional Authority for wildlife, and for level 2/3 spills, will also lead the oiled wildlife response under the control of the DoT.

DBCA is the State Government agency responsible for administering the *Biodiversity Conservation Act 2016 (BC Act)*, which has provisions for authorising activities that affect wildlife. DBCA will activate the WA Oiled Wildlife Response Plan (WAOWRP) (DBCA, 2022a) where medium or high wildlife impact is noted or anticipated as per the WAOWRP (DBCA, 2022a) Guide for Rating the Wildlife Impact of an Oil Spill (Table 14-1).

For level 1 spills (as defined in Appendix A7) within or that enter State waters, Jadestone will be the Control Agency, including for wildlife response. It is however also an expectation that for level 2/3 petroleum activity spills, Jadestone will conduct the initial first-strike response actions for wildlife and continue to manage those operations until DBCA is activated as the lead agency for wildlife response and formal handover occurs. Following formal handover, Jadestone will function as a support organisation for the OWR and will be expected to continue to provide planning and resources as required.

The key plan for OWR in WA is the WAOWRP (DBCA, 2022a) and the accompanying WA Oiled Wildlife Response Manual (WA OWR Manual) (DBCA, 2022b). The WAOWRP establishes the framework for preparing and responding to potential or actual wildlife impacts during a spill and sets out the management arrangements for implementing an OWR in conjunction with the State Hazard: SHP-MEE.

The WA OWR Manual will be used by Jadestone as the resource for all procedures and processes, regardless of the location of the spill.

**Table 14-1: WAOWRP Guide for rating the wildlife impact of an oil spill (DBCA, 2022a)**

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

### 14.1 Initiation and Termination Criteria

**Table 14-2: Initiation and Termination Criteria**

| Tactic | Initiation criteria | Termination criteria |
|---|---|---|
| Wildlife reconnaissance<br>Wildlife first response<br>Mobilisation of resources | When operational monitoring shows that wildlife have been oiled or at imminent risk of oiling.. | There are no oiled wildlife;<br>Oiled wildlife have been successfully rehabilitated and released; and<br>when agreement is reached with Jurisdictional Authorities and stakeholders to terminate the incident response |

### 14.2 Wildlife Priority Protection Areas

French-McCay et al. (2002), based on a review of existing literature at the time, determined lethal thresholds for floating and shoreline oil for the external coating of wildlife to be ≥10 g/m$^2$ for floating, and ≥100 g/m$^2$ for shoreline accumulation. It should however be noted that toxicity thresholds for wildlife are likely to be highly variable due to differences in species sensitivity, type of hydrocarbon, type of exposure (ingestion or external oiling), life-stage, and on-water versus land habitat.

For planning purposes, determination of wildlife priority protection areas is based on stochastic modelling of the worst-case spill scenarios at ≥10 g/m$^2$ for floating, and ≥100 g/m$^2$ for shoreline accumulation (acknowledging that impacts to wildlife may occur at lower concentrations), the known presence of wildlife, and in consideration of the following:

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

Table 14-3 outlines the wildlife priority protection areas for Stag Field operational activities and these align with the priority protection areas for spill response described in Section 5 and in Section 7 and Appendix J of the Stag Field Operations EP.

**Table 14-3: Wildlife Priority Protection Areas**

| Protection Priority | Wildlife |
|---|---|
| **Dampier Archipelago** | Birds<br>-16 species of seabirds, some protected under EPBC, JAMBA and CAMBA species with significant breeding on Goodwyn, Keast Islands, Nelson Rocks<br>-migratory seabird resting, foraging and breeding areas on beaches and mudflats<br>-breeding occurs predominantly in winter months<br>-nesting can occur on sandy beaches and dunes<br>Marine reptiles<br>Turtles<br>- nesting and foraging<br>(Hawksbill - largest known nesting for NW pop is NW of Rosemary Is and Delambre, nesting all year) |

| Protection Priority | Wildlife |
|---|---|
| | (Flatbacks - nest on Legendre, Huay, Delambre)<br>(Green – significant rookery in NWS)<br>(Olive Ridley – known to forage)<br>(Loggerhead – nesting and foraging)<br>Sea snakes<br>- possible transient presence<br>Marine mammals<br>- Eight species (dugong, whales, dolphins)<br>- migratory pathway for protected humpback whale in July-Sept. |
| **Barrow Island Inc. surrounds** | Bandicoot Bay - conservation area created to protect benthic fauna and seabirds. Class A Nature Reserve<br>Turtles<br>- Regionally and nationally sig Green (western side) and flatback turtle (eastern side) nesting beaches,<br>- Foraging and nesting areas around Barrow Island for green, flatback and hawksbill; mating flatback turtles;<br>o Green turtle nesting: All year round (peak Dec-Jan)<br>o Hawksbill turtle nesting: Oct-Jan<br>o Flatback turtles: Dec-Jan<br>o Loggerhead nesting: Dec-Jan<br>- John Wayne Beach, logger heads + hawksbill (low density)<br>- Turtle Bay is an important turtle aggregation and feeding area<br>Birds<br>- Migratory birds (important habitat) (important bird area) 10th of top 147 bird sites,<br>o Key period: Sept-Feb<br>- Highest pop of migratory birds in BI Nature reserve (south-south east island) and in tidal mudflats e.g. Bandicoot Bay<br>- Along the East Asian-Australasian Flyway migration route of migratory sea and shorebirds<br>- Double island important bird nesting (shearwaters, sea eagles)<br>Marine mammals<br>- Whale and dolphin species may occasionally visit the Barrow/Montebello islands region |
| **Montebello Islands** | Turtles<br>- Logger head, green significant rookery, hawksbill, flatback<br>- Northwest and Eastern Trimouille Islands (Hawksbill), western reef and Southern Bay at Northwest Island (Green)<br>Birds<br>- Migratory and threatened seabirds - 14 species<br>- Significant nesting, foraging and resting areas<br>Marine mammals<br>- Whale and dolphin species may occasionally visit the Barrow/Montebello islands region<br>- Only the humpback whale is a regular visitor to these areas (foraging)<br>- Pygmy blue whale northern migration (Apr - Aug)<br>- Dugongs regularly seen in shallow waters |

| Protection Priority | Wildlife |
|---|---|
| **Lowendal Islands** | Turtles<br>- Important hawksbill (Beacon, Parakeelya, Kaia and Pipeline), Loggerhead and green turtle nesting (minor) Varanus pipeline, Harriet and Andersons),<br>- Nesting is reported to occur throughout the year in WA, peaking between October and January<br>- Significant Flatback rookery, nesting season for Flatback turtles peaks in December and January with subsequent peak hatchling emergence in February and March<br>Birds<br>- Approximately 89 species of avifauna, 12 -14 species of migratory and seabirds<br>Marine mammals<br>- Seagrass beds around the Lowendal islands thought to provide valuable food source for dugongs |
| **Eighty Mile Beach** | Turtles<br>- Flatback turtles nest at scattered locations along shoreline.<br>- Green, hawksbill, loggerhead, olive ridley and leatherback may frequent the waters all year round<br>Birds<br>- Ramsar site<br>- 97 wetland bird species, 42 of which are listed under CAMBA, JAMBA and ROKAMBA<br>- 500,000 birds use the area as a migration terminus annually, key period is Aug-Nov when contact with oil spill could result in impacts at a population level<br>Marine Mammals<br>- Humpback whale migration pathway though the CMR<br>- Dugongs and other cetaceans inhabit or migrate through the CMR/marine park although unlikely to be larger whale species due to water depths |

### 14.3 Magnitude of Wildlife Impact and Oiled Wildlife Response

Using the WAOWRP (DBCA, 2022a) *Guide for Rating the Wildlife Impact of an Oil Spill* (Table 14-1), and stochastic modelling for the worst-case spill scenarios (Section 7.5 of the EP), it is predicted that medium wildlife impacts may occur.

During the initial first-strike the focus of the OWR by Jadestone will be on wildlife reconnaissance, notifications, activation of the Wildlife Division, and the mobilisation of resources. To mobilise OWR resources Jadestone will need to activate OWR arrangements with AMOSC and OSRL (depending on the magnitude of impact). Upon activation and formal handover to DBCA, Jadestone will function as a support organisation for the OWR and will continue to provide planning and resources as required.

Further information describing oiled wildlife response arrangements is provided at Appendix A of the Incident Management Team Response Plan (JS-70-PLN-F-00008).

## 15. REVIEW OF OPEP

This OPEP shall be reviewed, updated (if required) and submitted to NOPSEMA every 5 years from date of acceptance.

The document may also be reviewed and revised more frequently, if required, in accordance with Jadestone's Management of Change Procedure. This could include changes required in response to one or more of the following:

- On an annual basis (12 monthly); or
- When new testing response arrangements are introduced; or
- When response arrangements are significantly amended; or
- After a significant change to Jadestone's risk profile.

The extent of changes made to the OPEP and resultant requirements for regulatory resubmission will be informed by the relevant Commonwealth regulations, i.e. the OPGGS (E) Regulations.

## 16. CONTROLS

Environmental performance outcomes (EPOs) of the response strategies, control measures, performance standards presented in Table 16-1 are:

- Reduce oil volumes from reaching the shoreline to as low as reasonably practicable; and
- Reduce impacts to marine and coastal fauna through the implementation of the WA Oiled Wildlife Response Plan.

**Table 16-1: Operational Performance Standards and Measurement Criteria**

| Response Element | Control Measures | Performance Standards | Measurement Criteria |
|---|---|---|---|
| Notifications and Activations | AMOSC activation | Verbal notification/activation of AMOSC within 60 mins of IMT being convened | Incident Log |
| | AMSA activation | Verbal notification/activation of AMSA within 60 mins of IMT being convened | Incident log |
| | IMTRP | Complete regulatory notification within designated timeframes | Incident log |
| | Monitoring service provider activation | Verbal notification/activation of monitoring service provider within 6 hours of IMT being convened | Incident log |
| Overall spill response | Spill response activities selected on basis of a Net Environmental Benefit Analysis (NEBA) (Incident Management Team Response Plan JS-70-PLN-F-00008) | NEBA undertaken every operational period and considered in development of following period Incident Action Plan. | Incident log |
| | Stag Field Operations OPEP (GF-70-PLN-I-00001) provides for NEBA, notifications and consultation requirements to ensure net environmental benefit from response | NEBA undertaken every operational period and considered in development of following period Incident Action Plan. | Incident log |
| | | OPEP activated as per OPEP notification tables | Incident log |

| Response Element | Control Measures | Performance Standards | Measurement Criteria |
|---|---|---|---|
| | Jadestone Energy Incident Management Team Response Plan (JS-70-PLN-F-00008) procedure details IMT Core team members, resource pool and responsibilities | Jadestone IMT comply with Jadestone Energy Incident Management Team Response Plan (JS-70-PLN-F-00008) | Incident log |
| | Vessels comply with MARPOL and protected area sewage disposal requirements | Vessel sewage disposal will meet MARPOL Annex IV requirements. If vessel activities occur within protected areas, discharges will meet marine park management plan requirements and the DoT sewage strategy[11] | Vessel checklist or other confirmation from vessel master that requirements will be met |
| | Vessels comply with MARPOL requirements for oily water (bilge) discharges | Vessel oily water disposal will meet MARPOL Annex I requirements. | |
| | Consultation undertaken in accordance with Jadestone Energy Consultation of Relevant Persons Procedure (JS-70-PR-I-00034) prior to deployment in populated areas | Consultation is undertaken with relevant stakeholders prior to deployment of resources to townships and marine/coastal areas. | Consultation records |
| | Localised Risk Management Assessment undertaken to minimise potential impacts on populated areas | A Risk Management Assessment is undertaken prior to large scale deployment to populated areas | Risk Management Assessment |

[11] http://www.transport.wa.gov.au/mediaFiles/marine/MAC-IS-SewageStrategy.pdf

| Response Element | Control Measures | Performance Standards | Measurement Criteria |
|---|---|---|---|
| Source Control | Shipboard Oil Pollution Emergency Plan (SOPEP) | SOPEP activated within 60 minutes of spill incident | Incident Log |
| | Jadestone's Stag Incident Response Plan (GF-00-PR-F-00041) | Stag Incident Response Plan activated within 60 minutes of IMT being convened | Incident Log |
| Operational monitoring | Operational Monitoring Plan | Activate Operational Monitoring Action Plan within 60 minutes of IMT being convened | Incident Log |
| | Vessel Surveillance | Vessel Surveillance initiated within 120 minutes following request from IMT | Incident log |
| | | Observation reports submitted to IMT within 60 mins of completing surveillance | Incident log |
| | Aerial Surveillance | Aerial Surveillance initiated within 6 hours following request from IMT | Incident log |
| | | Two passes per day of spill area by observation aircraft provided from Day 1 of response | Incident log |
| | | Trained Aerial Observers supplied within 48 hours of notification | Incident log |
| | | Flight schedules are maintained throughout response | Incident Action Plan |
| | | Observers completed aerial surveillance observer log following completion of flight | Aerial Observer Logs |
| | | Aerial surveillance continues until termination criteria are met | Incident log |
| | Tracking Buoys | Tracking buoys deployment to be initiated within one hour of IMT being convened, subject to vessel availability and weather conditions | Incident log |
| | | Tracking buoys utilised until termination criteria met | Incident log |
| | Satellite Imagery | Satellite imagery commissioned within 6 hours of IMT being convened | Incident Log |
| | | Satellite imagery delivered to IMT within 24 hours of request to service provider | Incident Log |
| | | Satellite imagery continues until termination criteria are met. | Incident Log |
| | Oil Spill Modelling | Oil Spill modelling activated within 4 hours of IMT being convened for a Level 2/3 spill notification. | Incident Log |

| Response Element | Control Measures | Performance Standards | Measurement Criteria |
|---|---|---|---|
| | | OSTM to commence within approximately three hours of request submission | Incident Log |
| | | Modelling delivered to IMT within 4 hours of request to service provider. | Incident Log |
| | | Modelling continues until termination criteria are met | Incident Log |
| | Fluorometry | Jadestone will conduct in-field efficacy testing in accordance with the Special Monitoring of Applied Response Technologies (SMART) monitoring protocol (NOAA, 2006) | Incident Log |
| | | Visual monitoring surveys of dispersant effectiveness conducted from initial dispersant application | Incident Log |
| | | Fluorometry surveys mobilised within 2 days of initiation | Incident Log |
| | | Daily report including fluorometry results provided to IMT within 24 hours of completing daily survey | Incident Log |
| | SCAT | Commence deployment of SCAT Teams within 48 hours of becoming aware of potential impacts to shorelines | Incident Log |
| | | Completed SCAT surveys are delivered to IMT within two hours of the Survey Team returning to its operating base | Incident Log |
| | | SCAT surveys undertaken daily at priority locations | Incident Log |
| Chemical Dispersion | Chemical Dispersion Action Plan (Surface) | NEBA undertaken within 2-4 hours of IMT being convened and daily thereafter to determine if chemical dispersion will have a net environmental benefit. NEBA is to be included in development of following period Incident Action Plan | Incident Log |
| | | Activate Chemical Dispersant Action Plan within one hour of NEBA demonstrating that dispersant application is likely to result in a net environmental benefit | Incident Log |
| | | A pre-deployment operational assessment of dispersant application location, dosage and equipment use is undertaken | Incident Log/ IAP |
| | | The NEBA for dispersant application will consider the following inputs:<br>• Trajectory of spill and sensitive receptors within EMBA<br>• Dispersant efficacy testing | Incident Log |

| Response Element | Control Measures | Performance Standards | Measurement Criteria |
|---|---|---|---|
| | | • Forecast spill modelling of naturally and chemically dispersed oil<br>• Consultation with the SMPC. | |
| | | At no time, can chemical dispersant be applied:<br>• In waters shallower than 20 m (LAT);<br>• Within 10 km of water shallower than 20 m;<br>• Within restricted zones for offshore facilities;<br>• Within a Marine Park boundary or its buffer; or<br>• Within State Waters unless approved by the SMPC. | Incident Log |
| | | Develop a Surface Dispersant Application Plan (IAP Sub-Plan) within 12 hours of NEBA confirming an overall environmental benefit | Incident Log |
| | | Commence mobilisation of resources (equipment, stock, platforms) to support dispersant operations within four hours of Chemical Dispersant Action Plan being activated | Incident Log |
| | | Aerial chemical dispersant application will be available for operation within 18 hours of initial AMOSC notification (daylight and weather condition dependent) | Incident Log |
| | | If dispersant application is approved by the Incident Commander, a test spray will be conducted to assess dispersant effectiveness | Incident Log |
| | | Commence mobilisation of resources (equipment, stock, platforms) to support dispersant operations within 4 hours of Chemical Dispersant Action Plan being activated | Incident Log |
| | | Commence vessel chemical dispersant application within 24-36 hours of Chemical Dispersant Action Plan being activated | Incident Log |
| | | Each vessel shall have one person who has been trained in the operation of vessel-based dispersant systems and monitoring dispersant effectiveness | Incident Log |
| | | Prioritise the mobilisation and application of dispersants Dasic Slickgone NS and Corexit 9500 prior to other dispersant types | Incident Log |

| Response Element | Control Measures | Performance Standards | Measurement Criteria |
|---|---|---|---|
| | | Chemical dispersant applied in consultation with relevant statutory agencies and SMPC | Incident Log |
| | | AMOSC, in consultation with IMT to complete an Air Operations Plan and submit to AMSA within 12 hours of initial activation to enable activation of the FWADC | Incident Log |
| | | | Air Operations Plan |
| | | The effectiveness of the aerial based chemical dispersion strategy is communicated to the Operations Lead via the Air-Attack Supervisor | Incident Log |
| | | Response to continue until NEBA demonstrates no environmental benefit to use chemical dispersants | Incident Log |
| Offshore Containment and Recovery (C&R) | Containment and Recovery Action Plan | NEBA undertaken within 2-4 hours of IMT being convened and daily thereafter to determine if containment and recovery will have a net environmental benefit. NEBA is to be included in development of following period Incident Action Plan | Incident Log |
| | | Activate Containment and Recovery Action Plan within one hour of NEBA demonstrating that containment and recovery is likely to result in a net environmental benefit | Incident Log |
| | | Develop a Containment and Recovery Plan (IAP Sub-Plan) within 12 hours of NEBA confirming an overall environmental benefit | Incident Log |
| | | Commence mobilisation of personnel, equipment and vessels within six hours of Containment and Recovery Action Plan being activated | Incident Log |
| | | Commence C&R operations within 24-36 hours of Containment and Recovery Action Plan being activated | Incident Log |
| | | Containment and recovery operations to be managed by a minimum of two trained Oil Spill Responders (per system) | Incident Log |
| | | Review waste management options for C&R within 24 hours of Containment and Recovery Action Plan being activated | Incident Log |
| | | Obtain approvals from relevant Jurisdictional Authority prior to commencing decanting operations | Incident Log |

| Response Element | Control Measures | Performance Standards | Measurement Criteria |
|---|---|---|---|
| | | Oily water collected during offshore containment and recovery to be decanted (if approved) behind boom | Incident Log |
| | | Vessels to maintain minimal lighting required for safety and navigation requirements | Incident Log |
| | | Response vessels compliant with EPBC Act Regulation 8 (cetacean interactions) (Stag Marine Facility Operating Manual GF-90-MN-G-00038, Aviation Procedure JS-83-PR-G-00010) | Incident Log |
| | | Offshore equipment wash-down confined to hotzone | Incident Log |
| Shoreline Protection and Deflection | Shoreline Protection and Deflection Action Plan | NEBA undertaken within 2-4 hours of IMT being convened and daily thereafter to determine if Protection and Deflection will have a net environmental benefit. NEBA is to be included in development of following period Incident Action Plan | Incident Log |
| | | Activate Protection and Deflection Action Plan within one hour of NEBA demonstrating that protection and deflection is likely to result in a net environmental benefit | Incident Log |
| | | IMT to confirm priority receptors in consultation with the Control Agency | Incident Log |
| | | Develop a P&D Plan (IAP Sub-Plan) (if required) within 12 hours of NEBA confirming an overall environmental benefit | Incident Log |
| | | Obtain regulatory approvals to access locations for P&D operations within 3 days of spill or 48 hours prior to estimated contact with shoreline environment | Incident Log |
| | | Commence deployment of personnel, equipment and vessels within 24 hours of completion of Protection and Deflection Plan (IAP Sub-Plan) | Incident Log |
| | | Use shallow draft vessels for shoreline and nearshore operations to reduce seabed disturbances | Incident Log |
| | | Establish demarcation zones for vessel, boom and skimmer usage | Incident Log |
| | | Nearshore booming and skimming operations conducted during daylight hours only to minimise impacts from light emissions | Incident Log |

| Response Element | Control Measures | Performance Standards | Measurement Criteria |
|---|---|---|---|
| Shoreline Clean-up | Shoreline Clean-up Action Plan | NEBA undertaken within 2-4 hours of IMT being convened and daily thereafter to determine if Shoreline Clean-up will have a net environmental benefit. NEBA is to be included in development of following period Incident Action Plan | Incident Log |
| | | Activate Shoreline Clean-up Action Plan within one hour of NEBA demonstrating that clean-up is likely to result in a net environmental benefit | Incident Log |
| | | IMT to confirm priority receptors in consultation with the Control Agency | Incident Log |
| | | Develop a Shoreline Clean-up Plan within 12 hours of NEBA confirming an overall environmental benefit | Incident Log |
| | | Obtain regulatory approvals to access land within 3 days of spill or 48 hours prior to estimated contact with shoreline environment | Incident Log |
| | | Commence deployment of personnel, equipment and vessels within 24 hours of completion of Shoreline Clean-up Plan (IAP Sub-Plan) | Incident Log |
| | | Shoreline Team Lead to consult with SCAT Team and confirm shorelines for appropriate clean-up techniques prior to undertaking clean-up | Incident Log |
| | | Selection of the shoreline clean-up technique appropriate to shoreline type is to be undertaken in consultation with the Control Agency and selected based on SCAT surveys and NEBA | Incident Log |
| | | Shoreline clean-up team members are briefed by shoreline team leads on how to implement the shoreline clean-up techniques including how to prevent damage to shoreline habitat and surrounding laydown/staging areas | Operational Orders |
| | | Clean-up activities in sensitive environments shall be conducted in front of the primary dune and crews will not access behind the primary dune | Incident Log |
| | | Temporary waste storage on remote beaches should be located at the bottom of the primary dune and above the Highest Astronomical Tide (HAT) mark | Incident Log |
| | | Clean-up strategies will be implemented under the direction of the SMPC (where relevant) | Incident Log |

| Response Element | Control Measures | Performance Standards | Measurement Criteria |
|---|---|---|---|
| | | A shoreline/ nearshore habitat/ bathymetry assessment is conducted prior to nearshore activities | Incident Log |
| | | Demarcation zones to be established for shoreline operations involving vehicle and personnel movement considering vegetation, bird nesting/roosting areas and turtle nesting timeframes | Incident Log |
| | | Operational restriction of vehicle and personnel movement to limit erosion, compaction and disturbance to birdlife | Incident Log |
| | | Access plans for shoreline operations will prioritise use of existing roads and tracks | Incident Log |
| | | Terrestrial vehicle and equipment deployment via landing barges where there is no existing track access | Incident Log |
| | | A Specialist Advisor is consulted if shoreline operations overlap with areas of cultural or heritage significance. | Incident Log |
| | | Vehicles and equipment are verified as clean and invasive species free prior to deployment to site | Incident Log |
| | | Onshore equipment wash-down occurs in a decontamination area | Incident Log |
| | | Booms are used for containment of shoreline flushing liquids if contaminated flushing has potential to cause secondary impacts in excess of oil dispersion into ocean | Incident Log |
| | | Shoreline team leads shall verify clean-up effectiveness and conduct final evaluations in consultation with SCAT Teams | Incident Log |
| Oiled Wildlife Response (OWR) | Oiled Wildlife Response Action Plan | Initiate OWR first strike plan within 12 hours of IMT being convened | Incident Log |
| | | OWR undertaken in accordance with the WA Oiled Wildlife Response Plans and the Regional Oiled Wildlife Response Plans | Incident log |
| | | Maintenance of access to oiled wildlife response equipment and personnel through AMOSC and OSRL throughout activity | AMOSC Master Services Agreement and OSRL Service Level Agreement |

| Response Element | Control Measures | Performance Standards | Measurement Criteria |
|---|---|---|---|
| | | Establish OWR structure within IMT within 24 hours of OWR risk being identified | Incident Log |
| | | Commence mobilisation of OWR resources within 48 hours of OWR risk being identified | Incident Log |
| | | Prepare IAP oiled wildlife response sub-plan within 12 hours of wildlife reconnaissance confirming potential or realised impacts to wildlife | Incident Log |
| Waste Management | Waste Management Plan | Activate Waste Management Plan within 12 hours of IMT identifying waste management requirements for any response strategy | Incident Log |
| | | Request to stand up Waste Contractor to arrange waste pickup and transport undertaken immediately following assessment of need for waste management in the response | Incident Log |
| | | All decisions to escalate and de-escalate waste management equipment and personnel shall be approved by the IMT Leader | Incident log |
| | | The IAP process is to be used to determine the required level of response and the quantities and types of waste management equipment required | IAP |
| | | All waste associated with oiled wildlife response disposed of in accordance with the WAOWRP | Incident log |
| | | DoT OSCP 2015 Waste Management Sub-Plan Guidance considered as part of the Waste Management Plan – Oil Spill Response Support (JS-70-PR-I-00037) | IAP |
| | | All waste associated with oil spill response activity transported and disposed of in accordance with Environmental Protection (Controlled Waste) Regulations 2004, EP Act 1986 and associated regulations | Waste tracking records |
| | | Compliance with local government municipal waste requirements | Waste consignment records |
| | | Offshore inductions include municipal waste requirements (how to manage domestic waste) | Incident log |
| | | Reduce/ Reuse/ Recycle assessment of collected waste conducted by waste contractor | Waste contractor records |

| Response Element | Control Measures | Performance Standards | Measurement Criteria |
|---|---|---|---|
| | | The Waste Management Operations Team Leader shall communicate daily reports to the Logistics Team Leader to inform of required resources and response effectiveness | Incident Log |
| | | The Logistics Lead shall monitor and record the response to demonstrate all waste management legislative requirements are met | Incident Log |
| | | Demobilisation of the Waste Management Plan will be guided by the IAP | Incident Log |
| | | Waste contractor shall track all wastes from point of generation (Warm-zones and Marinas) to final destination. | Waste contractor records |
| Scientific Monitoring | Scientific Monitoring Framework (JS-70-PR-I-00038) | Initiation criteria of SMPs will be reviewed during the preparation of the initial Incident Action Plan (IAPs) and subsequent IAPs; and if any initiation criteria are met, relevant SMPs will be activated. | Incident Log |
| | | If any SMPs are activated, the subsequent activation of monitoring service provider is to follow the process outlined in the Jadestone SMP Implementation Plan | Incident Log |
| | | If any SMPs are activated, the subsequent activation of monitoring service provider is to follow the process outlined in the Jadestone SMP Implementation Plan | Contract with Monitoring Service Provider/s |
| | | Six-monthly capability reports from Monitoring Service Provider to demonstrate suitable resources are available throughout the activity | Audit Manual (JS-90-PR-G-00003) |
| | | Participation in a Jadestone annual exercise for a spill response scenario by the Environmental service provider is undertaken | Audit Manual (JS-90-PR-G-00003)<br>Emergency exercise evaluation report<br>Audit Manual (JS-90-PR-G-00003) Notification of membership<br>Contract with external environmental consultancy |
| | Competency and Training Management System [JS-60-PR-Q-00015] | Planning Team Lead has the competency to undertake coordination role with environmental service provider | Skills matrix and annual audit of Competency and Training Management system. |

| Response Element | Control Measures | Performance Standards | Measurement Criteria |
|---|---|---|---|
| Activation of IMT | Competency and Training Management System [JS-60-PR-Q-00014] | IMT members are competent to undertake IMT role as defined by the Competency and Training Management System | Skills matrix and annual audit of Competency and Training Management system. |
| | Incident Management Team Response Plan [JS-70-PLN-F-00008] | Rostered IMT members are at the Incident Control Centre (ICC) or alternative location no less than 2 hours after receiving the activation notification or as decided by the IMT Leader | Incident Log |

# PART B – RESPONSE

## 17. INITIAL INCIDENT ACTION PLANS

In the event of a spill:

- Define the spill level (as per Appendix A of the Jadestone Incident Management Team Response Plan (IMTRP) (JS-70-PLN-F-00008))

**Activate Incident Action Plan** for the first 48-hour operational period:

- Section 17.1for Level 1 spills; or
- Section 17.2for Level 2 spills.

### 17.1 Level 1 Initial Incident Action Plan

| **LEVEL 1 SPILL INITIAL INCIDENT ACTION PLAN** | **Operational Period: First 48 Hours** |
|---|---|
| **Objectives for operational period:** | 1. Gain control of the spill source (stop or minimise further loss)<br>2. Build and maintain situational awareness |
| **Protection Priorities:** | **Spill Response Strategies:** |
| ○ N/A | 1. Source control<br>2. Operational monitoring |

| **LEVEL 1 SPILL: INITIAL IAP** | | **Operational Period: First 48 Hours** | | |
|---|---|---|---|---|
| **Timeframe (Within)** | **Strategies and timeframe** | **Tactics (what is to be done)** | **Task guidance (ref.)** | |
| | | | **Appendix A IMTRP** | **OPEP** |
| 30 mins | Activate the Notifications | Verbal and written notifications | **Section 4.2** | **Appendix A6** |
| 60 mins | Activate source control – vessel or release from offtake hose | Shipboard Oil Pollution Emergency Plan (SOPEP) | - | **Section 8** |
| | | Jadestone's Stag Incident Response Plan (Offshore component) (GF-00-PR-F-00041) | | |
| | | Isolate hydrocarbon leak source/shut down equipment as per normal operating practice | | |
| 60 mins | Activate operational monitoring to confirm floating oil location and extent, and to confirm spill level and form development of IAP. | Deploy tracking buoys<br>Conduct visual surveillance<br>Report weather information to IMT<br>Determine extent of spill (volume, size, movement) | - | **Section 17.5** |

### 17.2 Level 2 Initial Incident Action Plan

| LEVEL 2 SPILL<br>INITIAL INCIDENT ACTION PLAN | Operational period: First 48 Hours |
|---|---|
| **Objectives for operational period** | 1. Gain control of spill source (stop or minimise further loss)<br>2. Build and maintain situational awareness<br>3. Prevent or minimise oiling of Protection Priorities |
| **Protection Priorities:** | **Spill Response Strategies:** |
| ○ Dampier Archipelago;<br>○ Montebello Islands;<br>○ Lowendal Islands;<br>○ Barrow Island; and<br>○ Eighty Mile Beach. | 1. Source control<br>2. Operational monitoring<br>3. Surface chemical dispersion<br>4. Containment and recovery<br>5. Nearshore protection and deflection<br>6. Shoreline clean-up<br>7. Oiled wildlife response<br>8. Scientific monitoring |

| LEVEL 2 SPILL: INITIAL IAP | | Operational period: First 48 Hours | | |
|---|---|---|---|---|
| **Timeframe (Within)** | **Strategies and timeframe** | **Tactics (what is to be done)** | **Task guidance (ref.)** | |
| | | | **IMTRP** | **OPEP** |
| 30 mins | Activate the **Notifications** | Verbal and written notifications | **Appendix A IMTRP (Section 4.2)** | **Appendix A6** |
| 60 mins | Activate **Source Control** – vessel or platform release | Shipboard Oil Pollution Emergency Plan (SOPEP) | - | **Section 17.4** |
| | | Jadestone's Stag Incident Response Plan (Offshore component) (GF-00-PR-F-00041) | | |
| Within 60 mins of IMT activation | Activate **Operational Monitoring** Action Plan | Deployment of resources to build and maintain situational awareness | - | **Section 17.5** |
| Within 1 hour of NEBA demonstrating that protection and deflection is likely to result in a net environmental benefit | Activate **Surface Chemical Dispersion** Action Plan | Mobilisation and deployment of vessel/aerial dispersant equipment, dispersant stockpiles and resources to reduce the volume of oil on the sensitivities (shoreline and surface) and reduce waste generated | - | **Section 17.6** |
| Within 1 hour of NEBA demonstrating that | Activate **Containment and Recovery** Action Plan | Mobilisation and deployment of vessels, personnel and equipment to reduce volume of oil contacting sensitivities | - | **Section 17.7** |

| LEVEL 2 SPILL: INITIAL IAP | | Operational period: First 48 Hours | | |
|---|---|---|---|---|
| **Timeframe (Within)** | **Strategies and timeframe** | **Tactics (what is to be done)** | **Task guidance (ref.)** | |
| | | | **IMTRP** | **OPEP** |
| protection and deflection is likely to result in a net environmental benefit | | | | |
| Within 1 hour of NEBA demonstrating that protection and deflection is likely to result in a net environmental benefit | Activate the nearshore **Protection and Deflection Strategy** Action Plan | Booming configurations to protect sensitivities or deflect oil away from sensitivities | - | **Section 17.8** |
| 12 hours | Activate **Scientific Monitoring** Plan | Scientific monitoring plans to be conducted throughout spill response activities as directed by ongoing IAPs. | **Appendix A - Section 8** | - |
| Within 1 hour of NEBA demonstrating that clean-up is likely to result in a net environmental benefit | Activate the **Shoreline Clean-Up Strategy** Action Plan | Shoreline assessment and selection of suitable clean-up techniques for sensitivities<br>Deployment of personnel and resources to clean-up impact locations | - | **Section 17.9** |
| 24 hours | Activate the **Oiled Wildlife Response** Action Plan | Mobilisation of support and resources to manage and coordinate oiled wildlife response operations | - | **Section 17.10** |
| 12 hours | Activate the **Waste Management Plan** to prepare for managing waste, and safe treatment and disposal of oily contaminated materials | Activation of initial waste collection, storage, and transport options. | **Appendix A - Section 9** | - |
| As the situation dictates | Commence transition to **pro-active incident management** by the IAP process. | Develop IAPs for subsequent operational periods.<br>Document 'Performance Objectives' and 'Measurement Criteria' against actions in IAPs, and feed performance data into the development of subsequent IAPs.<br>Manage the response documentation and records to ensure sufficient information is available to post-incident cost recovery and litigation processes. | **Section 6** | - |

| LEVEL 2 SPILL: INITIAL IAP | | Operational period: First 48 Hours | | |
|---|---|---|---|---|
| Timeframe (Within) | Strategies and timeframe | Tactics (what is to be done) | Task guidance (ref.) | |
| | | | IMTRP | OPEP |
| | | Transition to Incident Management Team Response Plan (JS-70-PLN-F-00008). | | |

## 17.3 Notification and Activation

| ACTION PLAN: INITIAL NOTIFICATIONS & ACTIVATIONS | | | | |
|---|---|---|---|---|
| **Aim:** To provide early notification (and activation if required) to essential support organisations & regulatory agencies. | | | | |
| **Task** | | **Actions** | **Resources** | **Timeframe** |
| **1. Contact and provide incident information to support and regulatory organisations**<br>Responsible Person: IMT Leader to delegate task | | | | |
| **Note:**<br>- Notification and/or activation of these support organisations is to be clearly annotated in the IMT Incident Log, additionally, all associated contracts/forms are to be filed.<br>- To reduce confusion, IMT (Log or Ops) is to assume **PRIMARY** point of contact with AMOSC and AMSA - if resources are required | | | | |
| INITIAL RESPONSE ACTIONS | **Initial Response (Support Organisations)**<br>IMT Leader to direct designated IMT staff to conduct "initial" notifications to relevant support organisations. | **Australian Marine Oil Spill Centre (AMOSC)**<br>Verbal<br>Call AMOSC Duty Officer and provide initial incident notification.<br>An initial call should be completed as soon as possible so that AMOSC can start their own internal preparations for activation.<br>This initial call can be followed up once more information is known and a decision has been made as to what spill response equipment / personnel are going to be required.<br>Signed Contract Note<br>After verbal notification AMOSC will email a copy of Contract Note which will formalise activation. The CN must be signed by an authorised member of staff and returned to AMOSC.<br>**Note:** may also include requirement to access SFRT (see Source Control) | Refer to MT Contact List<br><br>Jadestone call out authorities to AMOSC are the following:<br>• Country Manager (Australia);<br>• Operations Manager (Australia);<br>• Finance Manager (Australia);<br>• Maintenance Integrity & Engineering Manager; and<br>• Incident Management Team (IMT) Leader. | ASAP<br>(< 60mins) |
| | | **Australian Marine Safety Authority (AMSA)**<br>Verbal<br>Call AMSA and provide initial incident notification.<br>An initial call should be completed as soon as possible for two reasons:<br>a) Incident notification; and | Refer IMT Contact List | ASAP<br>(< 60 mins) |

| | | | | |
|---|---|---|---|---|
| | | b) So that Jadestone can request mobilisation of AMSA resources as quickly as possible.<br>This initial call is to be followed up with a written POLREP | | |
| ONGOING RESPONSE ACTIONS | **Notification of Regulatory Organisations**<br>IMT Leader to direct IMT staff to complete required regulatory/compliance notifications. | Complete all relevant verbal and written regulatory notifications listed in Appendix A6 – Regulatory Notifications | Appendix A6 – Regulatory Notifications | To be commenced as soon as practicable, and no later than 2 hours of IMT being convened |
| | **Secondary Response (Support Organisations)**<br>IMT Leader to direct designated IMT staff to conduct notification/activation of secondary support organisations | **Scientific Monitoring Programme**<br>Call to be made to scientific monitoring service provider providing them with information relating to the incident and intention with respect to activation of the SMP.<br>Call is to be followed up with written confirmation<br><br>**Waste Management Contractor (Oil Spill Response Waste Management Plan)** | **<u>Refer IMT Contact List</u>**<br>24 hr Contact details<br>Contact details as per Jadestone Incident Management Contact List | Scientific monitoring service provider: within 6 hours of IMT being convened<br><br>Waste management contractor: within 12 hours of spill notification |

## 17.4 Source Control Action Plan

| ACTION PLAN: SOURCE CONTROL | | | |
|---|---|---|---|
| **1. Commence initial response actions**<br>Responsible Person: OIM /IMT Leader (to delegate) | | | |
| **Task** | | **Resources** | **Timeframe** |
| INITIAL RESPONSE ACTIONS | The following actions will be undertaken as an initial response to the relevant source control incident:<br>Vessel spills:<br>• Vessel to undertake initial response actions as per their SOPEP.<br>Facility spills<br>• Implement Stag Incident Response Plan (GF-00_PR-F-00041).<br>• Considerations:<br>• For spills involving pumping operations, cease pumping immediately and activate Emergency Shutdown Devices;<br>• Isolate spill (if possible) and prevent spill to the marine environment;<br>• Recover spilt hydrocarbons on Facility using spill kits;<br>• Isolate and repair damaged equipment.<br>Pipeline leak<br>• Implement Stag Incident Response Plan (GF-00_PR-F-00041).<br>• Implementation of Emergency Pipeline Repair Plan (GF-09-PLN-L-00039). | Shipboard Oil Pollution Emergency Plan (SOPEP)<br><br>Stag Incident Response Plan (GF-00_PR-F-00041)<br><br>Emergency Pipeline Repair Plan (GF-09-PLN-L-00039). | Immediately |

## 17.5 Operational Monitoring Plan

| ACTION PLAN: MONITOR AND EVALUATE | | | | |
|---|---|---|---|---|
| **Aim:** To build and maintain the most accurate picture regarding the spill and oil lost into the marine environment in the most effective and efficient manner | | | | |
| **Task** | | **Actions** | **Resources** | **Timeframe** |
| **1. Deployment of satellite tracking buoy (TB)**<br>Responsible Person: OIM / IMT (Planning) | | | | |
| INITIAL RESPONSE ACTIONS | **Deploy and access tracking buoy information**<br>OIM to direct crew to deploy buoy from the facility or a vessel as close as is safe to the leading edge of the spill. | 1. OIM (or Rep) to report to IMT as soon as TB has been deployed<br>2. OIM (or Rep) to provide IMT with current weather conditions at Stag (wind, sea state, current direction) – IMT to log information and add to Common Operating Picture (COP)<br>**3.** IMT to confirm deployment via TB website using associated login information (ensure IMT Leader is briefed). Refer IMT OneNote for Login details for Tracker Buoys.<br>4. IMT to ensure TB location is added to the COP<br>5. IMT to ensure deployment of TB is captured in Incident Log<br>**Note:** Buoys are not to be dropped from a height of greater than 10m to water surface. | Satellite tracking buoys – Stag Facility<br>Support vessel if available | Deploy within 1 hour of of IMT being convened (subject to vessel availability and weather conditions) and continually track thereafter |
| ONGOING ACTIONS | **Deployment of additional tracking buoy**<br>OIM/Vessel Masters to liaise with IMT with respect to the continued deployment of TB. | 1. As part the ongoing response the IAP is to include guidance to the OIM (of vessels) with respect to the continued deployment of available TB in support of operational monitoring of the spill<br>2. Deployed TB are to be continually monitored by the IMT (Planning) and added to the COP as a regular action<br>3. Deployment of the TB's to captured in Incident Log | Incident Action Plan (IAP) | As detailed within the IAP |
| **2. Commencement of aerial surveillance operations (for Level 2 spills)**<br>Responsible Person: OIM / IMT | | | | |

| | | | | |
|---|---|---|---|---|
| INITIAL RESPONSE ACTIONS | **Activation of initial aerial surveillance flights**<br>Source and mobilise available aircraft to commence aerial surveillance of the spill | 1. IMT (Log) to contact aviation provider to confirm availability of a helicopter to conduct an initial surveillance flights in vicinity of the spill<br>a. Confirm approx. time flight can depart (or be re-tasked)<br>b. Confirm crew composition – likely a trained observer will not be available. Flight can be conducted using a standard crew and should be flown as soon as practicable.<br>2. IMT (Plan or Ops) to contact AMOSC (requesting assistance with sourcing trained observers)<br>3. IMT (Ops) to liaise with the OIM regarding approval to commence surveillance flight in vicinity of the facility<br>4. IMT (Log/Ops) – once aircraft and crew have been confirmed, IMT Leader is to be updated.<br>5. IMT (Ops) ensure flight details are captured in the incident log (all details pertaining to the flight)<br>6. IMT (Ops) to assume primary coordination for flight. Provide aviation provider with tasking information<br>7. IMT (Ops) to contact aviation provider and confirm that all safety requirements have been met. Capture in incident log.<br>8. IMT (Ops) to monitor flight with aviation provider ensuring that the IMT are briefed regularly. Once complete ensure that all relevant information is provided back to the IMT so that it can be assessed, included into the COP and further flights determined.<br>9. All information should be entered into an Aerial Surveillance Observation Log (refer Appendix A1) which will be sent to the OIM/IMT within an hour of the aircraft returning to its operating base. Where possible, a verbal report via radio/telephone en-route providing relevant information should be considered if the aircraft has long transits from the spill location to base. | **Equipment**<br>helicopters<br>Jadestone aviation contract - fixed wing aircraft<br>**Personnel**<br>1 x Trained Aerial Observer (sourced from AMOSC, AMSA). **Note:** Initial reconnaissance may be completed by an untrained observer while waiting for trained observers to arrive.<br>**Forms and Guidance**<br>Aerial Surveillance Tasking Form<br>Aerial Surveillance Observation Log (refer Appendix A1)<br>Aerial Surveillance Marine Fauna Sighting Record Sheet (refer Appendix A1)<br>**Deliverables**<br>Completed Aerial and Fauna Surveillance Forms<br>Photographs / video footage | Initiation within 6 hours of request from IMT<br>(At least 1 aircraft available at airbase within 24 hours of mobilisation request)<br>Trained aerial observers within 48 hours of notification |

| ACTION PLAN: MONITOR AND EVALUATE | | | | |
|---|---|---|---|---|
| | | 10. Aerial Observers shall note fauna sightings in the Aerial Surveillance Marine Fauna Sighting Record Sheet. The location and details of each sighting should be recorded with a cross-reference to photographic imagery captured. The Aerial Surveillance Marine Fauna Sighting Record Sheet is provided in Appendix A1 | | |
| ONGOING RESPONSE ACTIONS | **Ongoing coordination of aerial surveillance flights**<br>Development and coordination of surveillance flights<br><br>**Note:** Coordination of aviation operations is essential. Therefore, flight-schedule is to cover all planned aviation operations on a daily basis. | IMT (Ops) to develop a flight schedule for ongoing surveillance as required:<br>1. Source fixed wing aircraft from Jadestone aviation contractor to commence aerial surveillance operations from Day 2<br>**Note:** A second fixed wing aircraft will be requested from Jadestone aviation contractor to support aerial dispersant operations from Day 2<br>2. Develop aerial surveillance flight schedule which includes the following operations:<br>a. Aerial surveillance utilising helicopters - Day 1<br>b. Aerial surveillance using fixed wing from Karratha – Day 2 onwards<br>c. Aerial dispersant operations from Karratha<br>d. Aerial Spotter flights in support of the dispersant application (if required)<br>3. The frequency of flights will be sufficient to ensure that the information collected during each flight (i.e. observer log and spill mapping) meets the information needs to validate dispersion of the spill and supports ongoing response operations<br>4. Flight schedule is to ensure that all aircraft operations are conducted safely and support “other” response operations where necessary<br>5. Aerial surveillance to continue daily until termination criteria are met | Incident Action Plan (IAP) | As per operational period |

| ACTION PLAN: MONITOR AND EVALUATE | | | | |
|---|---|---|---|---|
| **3. Commencement satellite imagery acquisition (for Level 2)**<br>Responsible Person: IMT (Planning) | | | | |
| INITIAL RESPONSE ACTIONS | **Provision of satellite imagery to the IMT**<br>Mobilise KSAT (through AMOSC) to produce daily satellite images | 1. IMT (Planning) to notify AMOSC Duty Officer to request initiation of satellite services via KSAT (OSRL subscription available as a secondary option) and provision of daily imagery<br>2. IMT (Planning) to combine satellite data with optical imagery (e.g. aerial surveillance, vessel-based observations) to mitigate issues these optical imagery results may present with angle of insolation, thick cloud cover and night<br>**Ongoing Response Actions**<br>3. Request satellite imagery be provided daily throughout the duration of the response until termination criteria are met. Integrate data into COP. Receipt of all daily imagery is to be captured in the incident log.<br>Note: Satellite data imagery will depend on satellite availability and location in orbit | AMOSC<br>Activation to be completed<br>Contract note executed<br><br>Mobilisation of AMOSC resources needs to be coordinated across all response strategies where support is required.<br><br>**Deliverables**<br>Daily satellite images | Request within 6 hours of IMT being convened<br>Satellite imagery delivered to IMT within 24 hours of request to service provider<br><br>Daily data acquisition |

| ACTION PLAN: MONITOR AND EVALUATE | | | | |
|---|---|---|---|---|
| **4. Oil spill trajectory modelling (OSTM)**<br>Responsible Person: IMT (Planning) | | | | |
| INITIAL RESPONSE ACTIONS | **Provision of OSTM to the IMT**<br>Mobilise RPS via AMOSC to produce three day forecast model outputs. | 1. IMT (Plan) to contact AMOSC and arrange for oil spill trajectory modelling to be provided. Will require completion of the RPS spill modelling request form.<br>2. IMT (Plan) update incident log with request for OSTM and estimated time of delivery.<br>3. Provide RPS with data from aerial surveillance so that they can verify and adjust fate predictions of the spill and improve predictive accuracy.<br>**Ongoing Response Actions**<br>4. IMT (Plan) to request ongoing OSTM to be provided on a daily basis. To ensure that COP is updated when provided. Receipt of all daily OSTM is to be captured in the incident log.<br>5. OSTM to continue daily until termination criteria are met | AMOSC<br>Activation to be completed<br>Contract note executed<br><br>**Forms and Guidance**<br>RPS trajectory modelling request form in One Note<br><br>**Deliverables**<br>OSTM three day forecast outputs daily | Oil Spill modelling activated within 4 hours of IMT being convened for a Level 2/3 spill notification<br>OSTM to commence within approximately three hours of request submission<br><br>Repeat as required |

| ACTION PLAN: MONITOR AND EVALUATE | | | | |
|---|---|---|---|---|
| **5. Vessel surveillance**<br>Responsible Person: OIM or IMT (Operations & Logistics) | | | | |
| INITIAL RESPONSE ACTIONS | **Mobilisation of vessels to conduct surveillance**<br>Source and mobilise available vessels to commence surveillance of the spill | 1. IMT (Ops & Log) to source available vessels to commence surveillance of the spill<br>a) Contracted vessels<br>b) Vessels of opportunity<br>2. IMT to liaise with OIM with respect to vessels operating in and around the facility<br>3. Vessels to be tasked to gather the following information about the spill:<br>a) Location (latitude and longitude);<br>b) Size and volume;<br>c) Direction of movement;<br>d) Visual appearance of the slick (colours, emulsification etc);<br>e) Associated weather conditions in vicinity of the spill (wind speed/direction, sea state, swell);<br>f) Any marine fauna or other activities observed; and<br>g) Photographic images.<br>4. Vessel Master to provide information back to the IMT within 60 mins of completing surveillance:<br>a) Complete Vessel Surveillance Observation Log<br>b) Email completed logs to the IC within an hour of completion. Include photographs and GPS data where available. | **Deliverables**<br>Completed Vessel Surveillance Observation Log and Marine Fauna Sighting Record Sheet<br>(refer Appendix A1)<br>Photographs / video footage | Vessel surveillance initiated within 24 hours of request from IMT<br><br>Vessel surveillance reports submitted to IMT within 60 mins of completing surveillance |

| ACTION PLAN: MONITOR AND EVALUATE | | | | |
|---|---|---|---|---|
| **6. Fluorometry**<br>Responsible Person: IMT (Planning & Logistics) | | | | |
| | Mobilise fluorometry via scientific service provider and CSIRO | 1. IMT (Plan) to activate scientific services providers. To confirm what logistical requirements will be required to support.<br>2. IMT (Logistics) to discuss with Planning requirements. Action as required.<br>3. IMT (Plan) discuss need for additional fluorometers (multiple towed fluorometers are available from OSRL)<br>4. Scientific service provider to provide daily fluorometry results to IMT | **Personnel and equipment**<br>1 x person trained to interpret data<br>5 x fluorometers<br>**Logistics**<br>Specific requirements to be discussed and confirmed with OSRL | Mobilised within 2 days of spill notification<br>Fluorometry results provided to IMT within 24 hours of completion of daily survey |
| **7. Shoreline and Coastal Habitat Assessment**<br>Responsible Person: IMT (Planning & Logistics) | | | | |
| | **Mobilisation of personnel to conduct Shoreline and Coastal Habitat Assessment Surveys**<br>Source and mobilise available personnel and equipment to commence shoreline and coastal habitat assessment | 1. IMT (Log) to contact AMOSC to confirm availability of personnel to conduct assessment surveys<br>2. IMT (Plan or Ops) to contact vessel and equipment providers to support assessment surveys<br>3. IMT (Ops) to arrange all safety requirements for shoreline assessment survey deployment. Capture in incident log.<br>4. IMT (Plan) to identify priority locations to deploy shoreline assessment survey teams by consulting the NEBA (e.g. location of priority receptors, seasonal presence) and existing operational monitoring data that will help confirm locations that will be/have been contacted by hydrocarbons.<br>5. IMT (Ops) to mobilise Survey Teams to commence assessment surveys prior to shoreline contact to obtain pre-contact data, where possible | **Equipment**<br>Vessels<br>Aircraft<br>Aerial survey equipment (e.g. UAVs)<br>All-terrain vehicles<br>**Personnel**<br>Trained Personnel (sourced from AMOSC)<br>**Forms and Guidance**<br>Shoreline Assessment Form (refer Appendix A3)<br>**Deliverables**<br>Completed Shoreline Assessment Form<br>Photographs / video footage | Commence deployment of SCAT Teams within 48 hours of becoming aware of potential impacts to shorelines |

| ACTION PLAN: MONITOR AND EVALUATE | | | | |
|---|---|---|---|---|
| | | **Note:** Unmanned Aerial Vehicles (UAVs) may be necessary for some sensitive environments and where personnel safety is at risk (e.g. UXO's at Cartier Island, dangerous fauna in remote locations) | | |
| | **Commence Shoreline and Coastal Habitat Assessment Surveys** | 1. Undertake shoreline assessment (SCAT) ground / aerial survey (depending on access) and sampling as per AMSA / ITOPF / NOAA guidelines (included in Key References above):<br>• Undertake pre-impact survey to obtain baseline information, where possible<br>• Undertake post-impact survey to confirm:<br>i) Levels of oil stranding;<br>ii) Actual impacts to environmental sensitivities;<br>iii) Priorities for clean-up;<br>iv) Resources required to implement a clean-up operation;<br>v) Appropriate cleaning methods according to shoreline conditions and oil loading, i.e.:<br>(1) Natural recovery with monitoring;<br>(2) Beach pre-cleaning;<br>(3) Low pressure flushing;<br>(4) Manual oil/sediment removal; and<br>(5) Vacuum pumping.<br>vi) Safe access locations.<br>2. Undertake routine surveys during shoreline clean-up operation to assess effectiveness of response.<br>3. IMT (Ops) to monitor assessment survey operations ensuring that the IMT are briefed regularly. Once initial surveys are complete ensure that all relevant information is provided back to the IMT so that it can be assessed, included into the COP and further surveys determined.<br>4. IMT to update IAP with survey information, as appropriate. | **Equipment**<br>Camera<br>GPS<br>Spades<br>Tape measures<br>Sampling equipment<br>Vehicles (as required)<br>Aerial survey equipment (e.g. Unmanned Aerial Vehicles (UAVs))<br>**Personnel**<br>Trained Shoreline Assessment Team Leads (one per team)<br>Team members (2 per team)<br>**Forms / Guidance**<br>Shoreline Assessment Form (Appendix A3)<br>AMSA / ITOPF / NOAA guidelines and forms<br>Shoreline Clean-up Methods table (Section 17.9)<br>**Deliverables**<br>Shoreline assessment survey reports<br>Lab reports | Completed surveys sent to IMT within two hours of the Survey Team returning to its operating base |

| ACTION PLAN: MONITOR AND EVALUATE | | | | |
|---|---|---|---|---|
| | | 5. All information should be entered into a Shoreline Assessment Form (refer Appendix A3) which will be sent to the IMT within two hours of the Survey Team returning to its operating base.<br>**Ongoing Response Actions**<br>6. IMT (Plan) to arrange for ongoing Shoreline and Coastal Habitat Assessment Surveys for priority locations to be provided on a daily basis. To ensure that COP is updated when provided. Receipt of all daily Survey Forms are to be captured in the Incident Log. | | |

## 17.6 Surface Chemical Dispersant Action Plan

| ACTION PLAN: DISPERSANT APPLICATION | | | |
|---|---|---|---|
| **Task** | | **Resources** | **Timeframe** |
| **NOTE: WA DoT must approve of dispersant application prior to commencement in WA state waters. Also notify WA DoT if any dispersant applied in Commonwealth waters are likely to enter WA waters.** | | | |
| **Task** | **Actions** | **Resources** | **Timeframe** |
| 1. **Mobilise dispersant resources**<br>Responsible Person: IMT (Logistics and Operations) | | | |
| **Aim:** To mobilise equipment and resources in support of dispersant operations | | | |

| ACTION PLAN: DISPERSANT APPLICATION | | | | |
|---|---|---|---|---|
| **Task** | | | **Resources** | **Timeframe** |
| INITIAL RESPONSE ACTIONS | **Conduct NEBA** | 1. Conduct operational NEBA to determine if dispersant application is likely to result in a net environmental benefit.<br>Considerations may include:<br>• Will the spill thickness be favourable for dispersant application?<br>• Is the product too weathered for dispersants to be effective?<br>• What Dispersant-to-Oil Ratio (DOR) is required for this strategy to be effective on this product?<br>• What are the metocean conditions and how would this affect the DOR?<br>• What dispersant types are most effective on the particular product spilt?<br>• Will spraying adversely affect any sub-surface receptors?<br>The initial operational NEBA for dispersant application shall consider the following inputs:<br>a) Trajectory of spill and sensitive receptors within EMBA<br>b) Forecast spill modelling of naturally and chemically dispersed oil<br>c) Ecotoxicity data (species protection trigger levels) for dispersed oil (including chemically dispersed oil) (once available)<br>d) Consultation with the SMPC<br><br>**Ongoing Actions**<br>Daily re-evaluation of NEBA to assess varying net benefits and impacts of continuing to apply dispersants and consideration of application rates, dilution rates and dispersant effectiveness. Dispersants should continue to be used until operational NEBA demonstrates net benefit is no longer being achieved through application. | Operational NEBA form<br>Planning Lead | Within 2-4 hours of IMT being convened<br>Daily NEBA re-evaluation |

| ACTION PLAN: DISPERSANT APPLICATION | | | | |
|---|---|---|---|---|
| **Task** | | | **Resources** | **Timeframe** |
| | **Develop Surface Dispersant Plan** | 1. If NEBA indicates that there is an overall environmental benefit develop a Surface Dispersant Plan (IAP sub-plan) to include the following data:<br>a) Operational zones for application;<br>b) Exclusion zones;<br>c) Locations to deploy personnel and equipment;<br>d) Frequency of application (sorties/day);<br>e) List of resources (personnel and equipment) required;<br>f) Logistics involved in deploying equipment and personnel;<br>g) Timeframes to undertake deployment;<br>h) Effectiveness monitoring; and<br>i) Health and Safety constraints.<br><br>**Note:** All surface chemical dispersant operations will occur during daylight hours only.<br>2. Dispersants Dasic Slickgone NS and Corexit 9500 shall be mobilised and applied prior to other dispersant types. If additional dispersant types are likely to be required, IMT shall prioritise the use of dispersants using the following criteria:<br>• Dispersant type listed as approved in the National Plan for Maritime Environmental Emergencies Register of Oil Spill Control Agents (OSCA); and<br>• Jadestone's Chemical Selection Evaluation and Approval Procedure (JS-70-PR-I-00033). | **Personnel**<br>Planning Lead / AMOSC to assist with development of Surface Dispersant Plan (IAP sub-plan)<br>**Deliverables**<br>Surface Dispersant Plan (IAP sub-plan) | Develop a plan, if required, within 12 hours of NEBA confirming an overall environmental benefit |

| ACTION PLAN: DISPERSANT APPLICATION | | | | |
|---|---|---|---|---|
| **Task** | | | **Resources** | **Timeframe** |
| INITIAL RESPONSE ACTIONS | **Mobilise resources to support dispersant operations**<br>Commence mobilisation of all required resources to Dampier/Karratha to support vessel/aerial dispersant operations | AMOSC Resources<br>1. Contact AMOSC Duty Officer (once notification/activation has been completed) and discuss the following support:<br>a) Access to and mobilisation of all AMOSC dispersant stocks and associated equipment into Dampier (AMOSC will arrange through their contracted transport provider);<br>b) Activation of the Fixed Wing Aerial Dispersant Capability (FWADC) from AMSA (AMOSC will activate this on behalf of Jadestone and assume operational control); and<br>c) Provision of trained spill responders to support operations (AMOSC Staff and Core Group). Each vessel shall require one person who has been trained in the operation of vessel-based dispersant systems and monitoring dispersant effectiveness.<br>2. Ensure that all actions/details are captured in the Resource tracking and Incident log<br>3. Ensure wider IMT are briefed on actions<br>**Ongoing Response Actions**<br>Following initial activation/mobilisation of support as detail above:<br>4. Contact AMOSC Duty Officer and request update on all requested actions.<br>5. Ensure that all logs are updated based on revised information<br>See "Commence vessel dispersant operations" below for ongoing operational guidance | AMOSC<br>Activation to be completed<br>Contract note executed<br><br>Mobilisation of resources needs to be coordinated across all **PRIMARY** response strategies where support is required.<br><br>Dispersant Stocks – Refer to Table 10-2 | Within 4 hours of IMT being convened |

| ACTION PLAN: DISPERSANT APPLICATION | | | | |
|---|---|---|---|---|
| **Task** | | | **Resources** | **Timeframe** |
| INITIAL RESPONSE ACTIONS | | AMSA Resources (via AMOSC)<br>1. Contact AMOSC and request mobilisation of dispersant stocks from all locations into Dampier/Karratha (will likely require Jadestone to make transport arrangements)<br>2. Request AMOSC assistance with mobilisation of Air Attack Supervisors into Karratha (AMSA has responsibility for sourcing a suitable aircraft for Air Attack Supervisor. Jadestone to arrange logistical support if required)<br>3. Ensure that all actions/details are captured in the Resource tracking and Incident log<br>4. Ensure wider IMT are briefed on actions<br>**Ongoing Response Actions**<br>Following initial activation/mobilisation of support as detail above:<br>5. Contact AMOSC Duty officer and request update on all requested actions.<br>6. Ensure that ALL logs are updated based on revised information<br><br>Note: Aircraft requiring two pilots are not suitable for air attack operations as the Air Attack Supervisor function needs to be conducted from the co-pilot's seat. | AMSA<br>Initial notification to be competed<br><br>FWADC Aerial Dispersant Operations Plan For Marine Oil Spills Off The Western Australian Coastline<br>(Air Ops Plan Template)<br><br>Mobilisation of AMSA resources needs to be coordinated across all **PRIMARY** response strategies where support is required<br><br>**Dispersant Stocks** – Refer to Table 10-2 | Within 4 hours of IMT being convened |

| ACTION PLAN: DISPERSANT APPLICATION | | | | |
|---|---|---|---|---|
| **Task** | | | **Resources** | **Timeframe** |
| INITIAL RESPONSE ACTIONS | **Mobilise vessels and aircraft to support dispersant operations** | <u>Aerial dispersant mobilisation</u><br>1. AMOSC, in consultation with the IMT prepare an Air Operations Plan in accordance with the Aerial Dispersant Operations Plan For Marine Oil Spills Off The Western Australian Coastline and submit to AMSA prior to commencement of any FWADC aircraft operations<br>2. Confirm progress of FWADC activation from AMSA following activation by AMOSC<br>3. Ensure in-field efficacy testing is conducted in accordance with the Special Monitoring of Applied Response Technologies (SMART) monitoring protocol (NOAA, 2006) | FWADC Aerial Dispersant Operations Plan For Marine Oil Spills Off The Western Australian Coastline– primary reference | Air Operations Plan submitted to AMSA within 12 hours of of IMT being convened |

| ACTION PLAN: DISPERSANT APPLICATION | | | | |
|---|---|---|---|---|
| **Task** | | | **Resources** | **Timeframe** |
| | | <u>Vessel dispersant mobilisation</u><br>IMT (Ops) to complete following actions:<br>1. Contact OSV – confirm location and ETA to spill location (maximum timeframe is 24-36 hours if alongside Dampier)<br>a) Test and prepare dispersant application system enroute<br>b) Tasking to be provided prior to arriving on location<br>2. Liaise with IMT (Log) to commence sourcing of additional vessels into Dampier to support dispersant operations.<br>3. Ensure in-field efficacy testing is conducted in accordance with the Special Monitoring of Applied Response Technologies (SMART) monitoring protocol (NOAA, 2006)<br><br>**Ongoing Response Actions**<br>4. Arrange for vessels to be loaded with equipment, dispersant and trained spill responders from AMOSC once alongside Dampier<br>5. All vessels to be designated with operational zones to conduct dispersant operations<br>6. Aerial surveillance sorties to provide vessels with updated locations for spills within operational zones. | **Dispersant Stocks** – Refer to Table 10-2<br><br>See Commence Vessel Dispersant Operations below<br><br>**Incident Action Plan (IAP)** – to detail tasking for vessel dispersant operations | Commence mobilisation within 6 hours of IMT being convened<br><br>Commence initial vessel dispersant application within 24 – 36 hours of Chemical Dispersant Action Plan being activated (this plan) (daylight and weather condition dependent) |

| ACTION PLAN: DISPERSANT APPLICATION | | | | |
|---|---|---|---|---|
| **Task** | | | **Resources** | **Timeframe** |
| **Ongoing Actions** | **Activate Dampier logistic support arrangements** | Logistics Yard (Dampier) activation<br>1. Contact Logistics Yard (Dampier) and stand-up staff/facilities to support resource mobilisation. Provide relevant information regarding estimated arrival times/dates into Dampier once confirmed with service providers<br>2. Confirm all arrangements with respect to loading equipment/dispersant and embarking spill response personnel aboard vessels alongside Dampier.<br>**Note**: ALL other response equipment required will be coordinated from the Logistics Yard (Dampier) throughout the response. | **Logistics Yard (Dampier)** | Within 6 hours of IMT being convened |

| Task | | | Resources | Timeframe |
|---|---|---|---|---|
| **2. Commence vessel dispersant operations**<br>Responsible Person: IMT (Operations and Logistics) | | | | |
| **Ongoing Actions** | **Conduct of vessel dispersant operations**<br>Following initial activation/mobilisation of required resources ongoing operations are to be commenced in support of the response | <u>Ongoing vessel dispersant operations</u><br>1. Confirm build-up of dispersant stocks at Dampier accordance with the Dispersant Mobilisation Plan.<br>2. Coordinate arrival and availability of vessels as they arrive in Dampier in accordance with Dispersant Mobilisation Plan.<br>3. Arrange and coordinate transport arrangements to mobilise dispersant and equipment to Dampier port<br>4. Ensure additional dispersant vessels (if required) become available from Dampier are to be included in the IAP for each operational period.<br>**Note**: Clear guidance to be provided in IAP with respect to:<br>6. Vessel will be "operationally ready" once dispersant/equipment loaded and trained spill responders are embarked.<br>7. Focus on application to windrows / spots of surface slick which threaten priority environmental sensitivities.<br>8. Conduct of visual monitoring to assess effectiveness<br>9. Completion of dispersant application logs<br>10. Daily reporting back to IMT on conduct of operations | **Incident Action Plan (IAP)** – Task Assignment to be developed and disseminated in order to commence vessel dispersant operations<br><br>**Dispersant Stocks** – Refer to Table 10-2 | Ongoing from next Operational Period |
| **3. Commence aerial dispersant application**<br>Responsible Person: IMT (Operations and Logistics) | | | | |

| | | | | |
|---|---|---|---|---|
| **Ongoing Actions** | **Conduct of aerial dispersant operations**<br>Following initial activation/mobilisation of required resources ongoing operations are to be conducted in support of the response | <u>Aerial dispersant operations commencement</u><br>1. Confirm status of Air Operations Plan implementation in consultation with AMOSC<br>2. Liaise with Western Australian Department of Transport prior to commencing aerial dispersant application in Commonwealth waters that could impact upon State waters<br>3. Upon agreement of suitability of Air Operations Plan from AMOSC commence aerial dispersant application<br>4. Air Attack Supervisors to ensure IMT Operations Lead is informed on effectiveness of surface aerial dispersant application<br>5. Confirm build-up of dispersant stocks at Karratha in accordance with the Dispersant Mobilisation Plan<br>6. Coordinate arrival and availability of additional aircraft as they arrive in Karratha in accordance with Dispersant Mobilisation Plan<br>7. Arrange and coordinate transport services to mobilise dispersant to Karratha airport<br>8. Support development of flight schedule (see Operational Monitoring Plan) to ensure inclusion of aerial dispersant operations and deconfliction from other planned operations (operational zones allocated)<br>9. Support ongoing coordination of aviation operations as response continues.<br>**Note**:<br>Air Operations Plan and IAP must ensure the following restrictions are adhered to for dispersant application:<br>a) No application in waters shallower than 20 m; and<br>b) No application within exclusion zones for offshore facilities; and<br>c) No application within an Australian Marine Park boundary or its buffer; and/or | **Air Operations Plan** – to be implemented for Karratha<br><br>**Incident Action Plan (IAP)** – Task Assignment to be developed and disseminated to commence vessel dispersant operations<br><br>**Daily Flight Schedule** – for all aviation operations<br><br>**Dispersant Stocks** – Refer to Table 10-2 | Commence air operations and dispersant application within 18 hours of IMT being convened |

| Task | | | Resources | Timeframe |
|---|---|---|---|---|
| | | d) No application within WA State waters unless approved by the SMPC.<br>Clear guidance to be provided in IAP with respect to:<br>e) Focus on application to windrows / spots of surface slick which threaten priority environmental sensitivities.<br>f) Conduct of visual monitoring to assess effectiveness after sorties<br>g) Completion of dispersant application logs<br>h) Daily reporting back to IMT on conduct of operations | | |

## 17.7 Containment and Recovery Action Plan

<table>
<tr><th colspan="5">ACTION PLAN: CONTAINMENT AND RECOVERY</th></tr>
<tr><th colspan="2">Task</th><th>Actions</th><th>Resources</th><th>Timeframe</th></tr>
<tr><td colspan="5">1. Mobilise containment and recovery resources<br>Responsible Person: IMT (Logistics and Operations)</td></tr>
<tr><td colspan="5">Aim: To mobilise equipment and resources to Dampier in support of containment and recovery (C&R) operations</td></tr>
<tr><td rowspan="2">INITIAL RESPONSE ACTIONS</td><td>Conduct NEBA</td><td>Conduct operational NEBA to determine if C&R is likely to result in a net environmental benefit.<br>Operational NEBA considerations:<br>• Are metocean conditions favourable for the available equipment?<br>• Will the spill thickness be adequate for recovery?<br>• Is decanting permitted? If not, how will waste volumes be managed?<br>Ongoing Actions<br>Daily re-evaluation of NEBA to assess varying net benefits and impacts of continuing to conduct C&R activities</td><td>Operational NEBA form<br>Planning Lead</td><td>Within 2-4 hours of IMT being convened<br>Daily NEBA re-evaluation</td></tr>
<tr><td>Develop Containment and Recovery Plan</td><td>2. If NEBA indicates that there is an overall environmental benefit develop a Containment and Recovery Plan (IAP sub-plan) to include the following data:<br>j) Operational zones;<br>k) Locations to deploy personnel and equipment;<br>l) List of resources (personnel and equipment) required;<br>m) Logistics involved in deploying equipment and personnel;<br>n) Timeframes to undertake deployment;<br>o) Health and Safety constraints.</td><td>Personnel<br>Planning Lead / AMOSC to assist with development of Containment and Recovery Plan (IAP sub-plan)<br>Deliverables<br>Containment and Recovery Plan (IAP sub-plan)</td><td>Develop a plan, if required, within 12 hours of NEBA confirming an overall environmental benefit</td></tr>
</table>

| ACTION PLAN: CONTAINMENT AND RECOVERY | | | | |
|---|---|---|---|---|
| **Task** | | **Actions** | **Resources** | **Timeframe** |
| | **Mobilise containment and recovery resources**<br>IMT to commence mobilisation of C&R resources into Dampier | 1. Arrange for mobilisation of C&R equipment to Dampier port<br>AMOSC/AMSA Resources<br>2. Liaise with AMOSC / AMSA to commence mobilisation of containment and recovery equipment and personnel into Dampier<br>3. Ensure each vessel has a minimum of two trained personnel onboard who are responsible for controlling operations, ensuring they are implemented safely and effectively<br>**Note:** Ensure all equipment mobilisation is coordinated noting need for AMOSC/AMSA equipment in support of other response strategies<br>4. Commence mobilisation of vessels to support C&R operations into Dampier<br>a) Service providers will provide vessels under current Master Service Agreement (MSA)<br>b) Additional vessels to be sourced through Jadestone approved broker<br>5. Mobilise waste management contractor and request all available IBCs and Iso-containers be sent to Dampier<br>6. Coordinate and activate arrangements to support loading and embarkation of equipment/personnel from Dampier port<br>7. Ensure that all actions/details are captured in the resource tracking and Incident log<br>8. Ensure wider IMT are briefed on actions | **Equipment**<br>Vessels<br>Booms, skimmers, ancillary equipment<br>Waste storage<br>**Personnel**<br>Trained Personnel (sourced from AMOSC, AMSA) – 2 per vessel<br>**Forms and Guidance**<br>Vessel Mobilisation Guide – to be used to support sourcing of vessels into Dampier | Commence mobilisation within 12 hours of IMT being convened |

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| **ONGOING RESPONSE OPERATIONS** | **Commence containment and recovery operations**<br>Following initial activation/mobilisation of required resources ongoing operations are to be commenced in support of the response | Containment and Recovery operations commencement<br>IMT (Log):<br>1. Confirm build-up of C&R resources in Dampier<br>2. Coordinate arrival and availability of vessels in Dampier<br>3. Arrange and coordinate transport arrangements to mobilise equipment and personnel to Dampier port<br>IMT (Ops and Plan)<br>4. Ensure additional vessels (once operationally ready) become available from Dampier are included in the IAP for each operational period.<br>5. Coordinate operational surveillance support to vessels to ensure they are being directed to priority locations<br>6. Assess daily operational surveillance information to drive future operational guidance<br>7. Coordinate vessel operations to support management of oily/water waste recovered by vessels<br>8. Support development and promulgation of the IAP to meet operational requirements<br>9. Coordinate daily operations in support of ongoing response<br>10. Ensure that all actions/details are captured in the Resource tracking and Incident log<br>11. Ensure wider IMT are briefed on actions on a daily basis<br>**Note**: Clear guidance to be provided in IAP with respect to:<br>- Vessel movements to/from port as required to assist with resupply/waste management/operational maintenance<br>- Vessel will be "operationally ready" once equipment loaded and trained spill responders are embarked<br>- Operations to be conducted in operational zones beyond dispersant operations and in areas which threaten priority environmental sensitivities<br>- Daily reporting requirements back to IMT on conduct of operations and operational status | **Equipment**<br>Vessels<br>Booms, skimmers, ancillary equipment<br>**Personnel**<br>Trained Personnel (sourced from AMOSC, AMSA) – 2 per vessel<br>**Incident Action Plan (IAP)** – Task Assignment to be developed and disseminated in order to commence containment and recovery operations | Commence C&R operations within 24-36 hours of Containment and Recovery Action Plan (this plan) being activated |

| ACTION PLAN: CONTAINMENT AND RECOVERY | | | | |
|---|---|---|---|---|
| **Task** | | **Actions** | **Resources** | **Timeframe** |
| | **Manage waste from containment and recovery operations** | IMT to assess viability of following options:<br>1. Option 1 (Preferred option): Subject to approvals from the relevant Jurisdictional Authority (refer to Section 11.5) and weather permitting, decant oil from water in tanks onboard the recovery vessels and discharge the water component overboard within the apex of the containment booms. Then transfer remaining product to IBCs for temporary storage<br>2. Option 2: Transfer oily waste water (not decanted) to tanks onboard support vessel/s or other recovery vessels for storage and possible treatment<br>**Note**: Environmental approvals must be obtained prior to liquid waste discharge to the environment. Records are to be retained of volumes discharged.<br>3. Manage solid waste generated:<br>a. Can be temporarily stored on-board the support vessel or facility for transfer to mainland for disposal by a licensed contractor<br>4. Ensure washdown of offshore equipment is conducted in hot zone's only | **Waste Management Plan**<br><br>**IMT support** – to be provided by waste management contractor<br><br>**Waste Management** – controlled waste tracking to be managed throughout | Review options within 48 hours of IMT being convened |

## 17.8 Protection and Deflection Action Plan

| ACTION PLAN: PROTECTION AND DEFLECTION | | | | |
|---|---|---|---|---|
| **Task** | | **Actions** | **Resources** | **Timeframe** |
| **1. Engage with relevant stakeholders and develop plan to conduct protection and deflection operations**<br>Responsible Person: IMT (Planning) | | | | |
| **ONGOING RESPONSE ACTIONS** | **Commence stakeholder engagement** | 1. Notify WA DoT if there are likely to be any impacts on state shorelines. Refer to IMTRP and Appendix A6 for detail on regulatory notifications.<br>**Note:**<br>All shoreline clean-up operations conducted within WA state waters (includes waters around islands) fall under the remit of WA DoT's IMT and associated IAP's. Priority receptors and strategies will be confirmed/implemented under the direction of the Control Agency.<br>Refer to IMTRP for further information on cross jurisdictional arrangements. | **Personnel**<br>WA DoT IMT<br>**Forms and Guidance**<br>WA DoT Offshore Petroleum Industry Guidance Note - Marine Oil Pollution: Response and Consultation Arrangements (WA DoT, 2020) | Within 2 hours of becoming aware of potential impacts to state |
| **NOTE: All protection and deflection activities in the following steps are indicative only – at the direction of the State IMT who will be the Control Agency for the spill in State waters** | | | | |
| | **Conduct SCAT** | 2. Conduct an initial shoreline assessment (i.e. SCAT) (ground / aerial survey depending on access) | Refer to Section 9.4.7 for detail. | Commence deployment of SCAT Teams within 48 hours of becoming aware of impacts to shorelines |

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| | **Conduct NEBA** | 3. Using the latest results of operational monitoring activities, conduct operational NEBA to determine if protection and deflection is likely to result in a net environmental benefit.<br>Operational NEBA considerations:<br>• Are conditions (e.g. tides, current, sea state) favourable for this strategy to be effective in open ocean environments immediately surrounding the emergent sensitivities (reefs)?<br>• Will access to the shallow intertidal areas on top of emergent sensitivities be safe and feasible?<br>• Can the IMT access suitable shallow draft vessels to safely establish booming arrangements (e.g. does vessel have ability to transfer anchors and booms; does it have adequate tie-points?).<br>• Is there potential that submerged receptors could be damaged from potential anchor drag?<br>**Ongoing Actions**<br>Daily re-evaluation of NEBA to assess varying net benefits and impacts of continuing to conduct protection and deflection activities | Operational NEBA form<br>Planning Lead | Within 2-4 hours of IMT being convened (and impacts to shorelines are likely)<br>Daily NEBA re-evaluation |

| | | | | |
|---|---|---|---|---|
| | **Develop Protection & Deflection Plan** | 4. If NEBA indicates that there is an overall environmental benefit of applying this strategy, develop a Protection and Deflection Plan (IAP sub-plan) to include the following data:<br>a) Priority near-shore and shoreline areas for protection (liaise with SMPC to confirm priority locations and consult latest operational monitoring data, including SCAT surveys);<br>b) Locations to deploy protection and deflection equipment;<br>c) Method of deployment for each location i.e., exclusion, diversion, river, shore-line sealing booing etc)<br>d) List of resources (personnel and equipment) required;<br>e) Timeframes to undertake deployment;<br>f) Access / egress locations from land or sea;<br>g) Frequency of boom inspections and maintenance (noting tidal cycles).<br><br>**Note**: Consult AMOSC and State, considering the practicalities, likely success and risks associated with a shoreline operations in remote locations. | **Personnel**<br>Environmental Advisor / AMOSC to assist with state IMT with development of Protection and Deflection Plan (IAP sub-plan)<br>**Deliverables**<br>Protection and Deflection Plan (IAP sub-plan) | Develop a plan, if required, within 12 hours of NEBA confirming an overall environmental benefit |
| | | 5. Obtain approvals to access the following areas if response activities are required within:<br>a) World Heritage Areas (from DCCEEW);<br>b) Commonwealth reserves including AMPs (from DCCEEW / Parks Australia);<br>c) State reserves (from WA DBCA);<br>d) Aboriginal heritage areas (from WA Department of Aboriginal Affairs (DAA)); and<br>e) International waters (from DFAT).<br>6. Refer IMTRP Arrangements for regulatory notification and reporting requirements. | **Deliverables**<br>Copy of access approvals | Within 3 days of spill or 48 hours prior to estimated contact with shoreline environment |

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|---|---|---|---|---|
| **2. Mobilise protection and deflection resources**<br>Responsible Person: IMT (Logistics and Operations) | | | | |
| | **Mobilisation of resources to support operations** | 1. Commence mobilising protection and deflection equipment in readiness for potential use. | **Equipment**<br>Booming systems<br>Sorbent materials<br>PPE | Commence deployment within 24 hours of completion of Protection and Deflection Plan (IAP sub-plan) |
| | | 2. Mobilise support vessels with capabilities to deploy protection and deflection teams and equipment to remote locations via:<br>a) Vessel deployment; and<br>b) Land-side deployment. | **Equipment**<br><u>Vessels:</u><br>Flat bottomed or vessels with tenders<br>Capable of accommodating vessel crew plus 7 additional personnel and equipment<br>Capable of deploying booms in waterways and shallow seas<br>**Personnel**<br><u>Per vessel:</u><br>Vessel crew<br>2 x Trained operator / Team Leader(s) (AMOSC, AMSA)<br>5 x Labourers | Commence deployment within 24 hours of completion of Protection and Deflection Plan (IAP sub-plan) |
| **3. Commence protection and deflection operations**<br>Responsible Person: IMT (Operations) | | | | |

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| | **Conduct Protection and Deflection operations** | 1. Commence on-site protection and deflection activities as per the P&D Plan (IAP sub-plan)<br>2. Nominated Shoreline Response Team Leader to report back on effectiveness to IMT Leader | **Equipment**<br>Booming systems<br>Sorbent materials<br>PPE<br>Vessels<br>**Personnel**<br>Per vessel:<br>Vessel crew<br>2 x Trained operator / Team Leader(s) (AMOSC, AMSA)<br>5 x Labourers<br>**Deliverables**<br>Records of equipment used and personnel employed | Commence deployment of personnel, equipment and vessels within 24 hours of completion of Protection and Deflection Plan |

## 17.9 Shoreline Clean-up Action Plan

| ACTION PLAN: SHORELINE CLEAN-UP | | | | |
|---|---|---|---|---|
| **Task** | | **Actions** | **Resources** | **Timeframe** |
| **1. Engage with relevant stakeholders and develop plan to conduct shoreline clean-up if appropriate**<br>Responsible Person: IMT (Planning) | | | | |
| **ONGOING RESPONSE ACTIONS** | **Commence stakeholder engagement** | 1. Notify WA DoT if there are likely to be any impacts on state shorelines. Notify Parks Australia if there are likely to be any impacts to Australian Marine Parks. Refer to IMTRP and Appendix A6 for detail on regulatory notifications.<br>**Notes:**<br>• All shoreline clean-up operations conducted within WA state waters (includes waters around islands) fall under the remit of WA DoT's IMT and associated IAP's. Priority receptors and clean-up strategies will be confirmed/implemented under the direction of the Control Agency.<br>• Refer to IMTRP for further information on cross jurisdictional arrangements | **Personnel**<br>WA DoT IMT<br>**Forms and Guidance**<br>WA DoT Offshore Petroleum Industry Guidance Note - Marine Oil Pollution: Response and Consultation Arrangements (WA DoT, 2020) | Within 2-4 hours of IMT being convened (and impacts to shorelines are likely) |
| **NOTE: All shoreline clean-up operations in the following steps are indicative only – at the direction of the State IMT who will be the Control Agency for the spill in State waters** | | | | |
| | **Conduct shoreline assessment** | 2. Conduct an initial shoreline assessment (i.e. SCAT) (ground / aerial survey depending on access)<br><br>**Note:** Unmanned Aerial Vehicles (UAVs) may be necessary for some sensitive environments and where personnel safety is at risk | Refer to Section 13. | Commence deployment of SCAT Teams within 48 hours of becoming aware of impacts to shorelines |

| | | | | |
|---|---|---|---|---|
| | **Conduct NEBA** | 3. Using the latest results of operational monitoring activities, (with a focus on SCAT surveys), conduct operational NEBA to determine if shoreline clean-up is likely to result in a net environmental benefit.<br>Operational NEBA considerations:<br>• What volumes and/or concentrations of hydrocarbons are present or expected on the shoreline and what would be the impact to leave the product to weather naturally?<br>• Will access to remote shorelines be safe and feasible?<br>• Will responders disturb sensitive nesting species?<br>• Would it reduce overall impacts to send small teams of clean-up personnel?<br><br>**Ongoing Actions**<br>4. Daily re-evaluation of NEBA to assess varying net benefits and impacts of continuing to conduct shoreline clean-up activities. | Operational NEBA form<br>Planning Lead | Conduct within 2-4 hours of IMT being convened (and impacts to shorelines are likely) |

| | | | | |
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| | **Develop Shoreline Clean-up plan** | 3. If NEBA indicates that there is an overall environmental benefit develop a Shoreline Clean-up Plan (IAP sub-plan) to include the following information:<br>p) Priority near-shore and shoreline areas for protection (liaise with SMPC for direction on locations and consult latest operational monitoring data, including SCAT surveys);<br>q) Locations to deploy shoreline clean-up personnel equipment;<br>r) Method of deployment for each location i.e., exclusion, diversion, river, shore-line sealing booming etc)<br>s) Frequency of clean-up (to minimise impacts to geomorphology, receptors)<br>t) List of resources (personnel and equipment) required;<br>u) Logistics involved in deploying equipment and personnel (i.e. vessel-based accommodation, use of barges, landing craft and helicopters in remote environments);<br>v) Timeframes to undertake deployment;<br>w) Health and Safety constraints;<br>x) Access / egress locations from land or sea; and<br>y) Waste management. (see note below).<br><br>**<u>Plan shall address the following:</u>**<br>• Clean-up activities in sensitive environments shall be conducted in front of the primary dune and crews will not access behind the primary dune<br>• Temporary waste storage on remote beaches should be located at the bottom of the primary dune and above the Highest Astronomical Tide (HAT) mark<br>• Demarcation zones to be established for shoreline operations involving vehicle and personnel movement considering vegetation, bird nesting/roosting areas and turtle nesting timeframes<br>• Access plans for shoreline operations will prioritise use of existing roads and tracks<br>• Terrestrial vehicle and equipment deployment via landing barges where there are no existing track access | **Personnel**<br>Environmental Advisor / AMOSC to assist with State IMT with development of Shoreline Clean-up Plan (IAP sub-plan)<br>**Deliverables**<br>Shoreline Clean-up Plan (IAP sub-plan) | Develop a plan, if required, within 12 hours of NEBA confirming an overall environmental benefit |

| | | | | |
|---|---|---|---|---|
| | | • Vehicles and equipment are verified as clean and invasive species free prior to deployment to site<br>• A Specialist Advisor is consulted if shoreline operations overlap with areas of cultural or heritage significance<br>• Onshore equipment wash-down occurs in a decontamination area<br><br>**Note**: : Refer to the Kimberley Shoreline Response (AMOSC, 2019) when developing IAP sub-plan to assist in determining suitable tactics and capability. Consult AMOSC and State, considering the practicalities, likely success and risks associated with a shoreline operations in remote locations. | | |
| | | 4. Obtain approvals to access the following areas if response activities are required within:<br>a) World Heritage Areas (from DCCEEW);<br>b) Commonwealth reserves including AMPs (from DCCEEW / Parks Australia);<br>c) State reserves (from WA DBCA);<br>d) Aboriginal heritage areas (from WA DAA); and<br>e) International waters (from DFAT).<br>5. Refer IMTRP for regulatory notification and reporting requirements. | **Deliverables**<br>Copy of access approvals | Within 3 days of spill or 48 hours prior to estimated contact with shoreline environment |

| | | | | |
|---|---|---|---|---|
| **2. Mobilise shoreline clean-up resources**<br>Responsible Person: IMT (Logistics and Operations) | | | | |
| | **Mobilisation of all required resources** | 1. Commence mobilising shoreline clean-up equipment in readiness for potential use. | **Equipment**<br>Manual equipment (i.e. shovels, rakes, buckets, wheelbarrows etc)<br>Mechanical equipment (i.e. tiller, skid steer etc)<br>Sorbent materials<br>Decontamination kit<br>Access vehicles (if required) (i.e. quad bikes, 4WD's etc)<br>Personnel facilities (i.e. PPE, food, water, temporary accommodation, communications network, amenities etc)<br>Waste storage (i.e. portable tanks, IBC's, plastic bags, skip bins etc) and transport<br>**Forms and Guidance**<br>Shoreline Clean-up Plan (IAP sub-plan) | Commence deployment within 24 hours of completion of Shoreline Clean-up Plan |
| | | 2. Commence mobilising shoreline clean-up teams:<br>a) Clean-up teams to consist of 10 responders, including one trained Shoreline Responder to act as Team Lead<br>3. Contact labour hire agencies in Dampier to source labour hire personnel. | **Personnel**<br>Trained Shoreline Responder Team Leads (one per team)<br>Labourers (9 per team)<br>**Forms and Guidance**<br>Shoreline Clean-up Plan (IAP sub-plan) | Commence deployment within 24 hours of completion of Shoreline Clean-up Plan |

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|---|---|---|---|---|
| | | 4. Mobilise transport with capabilities to deploy shoreline clean-up teams and equipment to remote locations. | **Equipment**<br>Vessels:<br>Flat bottomed or vessels with tenders<br>Capable of accommodating vessel crew plus a minimum of 10 additional personnel and equipment<br>Helicopters<br>**Personnel**<br>Vessel crew<br>Clean-up team as stated above<br>**Forms and Guidance**<br>Shoreline Clean-up Plan (IAP sub-plan) | Commence deployment within 24 hours of completion of Shoreline Clean-up Plan |

| | | | | |
|---|---|---|---|---|
| **3. Coordinate shoreline monitoring**<br>Responsible Person: IMT (Operations) | | | | |
| | **Prepare to commence Shoreline Clean-up operations** | 1. Shoreline Team Lead to liaise with SCAT Team to confirm suitable clean-up techniques for surveyed shorelines prior to undertaking clean-up activities<br>2. Shoreline Team Lead and IMT (Plan) to liaise with SMPC to confirm shoreline clean-up techniques based on NEBA and SCAT surveys<br>3. Shoreline clean-up team members are briefed by Shoreline Team Leads on how to implement the shoreline clean-up techniques including how to prevent damage to shoreline habitat and surrounding laydown/staging areas<br>4. Shoreline Team Leads shall verify clean-up effectiveness and conduct final evaluations in conjunction with SCAT Teams.<br>**Note:** Clean-up activities shall be implemented under the direction of the SMPC (Refer to IMTRP for further information on cross jurisdictional arrangements) | **Equipment**<br>Camera<br>GPS<br>Spades<br>Tape measures<br>Sampling equipment<br>Vehicles (as required)<br>Aerial survey equipment (e.g. Unmanned Aerial Vehicles (UAVs))<br>**Personnel**<br>Trained Shoreline Responder Team Leads (one per team)<br>Labourers (9 per team)<br>**Forms / Guidance**<br>Shoreline Assessment Survey Report<br>Shoreline Assessment Guideline – Ground Surveys<br>AMSA / ITOPF / NOAA guidelines and forms<br>Shoreline Clean-up Methods table (below)<br>**Deliverables**<br>Shoreline assessment survey reports<br>Lab reports | |
| **4. Set up shoreline clean-up operations**<br>Responsible Person: IMT (Operations) | | | | |

| | | | | |
|---|---|---|---|---|
| | **Complete preparations for Shoreline Clean-up operations** | 1. Establish base:<br>a) Set up shelter, communications, amenities, food, water etc;<br>b) Organise equipment and PPE;<br>c) Deliver inductions and training to all personnel as appropriate;<br>d) Define pathways for access / egress to minimise damage to the environment. | **Equipment**<br>As per Shoreline Clean-up Plan (IAP sub-plan)<br>**Personnel**<br>Shoreline clean-up assessment team<br>Government specialists<br>Labour hire<br>**Forms and Guidance**<br>Shoreline Clean-up Plan (IAP sub-plan)<br>**Deliverables**<br>Induction records | Commence deployment within 24 hours of completion of Shoreline Clean-up Plan |
| **5. Commence shoreline clean-up operations**<br>Responsible Person: IMT (Operations) | | | | |
| | **Implement plan and conduct Shoreline Clean-up operations** | 1. Commence shoreline clean-up activities as per the Shoreline Clean-up Plan (IAP Sub-plan) ensuring that the following will occur:<br>a) Adequate supervision of teams;<br>b) Minimise damage to flora and fauna;<br>c) Schedule oil removal activities for cooler times of the day when it is more solid / waxy to minimise the amount of waste that is generated;<br>d) Site is set up suitably to minimise secondary contamination; and<br>e) Correct waste management is implemented. | **Personnel**<br>Shoreline clean-up team leaders and crews<br>WA DoT specialists<br>Labour hire | Commence deployment within 24 hours of completion of Shoreline Clean-up Plan |
| | | 2. Monitor the following parameters during implementation to assess effectiveness:<br>a) Ongoing shoreline monitoring;<br>b) Ongoing availability on sufficient resources (personnel and equipment); and<br>c) Waste management (i.e. predicted volumes, minimisation, temporary storage, transport and waste disposal).<br>d) Report back on effectiveness to IMT Leader. | **Deliverables**<br>Progress reports<br>Records of equipment used and personnel employed<br>Records of waste generated<br>Waste disposal receipts | Ongoing until termination of response |

## 17.10 Oiled Wildlife Plan

| ACTION PLAN: OILED WILDLIFE RESPONSE | | | | |
|---|---|---|---|---|
| **Task** | | **Actions** | **Resources** | **Timeframe** |
| **1. First strike (0-48 hours): situation awareness, notifications and activation of Wildlife Division**<br>Responsible Person: IMT (Planning and Operations), Wildlife Division Co-ordinator, Oiled Wildlife Advisor | | | | |
| **INITIAL RESPONSE ACTIONS** | **Situation Awareness** | 1. Personnel conducting operational monitoring activities shall report wildlife sightings in or near the spill trajectory (including if any wildlife are oiled or are at risk of oiling) and report them to the IMT | **Personnel**<br>Operational monitoring personnel | <2 hours of becoming aware of potential impacts to wildlife |
| | **Complete initial regulatory notifications** | 2. If wildlife has been contacted by oil or are at risk of contact:<br>• In State waters, DoT<br>• In State waters, notify the DBCA State Duty Officer (who will then activate the DBCA OWA)<br>• In State waters, notify the DBCA Pilbara Regional Office<br>• Notify DCCEEW if there is a risk of death or injury to a protected species (including Matters of National Environmental Significance [MNES]). | **Forms and Guidance**<br>Refer to IMTRP for detail on regulatory notifications | <2 hours of becoming aware of potential impacts to wildlife |

| ACTION PLAN: OILED WILDLIFE RESPONSE | | | | |
|---|---|---|---|---|
| **Task** | | **Actions** | **Resources** | **Timeframe** |
| | **Activate OWR capability** | 3. If wildlife are sighted and are at risk of oiling or have been oiled, initiate wildlife response by notifying AMOSC Duty Manager<br>4. Activate the oiled wildlife response sub-division within the Operations Division with the support of the IMT Leader. | **Personnel**<br>OWA from Jadestone or AMOSC<br>DBCA OWA<br>Under the WAOWRP arrangement, DBCA and AMOSC may request assistance from each other if their internal pool of trained personnel or expertise for wildlife response has been exhausted.<br>**Forms and Guidance**<br>WAOWRP and WA OWR Manual | <24 hours of becoming aware of potential impacts to wildlife |
| | **Determine if targeted wildlife reconnaissance (beyond operational monitoring) is required (situation dependent)** | 5. Determine requirement for targeted wildlife reconnaissance and associated personnel and equipment requirements. | **Forms and guidance**<br>WA OWR Manual:<br>P1 OWR Procedure: Phase 1 Wildlife Reconnaissance<br>G-1: OWR Strategies by Fauna Group<br>F1-1 Oiled Wildlife Reconnaissance: Observation Record | Conduct NEBA within 2 hours of potential impacts to wildlife being identified |
| | **Determine If the establishment of an OWR field station is required (situation dependent)** | 6. Determine if the establishment of an OWR field station is required and associated personnel and equipment requirements. | **Forms and guidance**<br>WA OWR Manual:<br>P4 OWR Procedure: Phase 4 Wildlife Field Processing<br>WAOWRP:<br>Appendix A - Equipment | <48 hours of becoming aware of impacts to wildlife |

| ACTION PLAN: OILED WILDLIFE RESPONSE | | | | |
|---|---|---|---|---|
| **Task** | | **Actions** | **Resources** | **Timeframe** |
| **ONGOING RESPONSE ACTIONS** | **Mobilisation of all required resources** | 7. Commence mobilising required resources | **Personnel**<br>Logistics<br>OWAs to assist<br>**Forms and Guidance**<br>WAOWRP and WA OWR Manual | Ongoing |
| **2. IAP Wildlife Subplan**<br>Responsible Person: Oiled Wildlife Advisor with assistance from Wildlife Division Co-ordinator | | | | |

| ACTION PLAN: OILED WILDLIFE RESPONSE | | | | |
|---|---|---|---|---|
| **Task** | | **Actions** | **Resources** | **Timeframe** |
| ONGOING RESPONSE ACTIONS | **Prepare IAP Wildlife Subplan** | 1. Initial IAP Wildlife Subplan should:<br>• Assess the situation and determine the level of wildlife impact (low / medium / high)<br>• The DBCA OWA and AMOSC OWA should be consulted when determining the initial magnitude of impact<br>• Determine if there are spill activities / tactics that may benefit or adversely impact the OWR<br>• Determine wildlife response priorities<br>• Determine if any deterrence / hazing measures may be applicable (i.e. likely to result in a net benefit) followed by the development of a Preventative Actions Plan<br>• Anticipate number of oiled wildlife requiring rescue and development of a Capture Plan<br>Bridge to the operational phases, procedures and guidelines in the WA OWR Manual and relevant to the scale of the OWR<br><br>**Note:**<br>Any interactions involving nationally listed threatened fauna may require approval from DCCEEW as interactions with such species is controlled by the Commonwealth Environment Protection and *Biodiversity Conservation Act 1999* and the Environment Protection and Biodiversity Conservation Regulations 2000.<br>In WA State waters, preventative actions involving wildlife constitute fauna "disturbance" under the *Biodiversity Conservation Act* 2016 and require authorisation through DBCA unless undertaken by licensed personnel. No action specifically targeted at wildlife should occur without this authority. | **Personnel**<br>OWAs to assist<br>**Forms and Guidance**<br>WAOWRP and WA OWR Manual<br>**Deliverables**<br>IAP Wildlife Subplan | Ongoing every 24 hours thereafter or as required |

| ACTION PLAN: OILED WILDLIFE RESPONSE | | | | |
|---|---|---|---|---|
| **Task** | | **Actions** | **Resources** | **Timeframe** |
| | **Determine resource requirements** | 2. Determine number of Oiled Wildlife Responders and IMT Wildlife related positions required based on the likely number of oiled wildlife and arrange access to resources via AMOSC and DBCA.<br>3. Based on the IAP Wildlife subplan, develop a list of equipment and personnel required to implement the plan and provide a list to Logistics | **Guidance**<br>WAOWRP and WA OWR Manual | Ongoing every 24 hours thereafter or as required |
| **3. Mobilisation of wildlife resources**<br>Responsible Person: Wildlife Division Co-ordinator / Logistics | | | | |
| | **Mobilisation of required resources to support OWR operations** | 4. Commence mobilisation of equipment (including adequate PPE) and personnel to required location/s. | | Ongoing |

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## 19. ABBREVIATIONS

| | |
|---|---|
| AIIMS | Australian Inter-Service Incident Management System |
| AMOSC | Australian Marine Oil Spill Centre |
| ALARP | As Low As Reasonably Practicable |
| APASA | Asia Pacific Applied Science Associates (Marine and Freshwater Environmental Modelling) |
| AMOSPlan | A voluntary oil industry mutual aid plan intended to supplement the National Plan, administered by Australian Institute of Petroleum through AMOSC |
| AMSA | Australian Maritime Safety Authority |
| CPF | Central Processing Facility |
| DAA | Department of Aboriginal Affairs (WA) |
| DMIRS | Department of Mines, Industry Regulation and Safety (Previously Department of Mines and Petroleum) |
| DBCA | Department of Biodiversity Conservation and Attractions |
| DCCEEW | Department of Climate Change, Energy, the Environment and Water |
| DPIRD | Department of Primary Industries and Regional Development |
| DoT | Department of Transport |
| EP | Environment Plan |
| FPSO | Floating Production, Storage, and Offtake Vessel |
| FWADC | Fixed Wing Aerial Dispersant Contract |
| GIS | Geographic Information System |
| HAT | Highest Astronomical Tide |
| HMA | Hazard Management Agency |
| IAP | Incident Action Plan |
| IBC | Intermediate Bulk Container |
| IMO | International Maritime Organisation |
| IMT | Incident Management Team |
| ITOPF | International Tanker Owners Pollution Federation |
| JSA | Job Safety Analysis |
| kL | Kilolitres |
| NEBA | Net Environmental Benefit Assessment |
| NRT | National Response Team – a group of interstate based individuals with spill response experience across all areas of response activities available to provide support to an Incident Controller |
| NOPSEMA | National Offshore Petroleum Safety and Environment Management Authority |
| OIM | Offshore Installation Manager |
| OIW | Oil in Water |
| OPEP | Oil Pollution Emergency Plan |

| | |
|---|---|
| OSRA | Oil Spill Response Atlas. National CRA, developed by various State agencies. In WA, WA Transport holds the State OSRA |
| OSTM | Oil Spill Trajectory Model |
| OWR | Oiled Wildlife Response |
| OWRP | Oiled Wildlife Response Plan |
| POLREP | Pollution Report. A report, reporting a pollution incident |
| PPE | Personal Protective Equipment |
| RCC | Rescue Coordination Centre (Canberra, Australia) |
| SCAT | Shoreline Clean-up Assessment Techniques |
| SITREP | Means a Situation Report on an actual or potential marine oil pollution incident or response |
| SMP | Scientific Monitoring Program |
| SOPEP | Ship Onboard Pollution Emergency Plan |

## 20. APPENDICES

- A1. Observation Logs (vessel, aerial, shoreline)
- A2. Bonn Agreement Oil on Water Classification
- A3. Shoreline Assessment Form
- A4. Diesel Fuel Properties
- A5. Stag Crude Assay
- A6. Regulatory Notifications
- A7. Incident Management Guidance

**APPENDIX A1 – Observer Logs**

**Vessel visual observer log**

| Survey Details | | | | | | |
|---|---|---|---|---|---|---|
| Date | Start time | End Time | Observers | | | |
| Incident | | | Area of Survey | | | |
| Vessel type | Call sign | | | | | |
| **Weather Conditions** | | | | | | |
| Wind speed (knots) | | | Wind direction | | | |
| Cloud cover (%) | | | Visibility | | | |
| Time high water | | | Current direction | | | |
| Time low water | | | Current speed (nM) | | | |
| **Slick Details** | | | | | | |
| Slick grid parameters by lat/long | | | Slick grid parameters (vessel speed) | | Slick grid dimensions | |
| Length Axis | Width Axis | | Length Axis | | Width Axis | Length nm |
| Start Latitude | Start Latitude | | Time (seconds) | | Time (seconds) | Width nm |
| Start Longitude | Start Longitude | | | | | Length nm |
| End Latitude | End Latitude | | Vessel Speed (knots) | | Vessel Speed (knots) | Width nm |
| End Longitude | End Longitude | | | | | Grid area $km^2$ |

| Visual appearance slick |
| --- |
| Colours, emulsification etc. |
| Any marine fauna or other activities observed |
| |

**Aerial surveillance observation log**

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

## Slick details

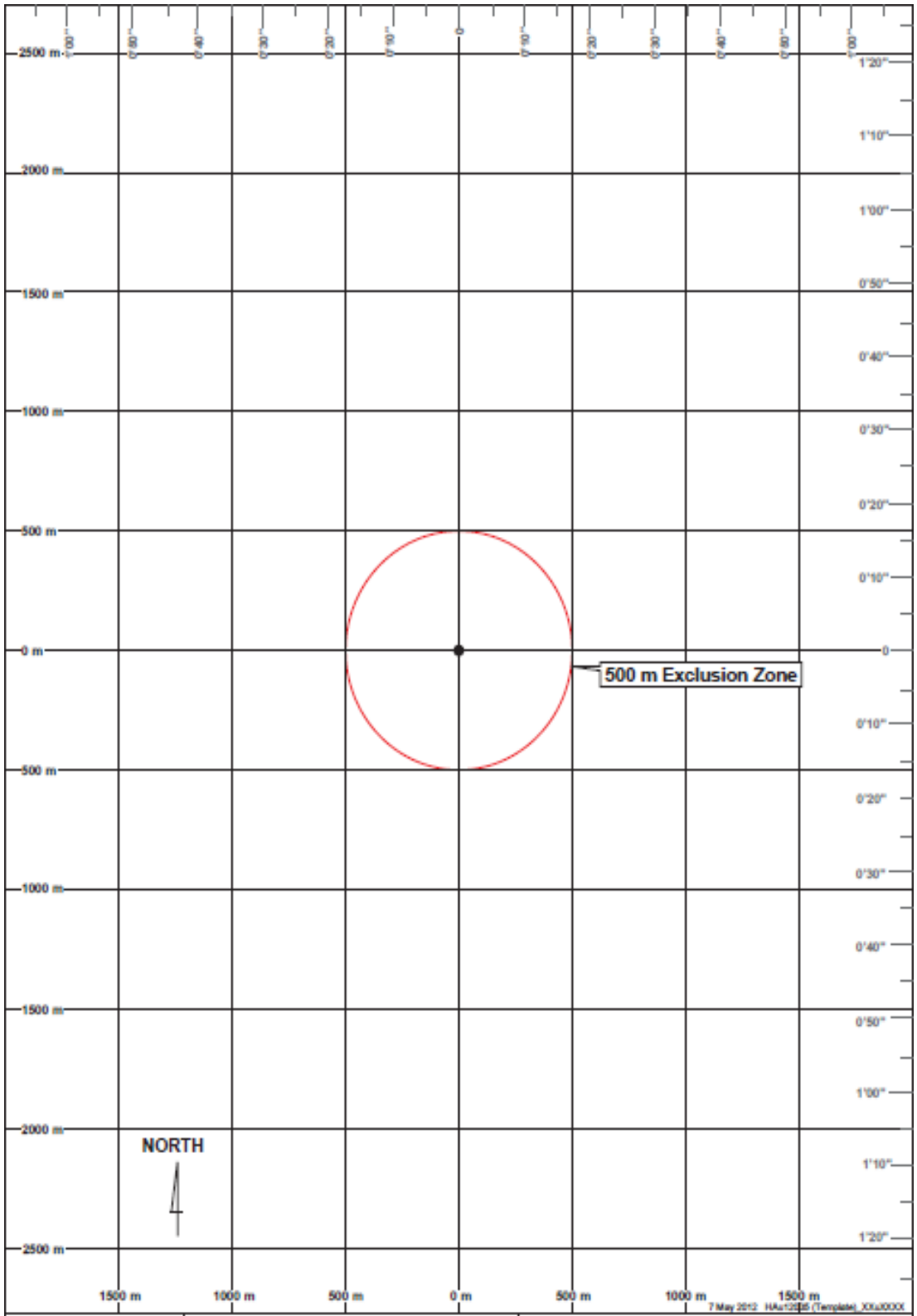
| Slick | Time local | Slick (centre or start) | | Slick (end) | | Slick Orient Degrees | Oil slick length | | | Oil slick width | | | Area $km^2$ | Coverage % | Oiled area $km^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LAT N/S | LONG E/W | LAT N/S | LONG E/W | | SOG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

| Slick | Oil appearance coverage - % | | | | | | Minimum volume - $m^3$ | Maximum volume - $m^3$ | Type of detection (etc. visual, IR) | Edge description (clear or blurred) | General description (windrows/patches) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | other | | | | | |
| A | | | | | | | | | | | |
| B | | | | | | | | | | | |
| C | | | | | | | | | | | |
| D | | | | | | | | | | | |
| E | | | | | | | | | | | |

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

| **The Bonn Agreement Oil Appearance Code (BAOAC)** | | | |
|---|---|---|---|
| **No** | **Oil appearance** | **Min. Volume $m^3$ / $km^2$** | **Max. Volume $m^3$ / $km^2$** |
| 1 | Sheen | 0.04 | 0.30 |
| 2 | Rainbow | 0.30 | 5.00 |
| 3 | Metallic | 5.00 | 50.0 |
| 4 | Discontinuous true colour | 50.0 | 200 |
| 5 | True colour | 200 | >200 |

**AERIAL SURVEILLANCE SURFACE SLICK MONITORING DIAGRAM**



**AERIAL SURVIELLANCE MARINE FAUNA SIGHTING RECORD SHEET**

<table>
<tr><th>Receptor</th><th>Type/species</th><th>Number</th><th>Location</th><th>Behaviour / Comments</th></tr>
<tr><td>Cetaceans</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Turtles</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Dugongs</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Sharks</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Sea snakes</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Seabirds</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Vessels</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Other details for each observation location</td></tr>
<tr><td rowspan="5">Ambient conditions at each location</td><td>Date</td><td rowspan="5">Photographic record (to include photo ID No., date and time of each photo or video clip, brief description):</td><td></td></tr>
<tr><td>Time</td><td></td></tr>
<tr><td>Weather Conditions</td><td></td></tr>
<tr><td>Visibility (atmospheric)</td><td></td></tr>
<tr><td>Water turbidity</td><td></td></tr>
</table>

**Marine Megafauna Assessment Surveys**

*Triggers*

1. Observed proximity of marine megafauna to oil slick or response operations combined with suggestion of significant harm (i.e. not an isolated incident), or
2. Observed incident of harm attributable to oil or the response.

*Objectives*

1. To quantify the presence of megafauna in the response area (i.e. near the oil slick, response vessels or aircraft) or wider region in order to determine the level of potential exposure to oil.
2. To observe and if possible quantify exposure of megafauna to surface oil or to the response.
3. To detect and quantify lethal effects.
4. Observe and to assess the significance of sub-lethal effects (e.g. avoidance behaviour) of this exposure or interactions.

*Data Collection and Management*

Data to be recorded from aerial megafauna surveys is outlined in the table below.

<table>
<tr><th>Resource</th><th colspan="2">Species</th><th>Numbers observed</th><th>Location</th><th>Behaviour/Comment</th></tr>
<tr><td>Cetaceans</td><td colspan="2"></td><td>Adult_____<br>Juvenile_____<br>Calf_____</td><td>Lat_____<br>Long____</td><td>Direction of movement<br>Proximity to oil<br>Proximity to vessels<br>Identify marks<br>Aversion or other behaviour<br>Carcasses</td></tr>
<tr><td>Birds</td><td colspan="2"></td><td></td><td>Lat_____<br>Long____</td><td>Direction of movement<br>Proximity to oil<br>Proximity to vessels<br>Identify marks<br>Aversion or other behaviour<br>Carcasses</td></tr>
<tr><td colspan="6">Other Details for each Observation Location</td></tr>
<tr><td rowspan="4">Ambient Conditions at Each Location</td><td>Date</td><td rowspan="4">Photographic/Video Record</td><td>Date and time of each</td></tr>
<tr><td>Time</td><td>Photo/video clip number</td></tr>
<tr><td>Weathering conditions</td><td>Brief description</td></tr>
<tr><td>Visibility</td><td>GPS link</td></tr>
</table>

*Methodology*

It is proposed that observations are made during dedicated monitoring flights supported where necessary by ground (vessel-based) surveys. Flights would normally be dedicated to the monitoring of only one fauna group but multi-objective flights may be required.

Observers must have relevant skills and expertise in the identification of the subject fauna and in interpreting their behaviour. Aircraft must have adequate downward visual capability.

A photographic or video record should be taken of each sighting and precise locations recorded on GPS.

A detailed methodology must be developed prior to commissioning this study. The scope and design of the detailed must include the following:

- State objectives;
- Reflect the level and distribution of observed or anticipated exposure and effects i.e.;
  - Geographic distribution
  - Study duration
- Stipulate replicate sampling, statistical analyses, and scientific rigour;
- Stipulate the expected flight frequency; and
- Indicate comparison to be made between impacted and unimpacted (control) habitats/biota, before and after spill observations.

The plane should follow line transects which are surveyed in passing mode (e.g. the plane did not deviate from the flight path.

*Pre-implementation Actions*

- Identify personnel or agencies with skills to design and undertake scientific monitoring of cetaceans, dugongs, birds, turtles;
- Undertake detailed study including design, budget, schedule and resource requirements;
- Identify and assign responsibilities for management of the study; and
- Secure identified resources.

*Resource Requirements Checklist*

- ¨ Aircraft
- ¨ Species identification manuals
- ¨ Aerial camera (still and video). Video to be GPS linked
- ¨ Expert megafauna observers

*Supporting Documents*

AFMA Protected Species Identification Guide: http://www.afma.gov.au/wp-content/uploads/2010/06/id_guide.pdf

**Shoreline observation log**

| Survey Details | | | | |
|---|---|---|---|---|
| Incident | Date | Start time | End Time | Observers |
| Area of Survey | | | | |
| Start GPS:<br>LAT_____deg._____LONG_____deg._____min | | End GPS:<br>LAT_____deg._____LONG_____deg._____min | | |
| Aircraft type | Call sign | Average Altitude | Remote sensing used (if any) | |
| Weather Conditions | | | | |
| Sun/Cloud/Rain/Windy | Visibility | Tide Height<br>L/M/H | | |
| Time high water | Time low water | Other | | |

| Shoreline Type - Select only ONE primary (P) and ANY secondary (S) types present | | | | | |
|---|---|---|---|---|---|
| | Rocky Cliffs | | Boulder and cobble beaches | | Sheltered tidal flats |
| | Exposed artificial structures | | Riprap | | Mixed sand and gravel beaches |
| | Inter-tidal platforms | | Exposed tidal flats | | Fine-Medium sand grained beaches |
| | Mangroves | | Sheltered rocky shores | | Other |
| | Wetlands | | Sheltered artificial structures | | |
| Operational Features (tick appropriate box) | | | | | |
| | Direct backshore access | | Alongshore access | | Suitable backshore staging |
| Other | | | | | |

**APPENDIX A2 - Bonn Agreement Oil Appearance Code**

## Volume Estimation - Oiled Area Measurement

6.1 Trials have shown that both oiled area and specific oil appearance area coverage measurement is the main source of error in volume estimation. Therefore observers should take particular care during this part of the volume estimation process.

6.2 Estimating or measuring the oiled area can bedone either by:

- Visual estimation
- Measurement of sensor images

6.3 Estimations of oiled slick area based on visual observations are likely to be less accurate than estimates based on measurements made of remote sensing images.

6.4 If possible, the whole slick should be visible in one image for ease of area measurement. Area calculations using accurate measurements of SLAR images will be more appropriate for large oil slicks, while measurements of UV images will be more suitable for smaller slicks.

6.5 Most modern SLAR systems incorporate electronic measuring devices; areas can be measured by drawing a polygon around the detected slick. It is recommended that these devices be used where at all possible as they will provide the most accurate measurement within the confines of the aircraft during flight. Alternatively the overall length and width can be measured electronically and the oiled coverage estimated visually.

*6.6 It should be remembered that because of the resolution of the SLAR (generally 20 metres) small areas of less than 20 metres NOT covered with oil but within the overall area would not show on the SLAR. However, oil patches of less than 20 metres will show up as patches of 20 metres.*

6.7 The recommended procedure for visual observation is to estimate the length and width of the slick by making time and speed calculations. This forms an imaginary rectangle that encloses the slick. The coverage of the oil slick (expressed as a percentage or proportion) within this imaginary rectangle is then used to calculate the oiled area of the slick. Inevitable inaccuracies in dimension estimates and estimated coverage within these dimensions can give rise to high levels of error in area estimation.

6.8 When determining the oiled area coverage it is essential to remember that the main body of an oil slick may have 'areas' of clear water, especially near the trailing edge of the slick. For compact slicks, there may be only a few ‘clear water’ areas but for more diffused oil slicks there could be several which would lower the overall coverage percentage significantly. More accurate assessments of the oiled area can be made by a thorough analysis of the SLAR or UV images.

## Volume Estimation - Specific Appearance Area Coverage Measurement

6.9 The ‘oiled’ area should be sub-divided into areas that relate to a specific oil appearance (see BAOAC). This can be achieved using the recorded data from the vertical sensors and the noted visualobservations.

6.10 This part of the volume estimation is mainly subjective, so great care should be taken in the allocation of coverage to appearance, particularly the appearances that relate to higher thicknesses (**discontinuous true colour and truecolour**).

6.11 The vertical camera data (if available in flight) and the visual observations should be compared with the IR data, which will give an indication of the thickest part of the slick.

6.12 Thermal IR images give an indication of the relative thickness of oil layers within a slick. Relatively thin oil layers appear to be cooler than the sea and relatively thick oil layers appear to be warmer than the sea in an IR image. There is no absolute correlation between oil layer thickness and IR image because of the variable heating and cooling effects caused by sun, clouds and airtemperature.

6.13 The presence of any area within the slick shown as warm in an IR image indicates that relatively thick oil (Code 4 or 5 in the BAOAC) is present. Since these areas may only be small, but will contain a very high proportion of oil volume compared to the much thinner areas, their presence should be correlated with visual appearance in the BAOAC assessment.

6.14 The Volume Estimation Procedure is illustrated at AnnexB.

6.15 It is generally considered that 90% of the oil will be contained within 10% of the overall slick (normally the leading edge (up wind side) of the slick), within a few hours after the release.

## Oil Volume Estimate Usage

9.1 Using the BAOAC to estimate oil volume gives a maximum and minimum quantity. It is suggested that in general terms the maximum quantity should be used together with other essential information such as location to determine any required response action.

BONN CP agreed that the minimum volume estimate should be used for legal purposes. Reference is made to Bonn Agreement Contracting Parties Meeting Summary Record 2003 Page 5, Para. 2.4 (f) which states “When the BAOAC is used to estimate the quantity of oil released at sea, the lower limit of the range in the code for each coded appearance should be used for estimating the amount of oil present in the slick for enforcement purposes and for statistical reporting”. However, it is emphasised that each national authority will determine how to use the BAOAC volume data within its own area.

9.2 It is emphasised that extra caution should be used when applying the BAOAC during major incidents involving large quantities of thick oil and / or heavy oils or when emulsion is present. Aircrews should use all the available information or intelligence; such as oil thickness measurements taken by surface vessels, to estimate the volume.

## The Bonn Agreement Oil Appearance Code

### 11.1 The Theory of Oil Slick Appearances

1. The visible spectrum ranges from 400 to 750 nm (0.40 – 0.75 µm). Any visible colour is a mixture of wavelengths within the visible spectrum. White is a mixture of all wavelengths; black is absence of all light.
2. The colour of an oil film depends on the way the light waves of different lengths are reflected off the oil surface, transmitted through the oil (and reflected off the water surface below the oil) and absorbed by the oil. The observed colour is the result of a combination of these factors; it is also dependant on the type of oil spilled.
3. An important parameter is optical density: the ability to block light. Distillate fuels and lubricant oils consist of the lighter fractions of crude oil and will form very thin layers that are almost transparent. Crude oils vary in their optical density; black oils block all the wavelengths to the same degree but even then there are different ‘kinds of black’, residual fuels can block all light passing through, even in thin layers.

## The Bonn Agreement Oil Appearance Code

4. Since the colour of the oil itself as well as the optic effects are influenced by meteorological conditions, altitude, angle of observation and colour of the sea water, an appearance cannot be

characterised purely in terms of apparent colour and therefore an 'appearance' code, using terms independent of specific colour names, hasbeen developed.

5. The Bonn Agreement Oil Appearance Code has been developed as follows:
   - In accordance with scientific literature and previously published scientific papers,
   - Its theoretical basis is supported by small scale laboratory experiments,
   - It is supported by mesoscale outdoor experiments,
   - It is supported by controlled sea trials.
6. Due to slow changes in the continuum of light, overlaps in the different categories were found. However, for operational reasons, the code has been designed without these overlaps.
7. Using thickness intervals provides a biased estimation of oil volumes that can be used both for legal procedures and for response.
8. Again for operational reasons grey and silver have been combined into the generic term 'sheen'.
9. Five levels of oil appearances are distinguished in the code detailed in the following table:

| Code | Description - Appearance | Layer Thickness Interval (µm) | Litres per $km^2$ |
|---|---|---|---|
| 1 | Sheen (silvery/grey) | 0.04 to 0.30 | 40 – 300 |
| 2 | Rainbow | 0.30 to 5.0 | 300 – 5000 |
| 3 | Metallic | 5.0 to 50 | 5000 – 50,000 |
| 4 | Discontinuous True Oil Colour | 50 to 200 | 50,000 – 200,000 |
| 5 | Continuous True Oil Colour | More than 200 | More than 200,000 |

10. The appearances described cannot be related to one thickness; they are optic effects (codes 1 - 3) or true colours (codes 4 - 5) that appear over a range of layer thickness. There is no sharp delineation between the different codes; one effect becomes more diffuse as the other strengthens. A certain degree of subjective interpretation is necessary when using the code *and any choice for a specific thickness within the layer interval MUST be explained on the Standard Reporting Log*.

**Description of the Appearances**

***Code 1 – Sheen (0.04 µm – 0.3 µm)***

11. The very thin films of oil reflect the incoming white light slightly more effectively than the surrounding water (Figure 1) and will therefore be observed as a silvery or grey sheen. The oil film is too thin for any actual colour to be observed. All oils will appear the same if they are present in these extremely thin layers.

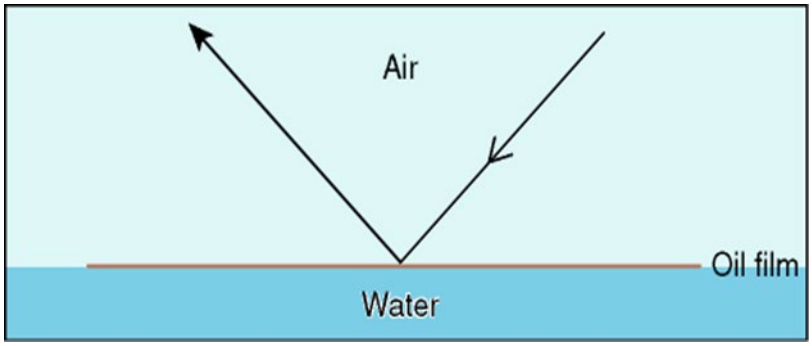



Figure 1. Light Reflecting From Very Thin Oil Films

12. Oil films below approximately 0.04-µm thickness are invisible. In poor viewing conditions even thicker films may not be observed.

13. Above a certain height or angle of view the observed film may disappear.

***Code 2 – Rainbow (0.3 µm – 5.0 µm)***

14. Rainbow oil appearance represents a range of colours: yellow, pink, purple, green, blue, red, copper and orange; this is caused by constructive and destructive interference between different wavelengths (colours) that make up white light. When white light illuminates a thin film of oil, it is reflected from both the surfaces of the oil and of the water (Figure 2).

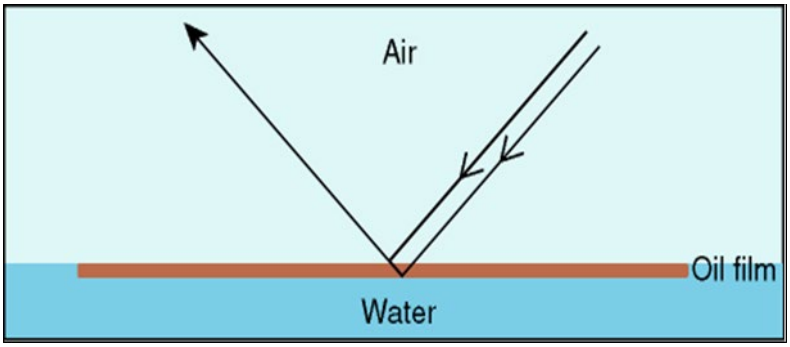



Figure 2. The Rainbow Region

15. Constructive interference occurs when the light that is reflected from the lower (oil / water) surface combines with the light that is reflected from the upper (oil / air) surface. If the light waves reinforce each other the colours will be present and brighter (Figure 3).

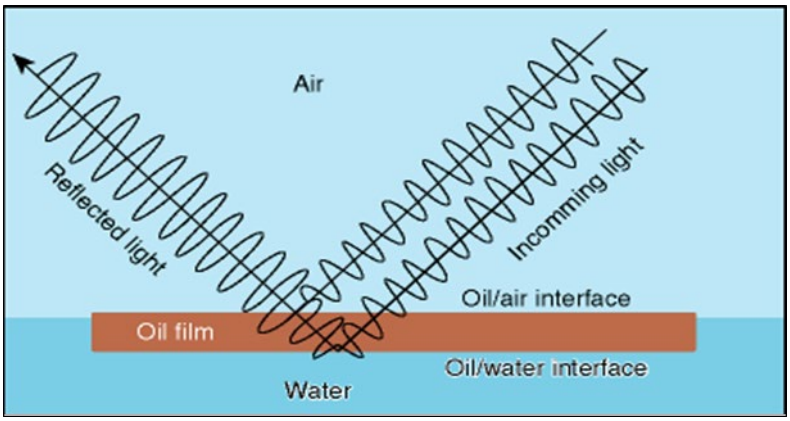



***Figure 3. Constructive Interference***

16. During destructive interference the light waves cancel each other out and the colour is reduced in the reflected light and appears darker (Figure 4).

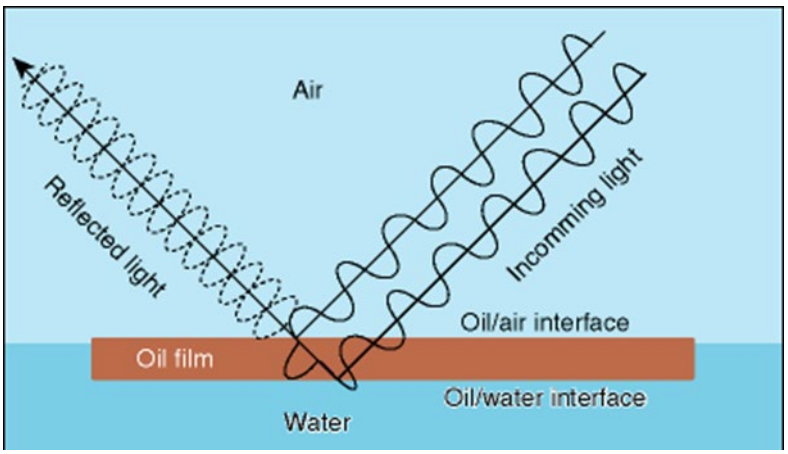



***Figure 4. Destructive Interference***

17. Oil films with thicknesses near the wavelength of different coloured light, 0.2 µm – 1.5 µm (blue, 400nm or 0.4 µm, through to red, 700nm or 0.7 µm) exhibit the most distinct rainbow effect. This effect will occur up to a layer thickness of 5.0 µm.

18. All oils in films of this thickness range will show a similar tendency to produce the 'rainbow' effect.

19. A level layer of oil in the rainbow region will show different colours through the slick because of the change in angle of view. Therefore if rainbow is present, a range of colours will be visible.

***Code 3 – Metallic (5.0µm – 50 µm)***

20. The appearance of the oil in this region cannot be described as a general colour. The true colour of the oil will not be present because the oil does not have sufficient optical density to block out all the light. Some of the light will pass through the oil and be reflected off the water surface. The oil will therefore act as a filter to the light (Figure 5).

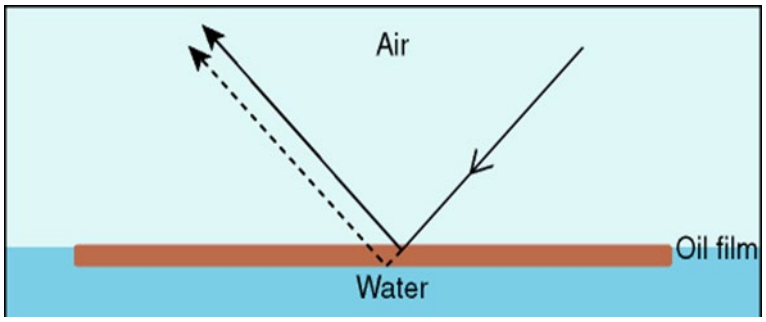
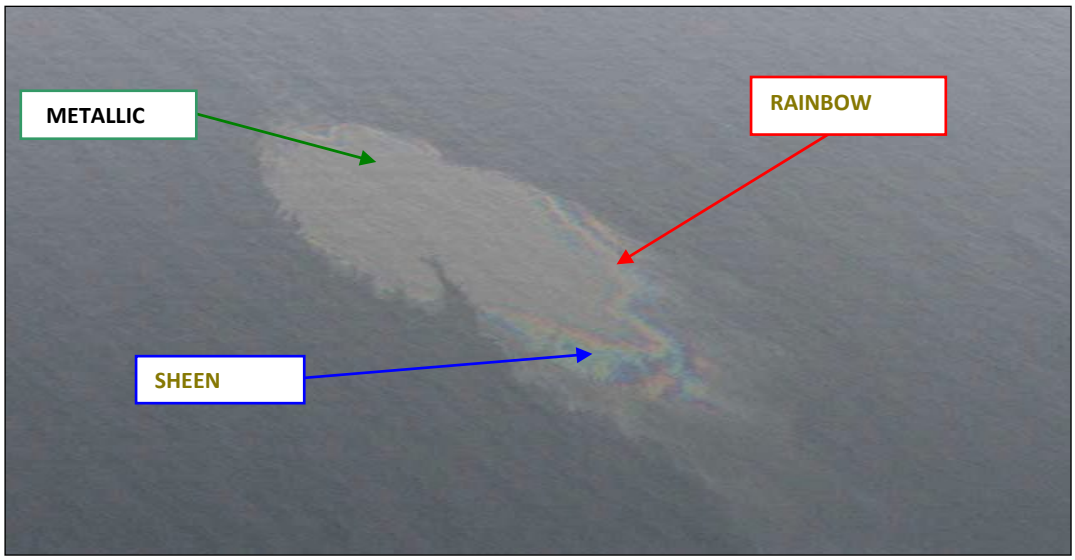



***Figure 5. The Metallic Region***

21. The extent of filtering will depend on the optical density of the oil and the thickness of the oil film.

22. The oil appearance in this region will depend on oil colour as well as optical density and oil film thickness. Where a range of colours can be observed within a rainbow area, metallic will appear as a quite homogeneous colour that can be blue, brown, purple or another colour. The 'metallic' appearance is the common factor and has been identified as a mirror effect, dependent on light and sky conditions. For example blue can be observed in blue-sky.



***Code 4 – Discontinuous True Colours (50 µm – 200 µm)***

23. For oil films thicker than 50 µm the light is being reflected from the oil surface rather than the sea surface (Figure 6).

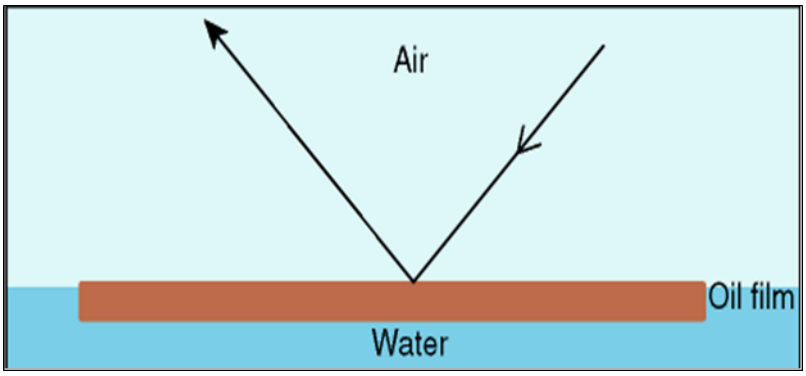



***Figure 6. Thick Oil Films***

24. The true colour of the oil will gradually dominate the colour that is observed. Brown oils will appear brown, black oils will appear black.

25. In this appearance category the broken nature of the colour, due to thinner areas within the slick, is described as discontinuous. This is caused by the spreading behaviour under the effects of wind and current.

26. 'Discontinuous' should not be mistaken for 'coverage'. Discontinuous implies colour variations and not non-polluted areas.

27. 'Discontinuous true colour' appeared to be a difficult appearance to describe and through imagery it may be possible to get a clearer picture of what is meant. For now the best result of the elaborations is: "true oil colour against a background of metallic".

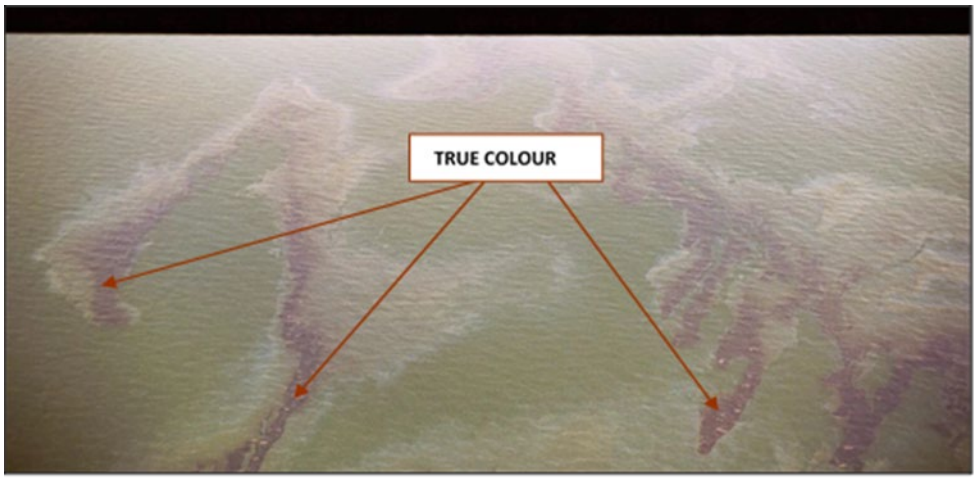
28. When oil is moved by waves, the oil layer obviously is thicker in the wave-trough than on the wave-top. This variation of the "oil appearance" may be understood by indicating "discontinuous".

***Code 5 – True Colours (>200 µm)***

27. The true colour of the specific oil is the dominant effect in this category.

28. A more homogenous colour can be observed with no discontinuity as described in Code 4.

29. This category is strongly oil type dependent and colours may be more diffuse in overcast conditions.




Note: all documentation on the study can be downloaded from the Bonn Agreement web-site under publications, at: www.bonnagreement.org

**ANNEX A**

**THE VOLUME ESTIMATION PROCEDURE**

**1. Oiled Area Measurement**

Area from SLAR Data 12 $km^2$

***Length and Width (SLAR Image or Time and Distance***

Length – 12 km x Width – 2 km (Imaginary Rectangle) Area

Covered with oil (Coverage) – 50%

Oiled Area 12 x 2 x 50% 12 $km^2$

**2. Appearance Coverage Allocation**

Appearance Code 1 (Sheen) 50%

Appearance 2 (Rainbow) 30%

Appearance 3 (Metallic) 15%

Appearance 5 (True Colour) 5%

**3. Thickness Band for Allocated Appearance**

Sheen 0.04 µm – 0.3 µm

Rainbow 0.3 µm – 5.0µm

Metallic 5.0 µm – 50 µm

True Colour More than 200 µm

4. **Minimum Volume Calculation**

Oiled Area x Area Covered with Specific Appearance x Minimum Thickness Appearance 1 (Sheen)

12 km2 x 50% x 0.04 µm = 0.24 $m^3$

Appearance 2 (Rainbow)

12 km2 x 30% x 0.3 µm = 1.08 $m^3$

Appearance 3 (Metallic)

12 km2 x 15% x 5.0 µm = 9 $m^3$

Appearance 5 (True Colour)

12 km2 x 5% x 200 µm = 120.0 $m^3$

**Minimum Volume = 0.24 + 1.08 + 9 + 120 = 130.32 $m^3$**

6. **Maximum Volume Calculation**

Oiled Area x Area Covered with Specific Appearance x Maximum Thickness Appearance 1 (Sheen)

12 km2 x 50% x 0.3 µm = 1.8 $m^3$

Appearance 2 (Rainbow)

12 km2 x 30% x 5 µm = 18 $m^3$

Appearance 3 (Metallic)

12 km2 x 15% x 50 µm = 90.0 $m^3$

Appearance 5 (True Colour)

12 km2 x 5% x (more than) > 200 µm = > 120.0 $m^3$

**Maximum Volume = 1.8 + 18+ 90.0 + > 120 = > 229.8 $m^3$**

**APPENDIX A3 – Shoreline Assessment Form**

Department of Transport

# Shoreline Assessment Form

This form should be submitted to the Shoreline Division Coordinator (SC). A summary of the information will be forwarded by the SC to the Operations Officer, Planning Officer and Management Support Unit.

## Purpose

This form is for shoreline responders who are required to complete a shoreline assessment.

It is recommended that such responders have completed oiled shoreline training as a minimum. This form is not intended to be used in isolation.

## Purpose

Human health and safety is **always** the number one priority in any incident.

**Priorities**

Protection priorities under Australia's National Plan to Combat Pollution of the Sea by Oil and other Noxious and Hazardous Substances (The National Plan) are:

- Human health and safety
- Habitat and cultural resources
- Rare and/or endangered flora and fauna
- Commercial resources
- Recreational and amenity areas

**Complete**

- Take Five and
- Job Safety Analysis (JSA)

Prior to and as part of your operations

**What is a shoreline assessment?**

A shoreline assessment:

- Is a simple and comprehensive survey of a shoreline
- Provides data to enable decision making for shoreline protection, clean-up and monitoring and
- Employs a systematic approach using standardised terminology

**What information needs to be gathered?**

Purpose

- Shoreline description
  - Shoreline type, substrate and energy
  - Biological character of shoreline
- Oil description
- Oil location, character and behaviour

Additional information that may be required:

- Access
- Site hazards and constraints
- Sensitive areas
- Features/landmarks
- Potential sites for
  - Decontamination/waste
  - Helicopter landing

## Dividing the shoreline

**Sectors**

Where there is a geographical barrier and restricted access between two areas, they will be split into separate sectors. Different sectors may have separate field command centres, catering, ablutions, decontamination, etc. Sectors will be further spilt into segments.

**Segments**

A segment is a piece of shoreline that's a workable size for a team and could be defined based on:

- Shoreline type
- Substrate type
- Access points
- Features e.g. breakwater
- Jurisdiction e.g. shire boundaries
- Presence of particular flora and/or fauna
- Distance e.g. every 50m

| Item Category | Item | Check |
|---|---|---|
| Recording | Camera | ☐ |
| Navigation | Maps and charts | ☐ |
| | GPS | ☐ |
| | Compass | ☐ |
| Communication | Mobile phone | ☐ |
| | Radio | ☐ |
| | Confirm phone/radio coverage | ☐ |
| Personal | First aid kit | ☐ |
| | Hat | ☐ |
| | Sun-cream | ☐ |
| | Drinking water | ☐ |
| | Rubber boots (non-slip) | ☐ |
| | Wet weather gear | ☐ |
| Documentation | Field booklet | ☐ |
| | Shoreline assessment forms | ☐ |
| | JSA forms | ☐ |
| | Log | ☐ |
| Other | Tape measure | ☐ |
| | Shovel | ☐ |
| | Sampling kit | ☐ |

Ensure you advise command of your planned operation and establish reporting expectations for while you are in the field.

Objective ID: A8525747 Page 1 of 4

**Shoreline descriptors:**

| Shoreline Type | Abbr. | | Note |
|---|---|---|---|
| Cliff | Cl | | Height and slope |
| Platform | Pl | | Height relative to tide |
| Reef | Re | | Reef is an intertidal platform |
| Beach | Be | | |
| Dune | Du | | |
| Flats | Fl | | |
| Artificial | A | | e.g. wharf, sea wall |
| **Shoreline substrate** | **Abbr.** | **Size** | **Note** |
| Bedrock or rock | R | | |
| Boulder | B | Larger than head | |
| Cobble | C | Fist to head size | |
| Pebble | P | Pen diameter to fist size | |
| Gravel | G | 2-4mm diameter | |
| Mud/silt/clay | M | Less than 0.6mm | Mix with water, if it goes cloudy = mud, if it sinks = sand |
| Earth | E | | Usually cliffs only |
| Shellgrit | Sh | | Usually with sand (i.e. Sh/S) |
| Coral | Co | | Dead coral, i.e. coral rubble *(if corals are live, record as coral in both substrate type and biological character)* |
| Artificial | A | | e.g. rip-rap |

*Note: S/B would indicate boulders and sand in equal amounts. S(B) would indicate sand was the dominant substrate.*

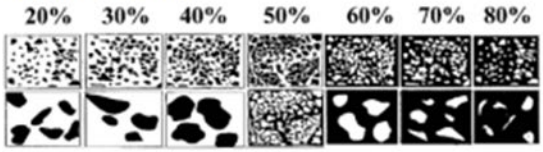
**Biological character**

This is flora and fauna living on the shoreline. Document this and indicate location on sketch map.

**Oil description/character**

- **Colour**
- **Viscosity: Solid** *(doesn't flow)*, **Viscous** *(flow slowly)*, **Fluid** *(flows easily)*
- **Stickiness: Very sticky** *(can't be wiped/washed off)*, **Sticky** *(partly removed by wiping/washing)*, **Non sticky** *(wipes of easily)*

**Percentage oil cover**

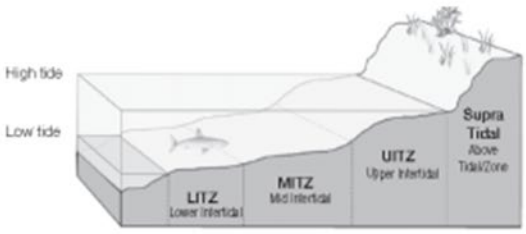



**Oil thickness**

| Name | Abbr. | Thickness | Description |
|---|---|---|---|
| Pooled | Po | Can be measured in mm or cms | Pooled fresh or emulsified oil |
| Cover | Co | Over 1mm | Coverage of oil of measurable thickness but not pooled |
| Coat | Ct | Less than 1mm | This coach of oil that masks colour of substrate and can be scratched off with fingernail. |
| Stain | St | Less than 1mm | Very thin stain of oil which cannot be scratched off substrate with fingernail |
| Film or sheen | Fi or Shn | Extremely thin film or sheen | Substrate can usually be seen through oil. Can be described as brown, rainbow or silver. |
| Tar balls | Tb | Variety of sizes | Ball or clumps of weathered oil. |

- To describe thickness of subsurface oil:
  - Depth = distance from substrate surface to top of buried layer
  - Thickness of lens = distance between top and bottom of buried layer

**Shoreline tidal zones**



| | | | |
|---|---|---|---|
| **Incident** | | **Ref No.** | |
| **REPORTING DETAILS** | | | |
| **Assessment Team Leader** | | **Position/ Organisation** | |
| **Team Members (name/org)** | | | |
| **Date Completed** | | **Time Completed** | |
| **Reporting to** | | **Position/ Organisation** | |
| **Date Received** | | **Time Received** | |
| **LOCATION DETAILS** | | | |
| **Sector** | | **Segment** | |
| **Name of Beach/Location** | | **Description (e.g. slope)** | |
| **Topography/ Other Map** | | **Map Reference** | |
| **Access Via** | ☐ Foot Only ☐ Road ☐ 4WD ☐ Boat ☐ Helicopter ☐ Gator/OUV | | |
| **Hazards** | | | |
| **TIMING** | | | |
| **First Assessment** | ☐ Yes ☐ No | **Last Assessment** | ☐ Yes ☐ No |
| **Timing** | ☐ Pre Impact ☐ Post Impact Before Clean-Up ☐ Post Impact After Clean-Up | | |
| **Time Since** | Impact (days/hrs.): | Last Clean-up (days/hrs.): | |

| **ASSESSMENT** | | | | |
|---|---|---|---|---|
| **Parameter** | **LITZ** | **MITZ** | **UITZ** | **Supratidal** |
| **Shoreline Description** | | | | |
| Shoreline type | | | | |
| Substrate type | | | | |
| Length of shoreline | | | | |
| Width of shoreline | | | | |
| Biological character | | | | |
| **Oil Distribution and Character** | | | | |
| Oil band length | | | | |
| Oil band width | | | | |
| % cover in band | | | | |
| Surface oil thickness | | | | |
| Oil appearance/character | | | | |
| Depth of buried oil (from surface) | | | | |
| Description of buried oil | | | | |
| **Other** | | | | |
| Un oiled debris | | | | |
| Oiled debris | | | | |

**Sketch Map**
Please include North point and scale



**Notes**

| |
|---|
| |
| |
| |
| |
| |
| |

**APPENDIX A4 – Diesel properties**

| DIESEL FUEL | Fresh | Weathering | | |
|---|---|---|---|---|
| | | 1-3 hours | 1 day | 1 week |
| **Physical Characteristics:** | | | | |
| API gravity (classification) | 33.2 (mid distillate) | | | |
| Density (g/mL) @ 20° C | 0.855 | ND | 0.856 | 0.860 |
| Viscosity (cP) @ 20° C | 3.62 | ND | 4.0 | 5.4 |
| Interfacial Tension (mN/m) | 34.5 | ND | 32.6 | 31.4 |
| Flash Point (°C) | 78.9 | ND | 91.1 | 118.3 |
| Pour Point (°C) | 6 | ND | 18 | 12 |
| Boiling Point (°C) | | | | |
| **Chemical Characteristics:** | | | | |
| Saturates (% by weight) | 63.1 | ND | 64.2 | 63.6 |
| Aromatics (% by weight) | 34.9 | ND | 33.4 | 33.7 |
| Resins (% by weight) | 1.7 | ND | 1.7 | 1.5 |
| Asphaltenes (% by weight) | 0.2 | ND | 0.7 | 1.2 |
| Waxes (% by weight) | ND | ND | ND | 4.2 |
| **Weathering:** | | | | |
| % loss after laboratory weathering | - | 0 | 3 | 23 |
| Persistent in the environment | moderate | | | |
| Forms oil in water emulsions | no | no | no | no |
| Demulsifier effective? | yes | yes | yes | yes |
| **Toxicity (laboratory tested):** | | | | |
| tropical clownfish (*Amphiprion clarkii*) | low | ND | low | low |
| inland silverside fish (*Menidia beryllina*) | mod. | ND | low-mod. | low- mod. |
| tropical prawn (*Penaeus vannamei*) | mod.-high | ND | mod.-high | mod.- high |

| | | | | |
|---|---|---|---|---|
| mysid shrimp (*Mysidopsis bahia*) | mod.-high | ND | mod.-high | mod.- high |
| sea urchin larvae (*Arbacia punctulata*) | low | ND | low | low |
| sand dollar/sea urchin larvae (*Dendraster excentricus/Strongylocentrotus purpuratus)* | mod.-high | ND | low | low |
| Amenable to Dispersant: | yes | yes | no | no |

**APPENDIX A5 – Stag Crude Assay**

# STAG CPF EXPORT CRUDE OIL ASSAY

conducted by

Petroleum Testing
Laboratory Refinery
Road, Lonsdale SA
5160

for

**Apache Energy**

## PROPERTIES OF CUTS

| Test | Method | Unit | LPG | IBP - 230C | 230 - 360C | 360 - 540C | 360C+ | 540C+ |
|---|---|---|---|---|---|---|---|---|
| Fractional Distillation | D2892 | %mass | Ni | 4.9 | 48.2 | 36.4 | 47.0 | 10.6 |
| Volume Yield | D5236 | %volume | Ni | 5.2 | 49.4 | 35.4 | 45.4 | 10.0 |
| Density @15°C | D4052 | kg/L | | 0.8788 | 0.9175 | 0.9670 | 0.9754 | 0.9937 |
| Specific Gravity @60/60°F | D4052 | - | | 0.8793 | 0.9180 | 0.9676 | 0.9760 | 0.9943 |
| API Gravity | D4052 | API | | 29.4 | 22.6 | 14.7 | 13.5 | 10.8 |
| Aniline Point | D611 | °C | | 51.9 | 54.5 | 62.3 | 68.8 | |
| Aniline Gravity Product | Calc | - | | 3685 | 2940 | 2119 | 2103 | |
| Ash | D482 | %mass | | | | | 0.0070 | |
| Asphaltenes | IP143 | %mass | | | | | 0.40 | |
| Carbon Residue - Micro | D4530 | %mass | | | | | 2.48 | |
| Cetane Index - Procedure A | D4737 | - | | | 33.2 | | | |
| Cetane Index - Procedure B | D4737 | - | | | 33.0 | | | |
| Characterization Factor,calc | UOP 375 | - | | | | | 11.5 | |
| Cloud Point | D2500 | °C | | | <-45.0 | | | |
| Colour ASTM | D1500 | - | | | L0.5 | | | |
| Copper Corrosion (3hrs @ 50C) | D130 | - | | | 1A | | | |
| FIA - Aromatic | D1319 | %volume | | 1.8 | | | | |
| Freeze Point | D5972 | °C | | <-70.0 | | | | |
| Heat of Combustion - Gross,calc | D4868 | MJ/kg | | | | | 43.5 | |
| Heat of Combustion - Nett,calc | D4868 | MJ/kg | | | | | 41.1 | |
| Hydrocarbon - Mono-Aromatics | IP391 | %mass | | | 23.4 | | | |
| Hydrocarbon - Di-Aromatics | IP391 | %mass | | | 4.8 | | | |
| Hydrocarbon - Polycyclic-Aromatics | IP391 | %mass | | | 5.0 | | | |
| Kinematic Viscosity @-20 | D445 | cSt | | 11.32 | | | | |
| Kinematic Viscosity @20°C | D445 | cSt | | 3.476 | | | | |
| Kinematic Viscosity @40°C | D445 | cSt | | 2.282 | 7.342 | | | |
| Kinematic Viscosity @50°C | D445 | cSt | | | | 200.2 | 675.2 | |
| Kinematic Viscosity @100°C | D445 | cSt | | | | 14.69 | 33.54 | |
| Metal - Nickel | ICP-OES | wt ppm | | | | | 7.2 | 31.4 |
| Metal - Vanadium | ICP-OES | wt ppm | | | | | <1 | <1 |
| Nitrogen - Basic | UOP269 | wt ppm | | | | | 158 | |
| Nitrogen - Total | D4629 | wt ppm | | | | 830 | 1284 | 3421 |
| PIONA (Benzene) | D6730 | %volume | | NA | | | | |
| Pour Point | D5950 | °C | | | <-39.0 | -3.0 | 0.0 | 48.0 |
| Smoke Point | D1322 | mm | | 16.5 | | | | |
| Sulphur - Total | IP336 | %mass | | <0.030 | 0.057 | 0.20 | 0.22 | 0.31 |
| Total Acid Number | D664 | mg KOH/g | | | 0.08 | 0.80 | 0.9 | |

**APPENDIX A6 – Regulatory Notifications**

| Agency / Authority | Notification Type & Timing | Legislation / Guidance | Reporting Requirements | Responsibility | Forms |
|---|---|---|---|---|---|
| **NOPSEMA Reportable Incidents** | | | | | |
| NOPSEMA (Incident Notification Office) | Verbal notification within **2 hours**<br>Written report as soon as practicable, but no later than 3 days | *Petroleum & Greenhouse Gas Storage Act 2006*<br>Offshore Petroleum Greenhouse Gas Storage (Environment) Regulations 2009 (as amended 2020) | A spill associated with the activity that has the potential to cause moderate to significant environmental damage[12] | Jadestone IMT Planning Lead | Incident reporting requirements: https://www.nopsema.gov.au/environmental-management/notification-and-reporting/ |
| National Offshore Petroleum Titles Administrator (NOPTA) (Titles Administrator) | Written report to NOPTA within 7 days of the initial report being submitted to NOPSEMA | Guidance Note (N-03000-GN0926) Notification and Reporting of Environmental Incidents | Spill in Commonwealth waters that is reportable to NOPSEMA | Jadestone IMT Planning Lead | Provide same written report as provided to NOPSEMA |
| **Level 1-3 Spills** | | | | | |
| AMSA (Rescue Coordination Centre (RCC)) | Verbal notification without delay to include:<br>• name of ship/s involved<br>• time, type and location of incident<br>• quantity and type of harmful substance<br>• assistance and salvage measures | National Plan for Maritime Environmental Emergencies | • All slicks trailing from a vessel<br>• All spills to the marine environment<br>• All spills where National Plan equipment is used in a response | Vessel Master | Incident reporting requirements: https://www.amsa.gov.au/marine-environment/marine-pollution/mandatory-marpol-pollution-reporting<br>Online POLREP - https://amsa- |

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

| Agency / Authority | Notification Type & Timing | Legislation / Guidance | Reporting Requirements | Responsibility | Forms |
|---|---|---|---|---|---|
| | • any other relevant information<br>Written POLREP form, within 24 hours of request from AMSA | | | | forms.nogginoca.com/public/ |
| Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) (Director of monitoring and audit section) | Email notification as soon as practicable | *Environment Protection and Biodiversity Conservation Act 1999* | If Matters of National Environmental Significance (MNES) are considered at risk from a spill or response strategy, or where there is death or injury to a protected species | Jadestone IMT Planning Lead | N/A |
| Parks Australia (24 hour Marine Compliance Officer) | Verbal notification as soon as practicable | *Environment Protection and Biodiversity Conservation Act 1999* | All actual or impending spills which occur within a marine park or are likely to impact on an Australian marine park | Jadestone IMT Planning Lead | Not applicable, however the following information should be provided:<br>• Titleholder's details<br>• Time and location of the incident (including name of marine park likely to be affected)<br>• Proposed OPEP response arrangements<br>• Details of the relevant IMT contact person. |

| Agency / Authority | Notification Type & Timing | Legislation / Guidance | Reporting Requirements | Responsibility | Forms |
|---|---|---|---|---|---|
| Australian Fisheries Management Authority (AFMA) | Verbal phone call notification within 24 hours of incident | | • Fisheries within the environment that may be affected (EMBA)<br>• Consider a courtesy call if not in exposure zone | Jadestone IMT Planning Lead | N/A |
| **Western Australia Waters** | | | | | |
| WA Department of Transport (WA DoT) (Maritime Environmental Emergency Response (MEER) Duty Officer) | Verbal notification within two hours<br>Follow up with Pollution Report (Appendix C) as soon as practicable after verbal notification<br>If requested, submit Situation Report (Appendix D) within 24 hours of request | Emergency Management Regulations 2006<br>State Hazard Plan: Maritime Environmental Emergencies<br>Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements | Notify of actual or impending Marine Pollution Incidents (MOP) that are in, or may impact, State waters.<br>Emergency Management Regulations 2006 define MOP as an actual or impending spillage, release or escape of oil or an oily mixture that is capable of causing loss of life, injury to a person or damage to the health of a person, property or the environment. | Jadestone IMT Planning Lead | WA DoT POLREP (Appendix C): https://www.transport.wa.gov.au/mediaFiles/marine/MAC-F-PollutionReport.pdf<br>WA DoT SITREP (Appendix D): https://www.transport.wa.gov.au/mediaFiles/marine/MAC-F-SituationReport.pdf |
| WA Department of Mines, Industry Regulation and Safety (DMIRS) (Petroleum Environment Duty Officer) | Verbal phone call within 2 hours of incident being identified<br>Follow up written notification within 3 days | Regulations 28, 29 and 30 of the Petroleum (Submerged Lands) (Environment) Regulations 2012<br>Guidance Note on Environmental Non-compliance and Incident Reporting | All actual or impending spills in State waters | Jadestone IMT Planning Lead | Environmental and Reportable Incident/ Non-compliance Reporting Form http://www.dmp.wa.gov.au/Environment/Environment-reports-and-6133.aspx |
| Department of Biodiversity | Verbal notification within 2 hours | Western Australian Oiled Wildlife Response Plan | Notify if spill has the potential to impact or has impacted wildlife in | Jadestone IMT Planning Lead | N/A |

| Agency / Authority | Notification Type & Timing | Legislation / Guidance | Reporting Requirements | Responsibility | Forms |
|---|---|---|---|---|---|
| Conservation and Attractions (State Duty Officer & Pilbara Regional Office) | | | State waters (to activate the Oiled Wildlife Advisor) | | |
| Department of Primary Industry and Regional Development (DPIRD) Fisheries | Verbal phone call notification within 8 hours | | Fisheries within the EMBA<br>Consider a courtesy call if not in exposure zone | Jadestone IMT Planning Lead | N/A |
| Department of Water and Environmental Regulation (DEWR) Pollution Watch Hotline | Initial verbal or electronic notification of the discharge as soon as practicable<br><br>Written notification of the incident to the CEO of the DWER, copied to the local DWER Industry Regulation Office, as soon as practicable | Environmental Protection Act 1986 (Section 72)<br><br>Environmental Protection (Unauthorised Discharge) Regulations 2004 | Call DWER 24 hour Pollution Watch hotline<br><br>Environmental Protection Act: Spill or discharge of hydrocarbons to the environment that has caused, or is likely to cause pollution, or material or serious environmental harm (Level 2 / 3 spills)<br><br>Environmental Protection (Unauthorised Discharge) Regs.: Unauthorised discharge (where there is potential for significant impact or public interest) to | Jadestone IMT Planning Lead | Reporting requirements: https://www.der.wa.gov.au/your-environment/51-reporting-pollution/110-reporting-a-life-threatening-incident-or-pollution-emergency |

**APPENDIX A7 - Incident Management Guidance**

The purpose of this section is to provide guidance on the implementation and management of emergency response at Jadestone Energy with respect to the Stag facility. This section summaries the key aspects of the Incident Management Team Response Plan (IMTRP) (JS-70-PLN-F-00008). For further details of Jadestone incident management team, refer to the IMTRP.

**1. Purpose**

The purpose of the Incident Management Team Response Plan (IMTRP) is to provide the Jadestone Energy (Australia) Pty Ltd, (JSE) organisation with the necessary information to respond to incidents affecting operations or business interruptions.

**2. Scope**

The scope of the IMTRP covers incidents involving facilities, offices or sites operated by Jadestone and where Jadestone has responsibility for organising incident and/or emergency response. It outlines incident activation procedures, incident management structures, communication arrangements, emergency response roster arrangements, information management procedures during incidents and IMT training and competency requirements.

**3. Principles**

Jadestone aligns with Australian Inter-Service Incident Management System (AIIMS) arrangements and uses five fundamental principles to guide and test the organisations incident management systems against:

- **Flexibility** – ensuring that the system can be applied across the full spectrum of incidents and hazards associated with Jadestone operations and activities;
- **Management by objectives** – the clear determination and communication of desired outcomes (objectives) to ensure that all parts of the incident management system understand the direction being taken;
- **Functional management** – the ability to delegate defined tasks across to groups able to effectively undertake actions in support of achieving objectives;
- **Unity of command** – the principle of management where there is a single Incident Controller providing direction and coordinating all actions; and
- **Span of control** – management of the number of individuals/groups within the structure that can be effectively supervised by one person.

Risk Management, Crisis and Incident Management and Business Continuity Management are a seamless continuum. Within Jadestone a high level of planning, preparation and practice is maintained through:

- **procedures** and **guidance** to manage and coordinate incidents;
- implementation and use of **incident response systems**;
- **training** and **management of competencies** across all elements of incident response;
- **drills** and **exercises** to test procedures / systems and to maintain competency; and
- **audits** and **inspections** of systems and capabilities.

Continuous improvement is also a vital part of the organisations incident management system. All opportunities to identify, capture and effectively “learn” from lessons are recommended and there is a continual drive to improve our ability to prepare for, respond to and recover from any incident that is experienced.

### 4. Define the spill level

Jadestone uses a tiered response framework which classifies incidents based on the significance of the consequences, the risks involved and potential for escalation. The significance of the incident determines the level of response that is activated.

Incident response personnel are trained to respond according to the characteristics of the response level. Table A7-1 provides an overview of the characteristics and escalation criteria for each level and how each level aligns to the incident levels in the National Plan for Environmental Emergencies (AMSA 2020).

Following an oil spill incident, it is important to assess the nature and potential of spill to respond appropriately. The Offshore Installation Manager (OIM) or Vessel Master, is required to make the initial assessment of the spill, which should then be confirmed with the IMT Leader. If the Incident Management Team is activated, the IMT Leader is responsible for ongoing re-assessment of spill level.

In the event of a spill occurring where an effective response is considered beyond the capabilities within a level, the response will be escalated immediately to the next level. The decision to escalate a response to a higher level (as defined in Table A7-1) will be made by the responsible Control Agency. If the response level is undetermined, then a worst-case scenario should be assumed when activating resources, as it is always possible to scale down the response effort.

The level of the oil spill incident is to be recorded in the IMT Incident Log following activation.

Table A7-1 below is to be used by the OIM and IMT Leader when determining the level of the oil spill incident.

**Table A7-1: Spill Level Assessment**

| Characteristic | Incident management response level | | |
|---|---|---|---|
| | **Level 1** | **Level 2** | **Level 3** |
| **General description and escalation criteria** | An incident which will not have an adverse effect on the public or the environment which can be controlled using resources normally available at the facility or vessel concerned without the need to mobilise the Jadestone IMT or other external assistance. | An incident that cannot be controlled using facility resources alone and requires external support and resources to combat the situation<br>OR<br>An incident that can be controlled by the facility but which may have an adverse effect on the public or the environment. | An incident which has a wide-ranging impact on Jadestone and may require the mobilisation of external State/Territory, National or International resources to bring the situation under control. |
| **AMSA National Plan levels and escalation criteria** | Level 1<br>Generally able to be resolved by Responsible Party through the application of local or initial response resources (first strike response) | Level 2<br>Typically, more complex in size, duration, resource management and risk than Level 1 incidents. May require deployment of resources beyond the first strike response | Level 3<br>Characterised by a high degree of complexity, require strategic leadership and response coordination. May require national and international response resources |
| **Resources at risk** | | | |
| **Human** | Potential for serious injuries | Potential for loss of life | Potential for multiple loss of life |

| Characteristic | Incident management response level | | |
|---|---|---|---|
| | Level 1 | Level 2 | Level 3 |
| **Environment** | Isolated impacts or with natural recovery expected within weeks. | Significant impacts and recovery may take months. Monitoring and remediation may be required. | Significant area and recovery may take months or years. Monitoring and remediation will be required. |
| **Wildlife** | Individuals of a small number of fauna species affected | Groups of fauna species or multiple numbers of individuals affected | Large numbers of fauna (individuals and species) affected |
| **Economy** | Business level disruption | Business failure | Disruption to a sector |
| **Social** | Reduced services | Ongoing reduced services | Reduced quality of life |
| **Infrastructure** | Short term failure<br>Non-safety/operational critical failure | Medium term failure<br>Potentially safety/operational critical failure | Severe impairment<br>Safety/operational critical system failure |
| **Public affairs** | Local and regional media coverage | National media coverage | International media coverage |

## 5. Interface with External Plans

Jadestone oil spill response arrangements have been developed to meet all relevant requirements of the OPGGS (E) Regulations. It is consistent with the national system for oil pollution preparedness and response; the National Plan for Maritime Environmental Emergencies managed by the Australian Maritime Safety Authority (AMSA); and the WA Department of Transport (WA DoT) Industry Guidance Note (2020) for offshore oil spill response and consultation.

Table A7-2 summarises regulatory involvement in spill scenarios from Jadestone Facilities.

**Table A7- 2: Jurisdictional and Control Agencies for Hydrocarbon Spills for Commonwealth & International Waters**

| Jurisdictional boundary | Spill source | Hazard Management Agency | Jurisdictional authority | Control agency | | Relevant documentation |
|---|---|---|---|---|---|---|
| | | | | Level 1 | Level 2/3 | |
| **Commonwealth** waters (three to 200 nautical miles from | Vessel[13] | N/A | AMSA | AMSA | | Vessel Ship Oil Pollution Emergency Plan<br>National Plan |

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

| Jurisdictional boundary | Spill source | Hazard Management Agency | Jurisdictional authority | Control agency | | Relevant documentation |
|---|---|---|---|---|---|---|
| | | | | Level 1 | Level 2/3 | |
| territorial/state sea baseline) | Petroleum activities[14] | N/A | NOPSEMA | Jadestone | | Activity OPEP |
| International | Vessel | Relevant foreign authority | Jadestone will liaise with the Australian Government Department of Foreign Affairs and Trade (DFAT) in the event that an oil spill may enter international waters. Jadestone will work with DFAT and the respective governments to support response operations. | | | |
| | Petroleum activities | | | | | |

Information from the following external documents have been used or referred to within this document:

- AMOSPlan – Australian Industry Cooperative Spill Response Arrangements
- National Plan – National Marine for Maritime Environmental Emergencies
- State Hazard Plan – Western Australia State Hazard Plan: Maritime Environmental Emergencies
- WAOWRP – Western Australia Oiled Wildlife Response Plan
- WA OWR Manual – Western Australia Oiled Wildlife Response Manual

### 5.1 AMOSPlan

The AMOSPlan is a voluntary mutual aid plan which is administered and funded by the oil industry through AMOSC. The principle of the AMOSPlan is that, to assist in a local response to an incident, individual company resources are available under co-operative arrangements through the AMOSC hiring agreements. Jadestone is a participating company of AMOSC and as such has access to AMOSC's Level 2 and 3 oil spill recovery and response equipment, dispersant and technical (human) capabilities, as outlined in the AMOSPlan. AMOSC manages a core group of personnel for oil spill response that can be made available for Jadestone requirements, as outlined in Jadestone's Master Service Contract with AMOSC.

### 5.2 National Plan

AMSA manages the National Plan for Maritime Environmental Emergencies (National Plan), Australia's key maritime emergency contingency and response plan. All resources under the National Plan are available to Jadestone through request to AMSA.

For any oil pollution event, Jadestone Energy agrees to notify AMSA immediately in the interests of facilitating the most efficient and effective response to the incident. In the instance of vessel sourced marine oil pollution events:

- AMSA is the designated Control Agency for oil spills from vessels within the Commonwealth jurisdiction. Upon notification of an incident involving a ship, AMSA will assume control of the incident and respond in accordance with the National Plan;

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

- The National Plan and its supporting documents provide direction for the operational management and response of ship-sourced incidents; and
- AMSA is to be notified immediately of all ship-sourced incidents through RCC Australia.

Jadestone acknowledges that in addition to marine pollution incidents, AMSA has specific national interest responsibilities regarding the management of maritime casualties (as defined within the National Plan for Maritime Environmental Emergencies and International Convention on the High Seas in Cases of Oil Pollution Casualties) and specifically regarding the application of the *Protection of the Sea (Powers of Intervention) Act 1981*. AMSA and Jadestone Energy agree to work cooperatively to manage maritime casualty incidents in accordance with the arrangements within the National Plan for Maritime Environmental Emergencies.

AMSA will coordinate the resources of the National Plan for Maritime Environmental Emergencies on the formal request of the IMT Leader. Jadestone agrees to provide all available support to AMSA in AMSA's performance of its Control Agency responsibilities.

The AMSA National Plan Policy number NP-POL-003 (AMSA, 2022b) describes the incident management system which is applied by AMSA, State Control Agencies and the offshore industry Australia wide for all marine oil spill response incidents and implemented through the National Plan for Maritime Environmental Emergencies. The Jadestone Incident Management System is based on AIIMS which is consistent with the AMSA system.

### 5.3 WA DoT & State Hazard Plan (MME)

The State Emergency Management Plan enables the Western Australian Government to prevent, prepare for, respond to and recover from hazards as listed in the *Emergency Management Act 2005 (WA)* and prescribed in the Emergency Management Regulations 2006 (the EM Regulations).

The State Emergency Management Committee (SEMC) is the body with overall responsibility for emergency planning. SEMC is responsible for the development and review of several emergency plans for the Department of Transport.

These include:

- *State Hazard Plan: Maritime Environmental Emergencies (MEE).*

Other State Hazard Plans include:

- *State Hazard Plan: Persons lost or in distress requiring a Search and Rescue response (Search and Rescue Emergency)*

The State Hazard Plan - MEE covers:

- Prevention and mitigation responsibilities and strategies.
- Responsibilities for preparedness and planning arrangements.
- Responsibilities and arrangements for responding to maritime emergencies.
- Information on recovery arrangements.

Copies of the WA State Hazard Plans can be found at: https://www.transport.wa.gov.au/imarine/state-hazard-plan.asp

**Table A7-3 Western Australian DoT Response Requirements**

| Jurisdictional boundary | Spill source | Hazard Management Agency | Jurisdictional authority | Control agency | |
|---|---|---|---|---|---|
| | | | | Level 1 | Level 2/3 |
| **Western Australian** | Vessel | WA DoT | WA DoT | WA DoT | WA DoT |
| | Petroleum activities | WA DoT | WA DoT | Jadestone | WA DoT |

If a Level 2/3 spill arises within, or has potential to enter Western Australian (WA) State waters, the HMA will nominate the role of the State Maritime Pollution Coordinator (SMPC) to certain DoT positions (as prescribed in Section 1.3 of the State Hazard Plan -MEE (DoT, 2021)) and DoT will take on the role as a Controlling Agency. The SMPC provides strategic management of the incident response on behalf of the HMA.

If a spill occurs within, or has the potential to impact State waters, Jadestone Energy will notify the DoT Maritime Environmental Emergency Response (MEER) unit as soon as reasonably practicable (within 2 hours of becoming aware of the incident occurring). On notification, the SMPC will activate their Maritime Environmental Emergency Coordination Centre (MEECC) and the DoT Incident Management Team (IMT). Jadestone will work in partnership with DoT during such instances, as outlined within the DoT's *Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements* (WA DoT, 2020).

For Level 2 spills that cross from Commonwealth waters to State waters, there will be two Controlling Agencies. Jadestone will retain Control Agency responsibility for Commonwealth waters, whilst DoT will assume Control Agency responsibility for the portion of the response in State waters. For a cross-jurisdictional response, there will be a Lead IMT (DoT or Jadestone) for each spill response activity. Appendix 2 within *Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements* (July 2020) provides guidance on the allocation of a Lead IMT to response activities for a cross jurisdictional spill. Figure A7-1 shows the cross jurisdictional arrangements and Control Agency structure for a Facility spill entering State waters.

To facilitate effective coordination between the two Controlling Agencies and their respective IMT's during a cross-jurisdictional response, a Joint Strategic Coordination Committee (JSCC) will be established. The JSCC will be jointly chaired by the SMPC and Jadestone's nominated senior representative and will comprise of individuals deemed necessary by the chairs to ensure an effective coordinated response across both jurisdictions. Additional detail on the JSCC's key functions are outlined in *Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements* (July 2020).

Jadestone will conduct initial response actions in State waters as necessary in accordance with this OPEP, and continue to manage those operations until formal handover of incident control is completed. Appendix 1 in DoT's *Offshore Petroleum Industry Guidance Note* (WA DoT, 2020) provides a checklist for formal handover. Beyond formal handover, the Jadestone will continue to provide all necessary resources, including personnel and equipment, to assist the DoT in performing duties as the Control Agency. The required roles and responsibilities of these positions are outlined in Table A7-9.

As a minimum, the Deputy Planning Officer and Deputy Logistics Officer supporting the WA DoT IMT will be filled by Jadestone IMT personnel familiar with relevant Jadestone systems and processes and trained as per role specific training and competency requirements outlined in Table A7-11.

Two DoT personnel will be provided from DoT's command structure into Jadestone's GCT/ IMT as GCT/ Media Liaison Officers. The roles and responsibilities of these roles are outlined in Table A7-10.

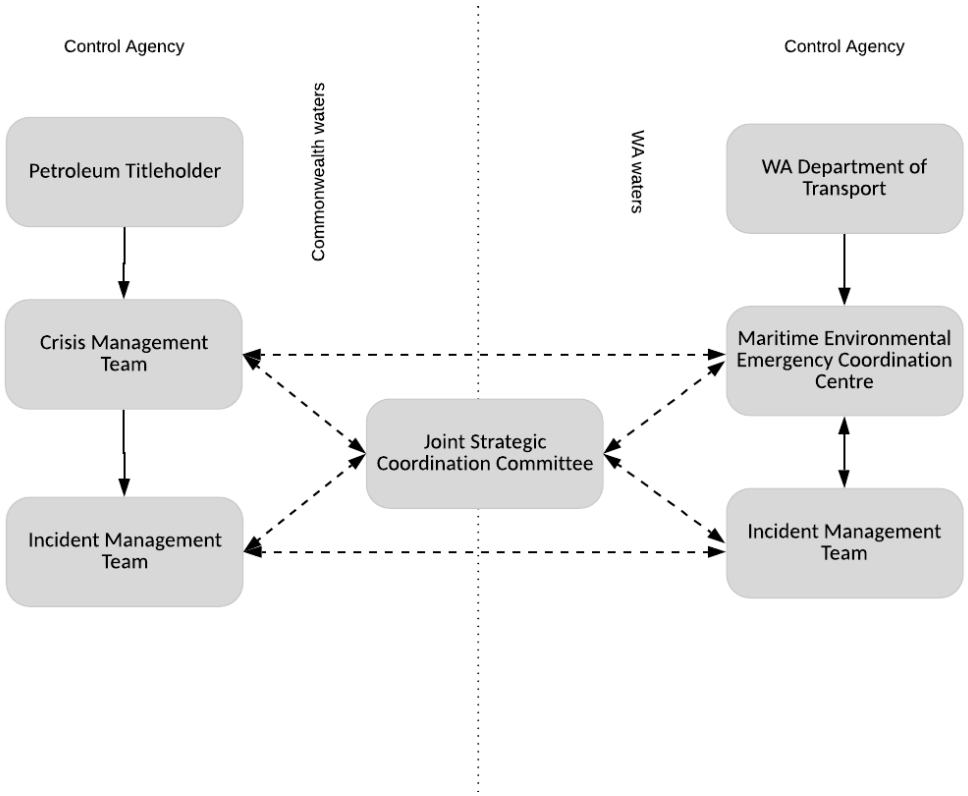



**Figure A7- 1: Cross Jurisdictional Control Agency Arrangements (WA waters)**

### 5.4 Western Australia Oiled Wildlife Plan (WAOWRP)

This plan establishes the framework for responding to potential or actual wildlife impacts in WA waters, within the framework of an overall maritime environmental emergency. It outlines risk reduction strategies, preparedness for, response to and initiation of recovery arrangements for wildlife impacts during a marine oil pollution incident.

### 5.5 Western Australia Oiled Wildlife Manual (WA OWR Manual)

The WA OWR Manual is a companion document to the Western Australia Oiled Wildlife Response Plan for Maritime Environmental Emergencies, designed to standardise operating procedures, protocols and processes for wildlife response.

## 6. Risks

The Jadestone incident management process is based around the organisation being able to understand and respond to all hazards, natural and human-induced incidents, including those which may not have been experienced by the organisation. Hazards and safeguards are identified and recorded within respective risk registers. Potential causes and preventative measures are identified for each hazard; qualitative assessments of the consequences and likelihood are undertaken, and detection, protection, mitigation and recovery systems are defined.

In addition, the risk management process will also define and describe the following:

- Major Accident Events (MAE);
- Safety Critical Elements (SCE); and
- Performance Standards (PS).

## 7. Incident Management Structure

Jadestone utilises a tiered incident response structure to deal with and manage "incidents" associated with each of the organisation's risks. This structure is activated progressively, from business as usual, facility-based Incident Response Team (IRT), shore-based Incident Management Team (IMT), then if required to the corporate Group Crisis Team (CGT).

The incident management process and structure support all of Jadestone's activities and provides guidance to the IMT when activated. Figure A7-2 illustrates this structure and the primary areas of focus at each level.

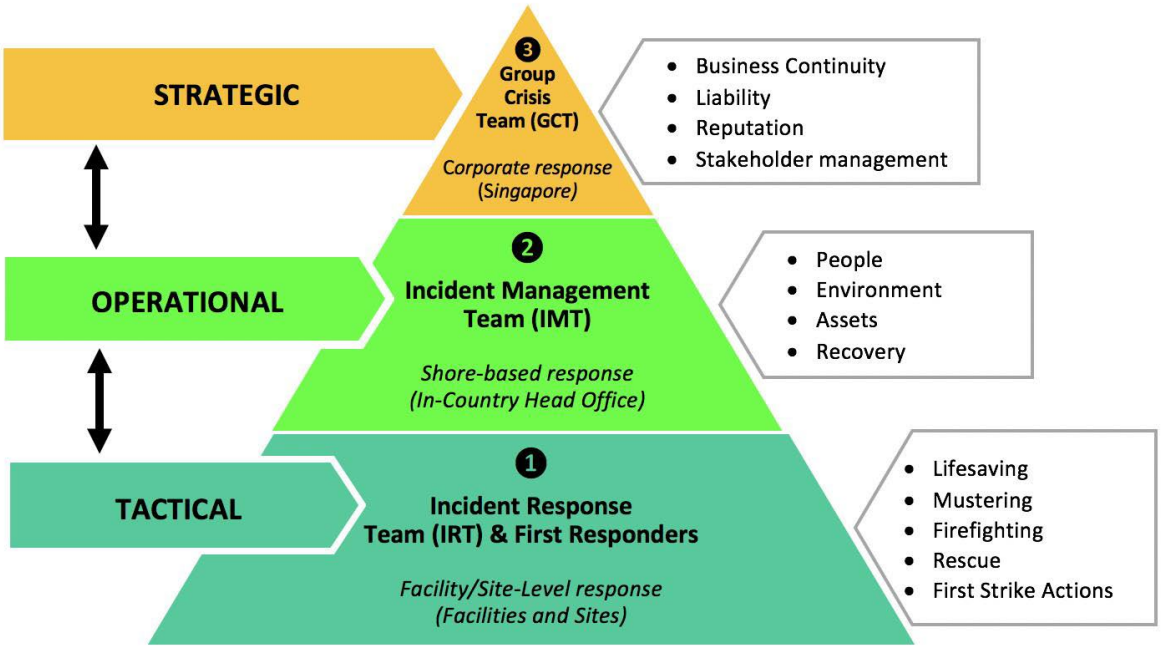



**Figure A7-2 : Jadestone Incident Response Structure**

The Jadestone incident response structure is based on the Australasian Inter-Service Incident Management System (AIIMS), which consists of a standard management hierarchy and procedures for managing incidents of any size. The use of AIIMS principles drives consistent response operations through a set of common terminology, procedures and processes to:

- Organise personnel and skills necessary for a safe, secure and compliant response;
- Allow personnel from a wide variety of agencies to meld rapidly into a common management structure; and
- Provide a unified, centrally authorised emergency organisation.

### 7.1 Incident Response Team– Tactical Level

The Incident Response Team (IRT) and First Responders function at the tactical level and are responsible for the provision of immediate response to incidents in order to preserve safety of life, minimise damage (where possible) to the environment and protect property or assets.

Each facility/site/office will have a tactical level capability responsible for dealing with any emergency or hazard that may be foreseen as a function of its operations and to provide basic first aid and account for personnel. In addition, communicating of information will be a key requirement from the tactical level

upwards to ensure that all levels within the are able to build and maintain situational awareness and provide guidance and/or support as necessary.

Offshore Facility emergencies and incidents will be managed and coordinated by an On-Scene Commander (OSC); usually supported by an Incident Controller (IC) – *specific details relating to the Incident Response Team (IRT) is contained within respective facility response procedures or plans.*

### 7.2 Incident Management Team – Operational Level

An operational level response, and an IMT will generally be required for the following:

- To provide additional support to an IRT (facility or site) during an incident; or
- To develop and implement response actions/plans when an incident escalates to a level that the IRT can no longer effectively manage or coordinate response activities (example: Level 2/3 oil spill incident).

The IMT is led by the IMT Leader, who will lead the IMT to address the organisations "key priorities". The IMT is responsible for coordinating operational advice and functional support to the IRT and early liaison/notification of the Group Crisis Team (GCT) and external authorities if required.

The IMT will develop and implement operational plans to mitigate or respond to the incident and provide technical and logistic support as required.

### 7.3 Group Crisis Team – Strategic Level

Strategic level responses support the management of significant events that threaten the organisation and its stakeholders. At Jadestone these types of incidents will be managed by the Group Crisis Team (GCT); whose primary objectives will be to:

- Develop strategies and plans to manage reputation, operability, licence to operate, liabilities and/or potential financial loss;
- Provide technical, operational and communications advice to the in-country IMT and ensure it is adequately resourced;
- Identify, monitor, prioritise and manage domestic and global issues, gaining a deep understanding of perceptions and expectations of response and behaviour;
- Liaise and interface with high level government agencies including host country government authorities and elected/appointed political leaders; and
- Review and approve external and internal engagement strategies/plans and statements at global and country levels.

## 8. Incident Management

Effective incident management requires the ability to establish command and control, gain and maintain situational awareness and then develop, implement and monitor response activities either in support of a Jadestone facility/site or directly.

The Jadestone incident management system defines and standardises the organisational processes and structures to enable transition from reactive to proactive and ensure integration of the organisation and all other stakeholders while promoting successful incident management and coordination.

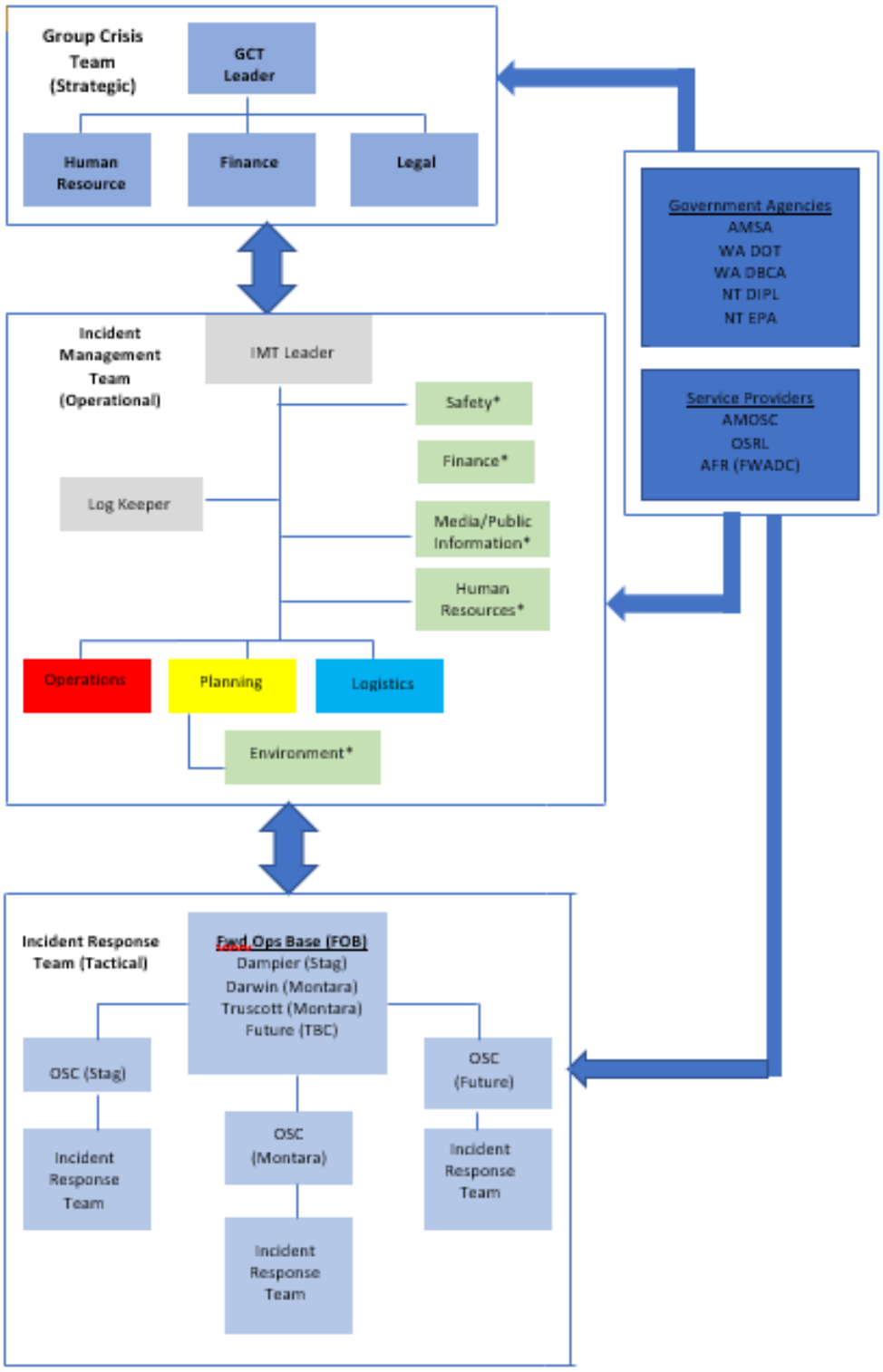
The IMT Leader will decide whether a full or partial mobilisation is required depending on the nature of the incident and the level of support required by the OSC during the initial period of the incident. The standard Jadestone incident management organisational structure is shown in Figure A7-3.

In support of response operations, an Incident Control Centre (ICC) will be established within the Jadestone Offices in Perth. The ICC will have adequate facilities for the IMT to function and coordinate response operations. The main conference room shall be the ICC with meeting rooms used as breakout for backup as required.

Jadestone utilises an electronic platform to provide all IMT personnel with universal access to key emergency management documents that may be required in the event of a spill (e.g. IMTRP, OPEPs, ICS forms). This system is also directly linked to Jadestone's Electronic Document Management System (EDMS).

Jadestone will also consider the activation of regional operational centre or a Forward Operations Base (FOB) to assist with oil spill response. The location of a regional operational centre or FOB will depend upon the nature, direction and extent of any spill. The preferred regional operational centre or FOB would be Dampier.

In accordance with the Jadestone IMT structure, the FOB will be subordinate to the IMT Operations function, and will be responsible for the coordination of personnel, resources, material, equipment and localised activities as directed by the IMT.




*Note: Key support functions to the IMT (Environment, Safety, HR, Finance and Public Information) are activated if required and coordinated by a suitable qualified/competent lead or outsourced to a third-party provider

**Figure A7-3: Jadestone Incident Management Structure**

## 8.1 IMT Activation Process

The notification and activation of IMT members is by direct telephone call to the individual, following declaration by the IMT Leader. The IMT Leader will specify the location and the time at which the team is to convene. The activation process is illustrated in Figure A7-4.

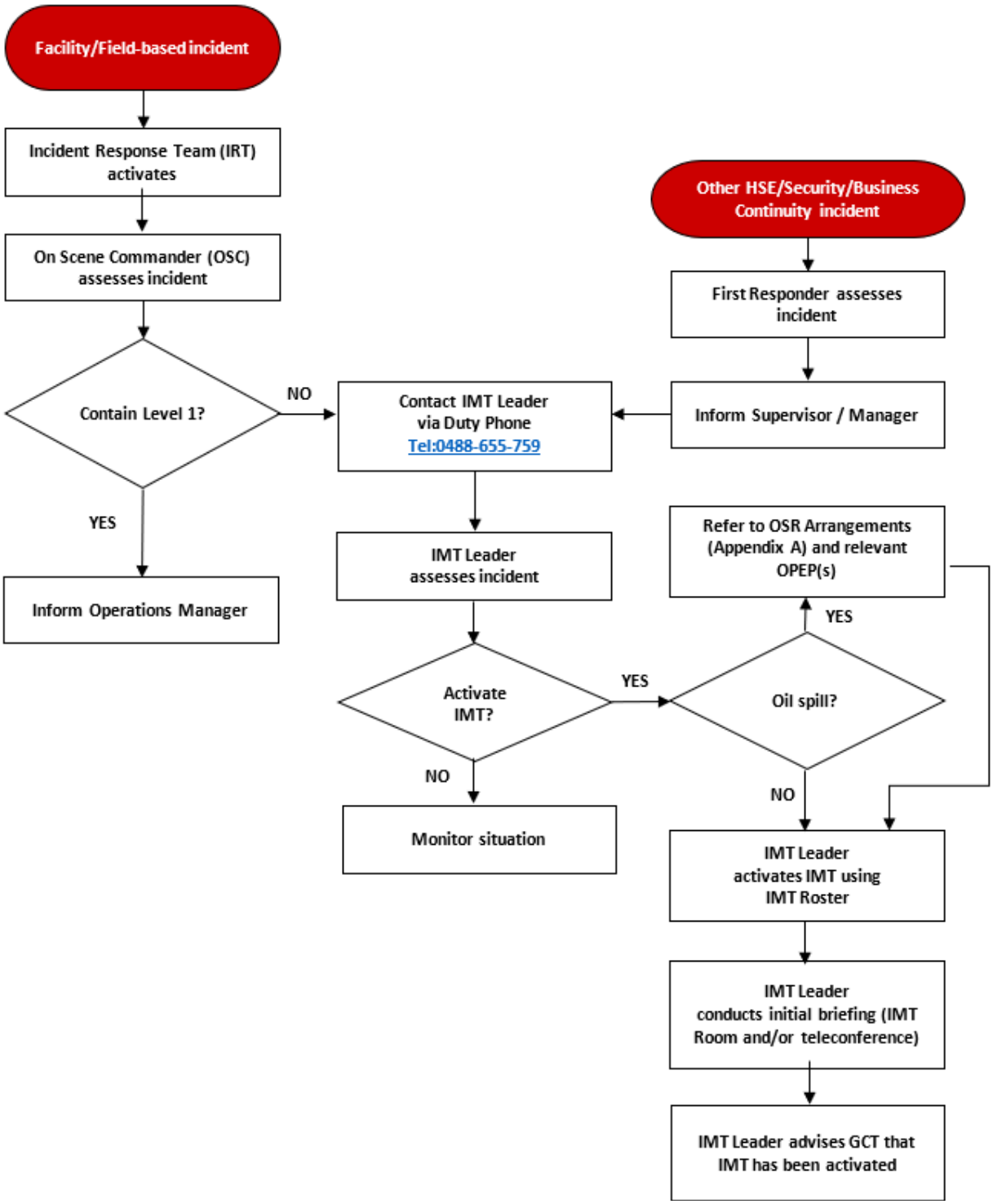



**Figure A7-4: Incident activation process**

### 8.2 Forward Operating Base (FOB)

In the event of a major incident, it is intended that facilities to support the Command & Control of response operations will be required in designated locations relevant to the respective Jadestone operation or location of the incident. Depending on the nature and scale of the incident, a Forward Operating Base (FOB) can be established in close proximity to the incident. The generic structure for the establishment of an FOB will be as shown in Figure A7-5.

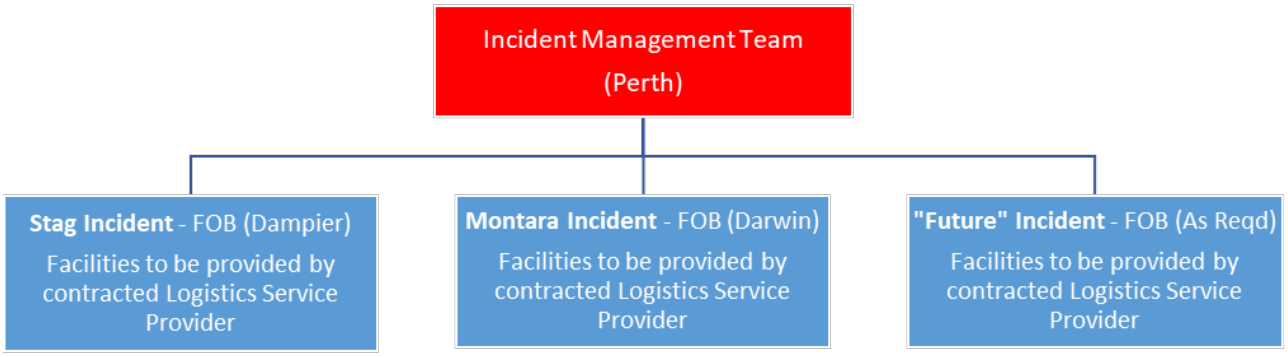



**Figure A7-5: Guidance on the establishment of an FOB for an incident**

The following facilities and services will be required to support the establishment of the FOB:

| | |
|---|---|
| Forward Operating Base<br>Supported by the Jadestone contracted logistic service provider (Dampier) | • Conference room facilities for briefings/meetings<br>• Telephone/Video conference capability<br>• Communication facilities (radio/sat phone)<br>• Break-out room facilities<br>• Provision of internet/Wi-Fi access<br>• Ability to access Jadestone IMS<br>• Catering and domestic services<br>• Access to logistical lay-down area<br>• Access to marine/port service providers |

In accordance with the Jadestone IMT structure, the FOB will be subordinate to the IMT Operations function, and will be responsible for the coordination of personnel, resources, material, equipment and localised activities as directed by the IMT.

A dedicated communication strategy in support of response operations will also be developed to support the functionality of the FOB.

FOB Integration with State - Depending on the nature of the incident, the FOB may be co-located with a State FOB activated in response to the incident. Information with respect to cross-jurisdictional arrangements are provided in the IMTRP Appendix A**.**

Personnel requirements to support the functionality of the FOB will be determined at the time and will be based around the nature of the incident, location and any requirements associated with State interaction.

### 8.3 IMT and FOB External Support Arrangements

The IMT Leader may activate external support if required, to assist with Jadestone incident response activities. Support to the IMT and/or FOB can be provided by the external agencies/organisations listed in Table A7-4.

**Table A7-4 External support agencies/organisations for the IMT**

| Organisation | Types of services available | Arrangement |
|---|---|---|
| Australian Marine Oil Spill Centre (AMOSC) | Oil spill response resources (IMT/FOB staff, equipment, technical advice) – Australian based | Master Service Contract |
| Oil Spill Response Ltd (OSRL) | Oil spill response resources (IMT/FOB staff, equipment, technical advice) – Internationally based | Master Service Contract |
| Other Operators | Trained personnel in support of IMT/FOB (Mutual Aid) | AMOS Plan |
| Environmental Monitoring Provider | Implementation of the Scientific Monitoring Plan (oil spill response) | Contract |
| Aviation Service Provider | Provision and coordination of aviation support | Contract |
| Transport Service Provider | Provision of logistical support (road transport) | Contract |
| Waste Contractor | Provision of waste management support | Contract |
| Australian Maritime Safety Authority (AMSA) | Access to National Plan resources (personnel, equipment, technical advice) for oil spill response | MOU |
| Oceaneering | Specialist technical services to support deployment and operation of the Sub-Sea First Response Tool Kit and dispersant injection | OTA Agreement |
| Wild Well Control | Specialist technical services to support planning and conduct of well blow out operations | OTA Agreement |

## 8.4 Cost Recovery

As required under Section 571(2) of the OPGGS Act 2006, Jadestone has financial assurances in place to cover any costs, expenses and liabilities arising from carrying out its petroleum activities, including major oil spills. This includes costs incurred by relevant control agencies (e.g. DoT) and third-party spill response service providers.

## 9. IMT Roles and Responsibilities

The following tables (Tables A7-5 to Tables A7-8) describe the roles and responsibilities of IMT Lead roles. Specific information relating to the Group Crisis Team (GCT) and the Incident Response Team (IRT) roles and responsibilities are provided in respective crisis management and incident response plans.

Table A7-9 outlines the key roles and responsibilities of Jadestone personnel required to be positioned in the State Maritime Environmental Emergency Coordination Centre (MEECC)/ DoT IMT in the event of a Level 2/3 spill. Table A7-10 outlines the roles and responsibilities of DoT personnel to be positioned within Jadestone's IMT. Duty Cards for all roles are provided in the IMTRP Appendix B – IMT Duty Cards.

**Table A7-5: IMT Leader Key Roles and Responsibilities**

| **DUTY CARD 1: IMT LEADER** |
|---|
| **ROLE** |
| **The IMT Leader has overall responsibility for the management the incident response.**<br>**The IMT Leader will be the initial point of contact for the Corporate Office.** |
| **RESPONSIBILITIES** |
| • Take charge and exercise leadership, including the establishment of the incident management structure<br>• Set objectives for the incident response, considering the safety of all personnel as a priority<br>• Develop and approve plans and strategies to control the incident<br>• Implement the IAP and monitor its progress<br>• Provide information and warnings to communities so that they can make informed decisions<br>• Establish effective liaison and cooperation with all relevant agencies, affected communities and others external to the IMT<br>• Obtain and maintain human and physical resources required for the resolution of the incident<br>• Apply a risk management approach, and establish systems and procedure for the safety and welfare of all response personnel<br>• Ensure effective communications with the GCT Leader, when activated<br>• Ensure appropriate financial delegations are in place and these delegations are made known to the appropriate response personnel.<br>• Ensure relief and recovery considerations are addressed<br>• Ensure collaborations between all organisations supporting the response |
| **SPECIFIC TASKS** |
| **Initial Actions** |
| ☐ Obtain briefing on incident from the OSC (or IRT contact) and review initial assessment<br>☐ Activate the necessary members of the IMT<br>☐ Proceed to IMT Room<br>☐ Ensure IMT Room is fully set-up before incident management commences<br>☐ Communicate with Country Manager, as link into Group Crisis Team (GCT) as appropriate<br>☐ Support Country Manager in seeking GCT guidance/support |

**DUTY CARD 1: IMT LEADER**

- ☐ Support Country Manager in scheduling ongoing contact

☐ If an oil spill, confirm spill level

**Determine Incident Objectives & general direction for managing the incident**

☐ Establish the immediate priorities:
- ☐ Define IMT aim and objectives
- ☐ If necessary, confer with government agencies to agree on common incident objectives and priorities

☐ Chair initial IMT briefing
- ☐ Communicate priorities to the IMT
- ☐ Confirm ongoing means of communications with OSC has been established to Operations function
- ☐ Confirm which key stakeholders need to be notified, responsibility for notification and ongoing liaison including regulatory authorities
- ☐ Confirm with Planning Lead that all appropriate log-keeping, issues and actions, and status boards are maintained.
- ☐ If required, give direction to HR/Admin on HR expectations to: Employee communications, Victim / next of kin support, affected contractors

**Ongoing Actions**

☐ Refer to and follow the Incident Management Process as described at Section 5.0

☐ Use the STAKEHOLDER MANAGEMENT Form – Appendix E and in OneNote – to assist with tracking stakeholder contact.

☐ Hold regular IMT updates
- o Time out, phones switched to time out mode
- o Every 30 minutes initially (as a guide)
- o Monitor effectiveness of response and review issues & actions and priorities.
- o With Planning Lead, establish short-term/long-term recovery goals, milestones and resource requirements
- o Brief Corporate Office as required

☐ Delegate Responsibilities
- o Allow yourself to focus on key stakeholder liaison and setting strategic objectives for next operational period

☐ Determine duration and structure of incident response operations
- o Decide duration of current operational period (start thinking of when to stand down or next day operations)
- o Identify additional personnel needs to maintain 24-hour support.

**Notifications & media strategy**

☐ Confirm that required notifications are made and updates provided

| **DUTY CARD 1: IMT LEADER** |
|---|
| ○ Ensure communications with governments/regulators are regular and proactive<br>○ Consider need for additional senior management liaison / high level briefing with regulators<br>○ Ensure that internal notifications are made<br>☐ The Media Support Team decide on the position the asset/company adopts:<br>○ Ensure an initial pre-approved media holding statement is prepared<br>○ Agree on message content and timing of release to media, internal audiences, regulators, community leaders etc.<br>○ Be prepared to deal with rapid media interest and possible presence at scene |
| **Stand Down** |
| ☐ Communicate end of IMT response to all relevant internal and external parties<br>☐ Provide copies of all incident related documents and logs to the Log Keeper<br>☐ Stand down those people not required in managing ongoing recovery process<br>☐ Hold debrief of IMT, specialist advisors, support teams and receive feedback<br>☐ Review any capability gaps and opportunities for improvement in the response<br>☐ Review and approve the incident report<br>☐ Commission post-incident investigation<br>☐ Ensure accepted recommendations have been incorporated into the IMTRP |

**Table A7-6: Operations Lead Key Roles and Responsibilities**

| DUTY CARD 2: OPERATIONS |
|---|
| **ROLE** |
| **Reports to IMT Leader and is responsible for activating and supervising tactical response operations in the field.**<br>**Implements the operational plans to achieve response objectives and protect people, the environment and property** |
| **RESPONSIBILITIES** |
| – Obtain a briefing from the IMT Leader or the position that you report to<br>– Establish the Operations Section appropriate to the size and complexity of the incident<br>– Appoint unit coordinators as required and delegate tasks<br>– Manage the personnel within the Operations Section<br>– Develop and maintain an effective register of all resources, required, en route, allocated to and released from the incident<br>– Adjust the structure of the Operations Section throughout the incident<br>– Provide a safe working environment for personnel within the Operations Section<br>– Establish and maintain a log of activities and decisions for the Operations Section<br>– Communicate Section performance to the IMT Leader or the position you report to<br>– Prepare shift handover and brief incoming Operations Lead<br>– Manage the continuity of Operations activities across shift changes<br>– Consider sources of local knowledge and information relevant to the incident.<br>– Identify new and emerging risks for the incident and address these in the IAP<br>– Collect, collate and store incident records<br>– Maintain a personal log of activities and decisions made<br>• Conduct handover briefing |
| **SPECIFIC TASKS** |
| **Initial Actions** |
| ☐ Identify and locate OSC - obtain all available information on the situation<br>☐ Agree call schedule with the OSC<br>☐ Use the INCIDENT STATUS Form – see Appendix E and in OneNote<br>☐ Assess incident, including incident potential<br>☐ Start a personal log |

| DUTY CARD 2: OPERATIONS |
|---|
| **Ongoing Actions** |
| ☐ Propose and agree immediate priorities with the IMT Leader<br>☐ Update Planning Lead on situation for development of the Incident Action Plan<br>☐ Work with Logistics to identify logistical support requirements<br>☐ Identify issues and actions required for the next period - mark and track on display boards<br>☐ Source and provide technical information and support required by the response teams.<br>☐ Develop strategy (i.e., what we are attempting to achieve)<br>☐ Identify tactics/breaking down tactics into manageable tasks (i.e., how we are going to implement strategy)<br>☐ Confer with response contractors / consultants for equipment and techniques<br>☐ Allocate tactical resources based on strategy requirements<br>☐ Provide updates to the display boards to reflect current operations in the field<br>☐ Resource additional technical support as required |
| **Stand Down** |
| ☐ Attend the IMT debrief<br>☐ Provide copies of all incident related documents and logs to the Log Keeper<br>☐ Monitor the demobilization of response teams |

**Table A7-7: Logistics Lead Key Roles and Responsibilities**

| DUTY CARD 4: LOGISTICS |
|---|
| **ROLE** |
| **Reports to IMT Leader and manages all logistics and procurement requirements for the response** |
| **RESPONSIBILITIES** |
| – Assist with setup and coordination of the incident control centre (ICC)<br>– Obtain a briefing from the IMT Leader or the position that you report to<br>– Establish the Logistics Section appropriate to the size and complexity of the incident<br>– Appoint unit coordinators as required and delegate tasks<br>– Manage the personnel within the Logistics Section<br>– Provide mobilisation and demobilisation for equipment and services<br>– Adjust the structure of the Logistics Section throughout the incident<br>– Provide a safe working environment for personnel within the Logistics Section<br>– Establish and maintain a log of activities and decisions for the Logistics Section<br>– Communicate Section performance to the IMT Leader<br>– Prepare shift handover and brief incoming Logistics Lead<br>– Manage the continuity of Logistics activities across shift changes<br>– Consider sources of local knowledge and information relevant to the incident.<br>– Identify new and emerging risks for the incident and address these in the IAP<br>• Collect, collate and store incident records<br>– Maintain a personal log of activities and decisions made<br>• Conduct handover briefing |
| **SPECIFIC TASKS** |
| **Initial Actions**<br>☐ Mobilize any additional resources or specialist advisors<br>☐ Determine and supply immediate incident resource and facility needs<br>☐ Establish communications, exchange information and coordinate activities with Logistic Supply Base(s)<br>☐ Use and maintain the Resources Summary sheet – Appendix E and in OneNote– to track resources<br>☐ Start a personal log |
| **Ongoing Actions** |
| ☐ Establish contact & coordinate logistics-related activities with other agency logistics personnel<br>☐ Review logistics requirements for proposed tactics for upcoming operational period<br>☐ Advise other Functions on resource availability to support incident needs<br>☐ Coordinate and process requests for additional resources<br>☐ Work with the Operations Lead to track and display incident resources and facilities<br>☐ Confer with IMT Leader for acquisition or release of major / costly resources or services |

| DUTY CARD 4: LOGISTICS |
|---|
| ☐ Provide responders in the field with adequate food, drink, medical assistance, communications, clothing, transportation (land, water and air), sanitary and sleeping arrangements, security and other requirements<br>☐ Ensure that responders are supplied with the proper PPE<br>☐ Provide management and security support for incident facilities such as:<br>☐ personnel and equipment staging areas<br>☐ warehouse and maintenance facilities; camps; heli-bases etc.<br>☐ As appropriate to the incident, work with the Operations & Planning Functions, contractors & government agency personnel to plan, permit and operate waste handling and disposal and injured wildlife rehabilitation facilities<br>☐ Identify long-term service and support requirements for planned and expected operations<br>☐ Recommend the reassignment or deactivation of incident resources |
| **Stand Down** |
| ☐ Arrange for transportation of equipment and personnel in conjunction with demobilization<br>☐ Attend the IMT debrief<br>☐ Provide copies of all incident related documents and logs to the Log Keeper |

**Table A7-8: Planning Lead Key Roles and Responsibilities**

| **DUTY CARD 3: PLANNING** |
|---|
| **ROLE** |
| **Reports to the IMT Leader and manages the IMT related planning functions for the response** |
| **RESPONSIBILITIES** |
| – Assist with setup and coordination of the incident control centre (ICC)<br>– Obtain a briefing from the IMT Leader or the position that you report to<br>– Establish the Planning Section appropriate to the size and complexity of the incident<br>– Appoint unit coordinators as required and delegate tasks<br>– Manage the personnel within the Planning Section<br>– Adjust the structure of the Planning Section throughout the incident<br>– Provide a safe working environment for personnel within the Planning Section<br>– Establish and maintain a log of activities and decisions for the Planning Section<br>– Communicate Section performance to the IMT Leader<br>– Prepare shift handover and brief incoming Planning Lead<br>– Manage the continuity of Planning activities across shift changes Checklist<br>– Consider sources of local knowledge and information relevant to the incident.<br>– Identify new and emerging risks for the incident and address these in the IAP<br>– Monitor effectiveness of risk mitigation strategies<br>– Provide strategic advice to the IMT based on information received<br>– Complete the Net Environmental Benefit Analysis (NEBA)<br>– Prepare the IAP for the next operational period and any longer-term planning required<br>– Disseminate the IAP throughout the incident management structure<br>– Develop changeover and demobilisation plans and manage their implementation<br>– Develop and review the Communications Plan and its implementation<br>– Regularly communicate progress of strategies and the IAP to the IMT Leader<br>– Collect, collate and store incident records<br>– Maintain a personal log of activities and decisions made<br>• Conduct handover briefing |
| **SPECIFIC TASKS** |
| **Initial Actions**<br>☐ Assist the IMT Leader to maintain and use the BRAINSTORMING/PLANNING Form – Appendix E and in OneNote<br>☐ Mobilize any additional resources or specialist advisors immediately required to commence recovery planning<br>☐ Ensure Log Keeper is in place and the IMT is maintaining an auditable documentation trail<br>☐ Consider need to activate Environmental Support |

| **DUTY CARD 3: PLANNING** |
|---|
| ☐ Setup and maintain a document retention process for all response documentation<br>☐ Start a personal log |
| **Ongoing Actions** |
| ☐ Drive and monitor the incident management process – See Section 5.0<br>☐ Oversee and coordinate the actions of the Environmental Support Team.<br>☐ Prepare the Incident Action Plan (IAP) –:<br>  ☐ Establish time for next operational period (generally starting the next morning for 24-hour duration)<br>  ☐ Create Incident Objectives for next operational period and submit to IMT Leader for approval<br>  ☐ Create Meeting Schedule and advise IMT Leader on planning process issues<br>  ☐ Develop plans for recovery operations to implement tomorrow, the next day, next week etc.<br>☐ Consolidate the IAP and assemble for final approval and signoff |
| **Stand Down** |
| ☐ Ensure team members and supports complete any outstanding log/record keeping<br>☐ Ensure all log sheets are collected before the team leaves the room. (All notebooks to be copied and / or originals to be retained)<br>☐ Arrange for copies of all email traffic and incident files to be collated and stored.<br>☐ Consider need to photograph IMT room and key display boards before it is tidied<br>☐ Contribute to the development of the incident report. |

**Table A7-9: Roles and Responsibilities of Jadestone Personnel Positioned in State Maritime Environmental Emergency Coordination Centre (MEECC)/ DOT IMT**

| Key Roles | Responsibilities |
|---|---|
| CMT Liaison Officer | Provide a direct liaison between the Jadestone and the State MEECC<br>Facilitate effective communications and coordination between the Jadestone CMT Leader and the SMEEC<br>Offer advice to SMEEC on matters pertaining to Jadestone crisis management policies and procedures |
| Deputy Incident Controller | Provide a direct liaison between the DoT IMT and the Jadestone IMT<br>Facilitate effective communications and coordination between the Jadestone IMT (W) Leader and the DoT Incident Controller<br>Offer advice to the DoT Incident Controller on matters pertaining to the Jadestone incident response policies and procedures<br>Offer advice to the Safety Coordinator on matters pertaining to Jadestone safety policies and procedures particularly as they relate to Jadestone employees or contractors operating under the control of the DoT IMT |
| Deputy Intelligence Officer | As part of the Intelligence Team, assist the Intelligence Officer in the performance of their duties in relation to situation and awareness<br>Facilitate the provision of relevant modelling and predications from the Jadestone IMT<br>Assist in the interpretation of modelling and predictions originating from the Jadestone IMT<br>Facilitate the provision of relevant situation and awareness information originating from the DoT IMT to the Jadestone IMT<br>Facilitate the provision of relevant mapping from the Jadestone IMT<br>Assist in the interpretation of mapping originating from the Jadestone IMT<br>Facilitate the provision of relevant mapping originating from the Jadestone IMT |
| Deputy Planning Officer | As part of the Planning Team, assist the Planning Officer in the performance of their duties in relation to the interpretation of existing response plans and the development of incident action plans and related sub plans<br>Facilitate the provision of relevant IAP and sub plans from the Jadestone IMT<br>Assist in the interpretation of the Jadestone OPEP from Jadestone<br>Assist in the interpretation of the Jadestone IAP and sub plans from the Jadestone IMT<br>Facilitate the provision of relevant IAP and sub plans originating from the DoT IMT to the Jadestone IMT<br>Assist in the interpretation of Jadestone's existing resource plans<br>Facilitate the provision of relevant components of the resource sub plan originating from the DoT IMT to the Jadestone IMT<br>(Note this individual must have intimate knowledge of the relevant Jadestone OPEP and planning processes) |

| Key Roles | Responsibilities |
|---|---|
| Environment Support Officer | As part of the Intelligence Team, assist the Environmental Coordinator in the performance of their duties in relation to the provision of environmental support into the planning process<br>Assist in the interpretation of the Jadestone OPEP and relevant TRP plans<br>Facilitate in requesting, obtaining and interpreting environmental monitoring data originating from the Jadestone IMT<br>Facilitate the provision of relevant environmental information and advice originating from the DoT IMT to the Jadestone IMT |
| Deputy Public Information Officer | As part of the Public Information Team, provide a direct liaison between the Jadestone Media team and DoT IMT Media team<br>Facilitate effective communications and coordination between Jadestone and DoT media teams<br>Assist in the release of joint media statements and conduct of joint media briefings<br>Advise on appropriate Aboriginal engagement and management strategies in the event of potential exposure of Aboriginal heritage sites, lands or waters to hydrocarbon spills, or for the potential access of responders to Aboriginal heritage sites or lands<br>Assist in the release of joint information and warnings through the DoT Information & Warnings team<br>Offer advice to the DoT Media Coordinator on matters pertaining to Jadestone media policies and procedures<br>Facilitate effective communications and coordination between Jadestone and DoT Community Liaison teams<br>Assist in the conduct of joint community briefings and events<br>Offer advice to the DoT Community Liaison Coordinator on matters pertaining to Jadestone community liaison policies and procedures<br>Facilitate the effective transfer of relevant information obtained from through the Contact Centre to the Jadestone IMT |
| Deputy Logistics Officer | As part of the Logistics Team, assist the Logistics Officer in the performance of their duties in relation to the provision of supplies to sustain the response effort<br>Facilitate the acquisition of appropriate supplies through Jadestone's existing OSRL, AMOSC and private contract arrangements<br>Collects Request Forms from DoT to action via the Jadestone IMT<br>(Note this individual must have intimate knowledge of the relevant Jadestone logistics processes and contracts) |
| Deputy Operations Officer | As part of the Operations Team, assist the Operations Officer in the performance of their duties in relation to the implementation and management of operational activities undertaken to resolve an incident<br>Facilitate effective communications and coordination between the Jadestone Operations Section and the DoT Operations Section<br>Offer advice to the DoT Operations Officer on matters pertaining to Jadestone incident response procedures and requirements<br>Identify efficiencies and assist to resolve potential conflicts around resource allocation and simultaneous operations of Jadestone and DoT response efforts |

| Key Roles | Responsibilities |
|---|---|
| Deputy Waste Management Coordinator | As part of the Operations Team, assist the Waste Management Coordinator in the performance of their duties in relation to the provision of the management and disposal of waste collected in State waters<br>Facilitate the disposal of waste through Jadestone's existing private contract arrangements related to waste management and in line with legislative and regulatory requirements<br>Collects Waste Collection Request Forms from DoT to action via the Jadestone IMT |
| Deputy Finance Officer | As part of the Finance Team, assist the Finance Officer in the performance of their duties in relation to the setting up and payment of accounts for those services acquired through Jadestone's existing OSRL, AMOSC and private contract arrangements<br>Facilitate the communication of financial monitoring information to the Jadestone to allow them to track the overall cost of the response<br>Assist the Finance Officer in the tracking of financial commitments through the response, including the supply contracts commissioned directly by DoT and to be charged back to Jadestone |
| Deputy Division Commander | As part of the Field Operations Team, assist the Division Commander in the performance of their duties in relation to the oversight and coordination of field operational activities undertaken in line with the IMT Operations Section's direction.<br>Provide a direct liaison between Jadestone's Forward Operations Base/s (FOB/s) and the DoT FOB<br>Facilitate effective communications and coordination between Jadestone Division Commander and the DoT Division Commander<br>Offer advice to the DoT Division Commander on matters pertaining to Jadestone incident response policies and procedures<br>Assist the Safety Coordinator deployed in the FOB in the performance of their duties, particularly as they relate to Jadestone employees or contractors<br>Offer advice to the Safety Coordinator deployed in the FOB on matters pertaining to Jadestone safety policies and procedures |

**Table A7-10: Roles and Responsibilities of DoT Personnel to be Positioned in Jadestone's IMT/CMT**

| Key Roles | Responsibilities |
|---|---|
| DoT Liaison Officer | Facilitate effective communications between the SMEEC and Incident Controller and Jadestone's appointed CMT Leader and Incident Controller<br>Provide enhanced situational awareness to DoT of the incident and the potential impact on State waters<br>Assist in the provision of support from DoT to Jadestone<br>Facilitate the provision technical advice from DoT to Jadestone's Incident Controller as required |
| Media Liaison Officer | Provide a direct liaison between Jadestone's Media team and DoT IMT Media team<br>Facilitate effective communications and coordination between Jadestone and DoT media teams<br>Assist in the release of joint media statements and conduct of joint media briefings<br>Assist in the release of joint information and warnings through the DoT Information and Warnings team<br>Offer advice to the Jadestone Media Coordinator on matters pertaining to DoT and wider Government media policies and procedures |

## 10. Incident Assessment & Orientation

The IMT Leader is to lead and manage the IMT in responding to all incidents, with their priority being to provide support and/or assistance to the facility or associated Jadestone activity.

### 10.1 Understand & Assess the Situation

The IMT Leader is to coordinate personnel in understanding and assessing the situation with consideration given to the following:

- Size, scope, effect, or potential effect of the incident on:
  - People, Environment, Assets, Reputation, Livelihood (PEARL)
  - Consultation with the GCT with respect to Recovery/Business Continuity;
- Capture information relating to:
  - Incident history and responses already taken
  - Current response actions
  - Confirmation of spill level
  - Other response organisations that are activated

### 10.2 Initial Briefing

The IMT Leader is to conduct an initial briefing to bring key IMT members together to share initial assessment information and to outline the process for initial response activities.

The initial brief is designed to provide all personnel with information about the incident, reason for IMT activation and initial intentions. The objectives of the initial briefing will be to confirm:

- Outline of incident;
- need to confirm spill level;

- Actions taken at the tactical level prior to activation;
- Overarching intention with respect to IMT actions; and
- Provision of initial actions to be taken by the IMT.

If required, the initial briefing may be conducted by teleconference ahead of the IMT arriving at the ICC.

### 10.3 Notifications

Depending on the type and nature of the incident various internal and external notifications will be required. It is therefore vitally important to ensure that accurate and timely information is captured and that situational awareness is achieved quickly. The IMT Leader must ensure that notifications (where required) are completed and managed as part of an ongoing incident.

IMT Leader should notify the Country Manager of the event within one hour of receiving initial call. As situational awareness is gained, the incident/spill level is reassessed by the IMT Leader. Specific guidance relating to the regulatory notifications required during an oil spill incident are provided at:

- Appendix A of the IMTRP (Oil Spill Response Arrangements); and
- Oil Pollution Emergency Plans (OPEP) (this document).

Jadestone store and maintain an Incident Management Contact List on the Jadestone intranet page which contains the contact numbers for external organisations and facilities required to be contacted in the event of an emergency. This includes the organisations to be contacted in Appendix A6: Regulatory Notifications.

## 11. Oil Spill Response Cycle

It is the function of the On-Scene Commander (OIM or Vessel Master for Level 1 incidents) or the IMT Leader (Levels 2) to assess the incident and respond as per the procedures outlined in the Jadestone IMTRP (JS-70-PLN-F-00008). The following sections describe the methods to assess oil spill response priorities.

### 11.1 Gaining Situational Awareness

The IMT needs to review the applicability of the response strategies contained within OPEPs to the actual incident characteristics. This is achieved using operational monitoring to gain situational awareness and obtain answers to the following:

- What type of hydrocarbon has been spilt?
- What is the expected behaviour of the hydrocarbon that has been spilt?
- How much has been spilt?
- Is the source under control?
- Where is the hydrocarbon going?
- Is there anything in the path of the predicted hydrocarbon travel zones?
- Can the hydrocarbon be approached or are there safety concerns?
- Can the hydrocarbon be contained?
- Can the hydrocarbon be dispersed?
- Will shoreline impact occur and clean-up be required?
- Will wildlife be affected and require response?

### 11.2 Assess Appropriate Strategies

Identify and assess known response strategy activities against the criteria detailed below using NEBA:

- Applicability of the response strategy to the range of credible spills (as detailed in the OPEP), including the potential effectiveness of the response in managing the environmental risks associated with each spill.
- Acceptability of the response strategy in relation to the potential environmental impact caused by the implementation of the response.

### 11.3 OPEP Actions Tables

The Action Tables detailed in the facility specific OPEPs have been developed to assist the IMT in commencing an oil spill response. They have been developed utilising risk assessments to identify credible worst case spill scenarios, expected/ calculated release rates, known information of hydrocarbon types and behaviour, and expected partitioning of the hydrocarbon within the marine environment with an estimate of the volume of persistent oil.

Models give a theoretical zone of spread that is used to identify potential sensitive receptors and response strategies required to reduce the consequences of a spill to ALARP. The response strategies described in the facility specific OPEPs are assessed using a NEBA process so the most effective response strategies with the lowest environmental consequences can be identified, documented and prepared for.

Jadestone uses a planning process based on risk-based scenario planning which required the team to:

- Understand the hazard profile;
- Identify parameters to assess applicable response strategies and scale of the event & suitable response strategies;
- Understand the impacts associated with response strategies; and
- Ensure capability supports management of risks to ALARP.

The outcome of this approach is that oil spill hazards associated with Jadestone's activities are addressed and risks are managed to ALARP; and that response strategies and resources are based on the nature and scale of the incident.

Spill response planning to identify a suitable combination of response strategies involves estimating required resources based on potential effectiveness. Capability to support the minimum resources required has been planned for and is presented in each facility specific OPEP**.**

### 11.4 Incident Action Plan

The Incident Action Plan (IAP) formally documents and communicates the:

- Incident objectives;
- Effectiveness of the response strategies;
- Status of assets;
- Operational period objectives; and
- The response strategies approved by the IMT Leader during response planning.

It is the responsibility of the IMT to evaluate the response strategies provided in the OPEP based on real time information. The actual response may not always adopt all response options; this is outcome based depending on the circumstances that will produce impacts that are ALARP. The process implemented throughout the response by the IMT to assess the appropriate response strategies and implement these in a controlled manner to ensure the health and safety of operational personnel and effectiveness in response is the Incident Action Planning (IAP) process.

Jadestone IMT use the incident management planning process described in Section 5 of the IMTRP to develop IAPs.

The IAP is developed and implemented by the IMT for each defined operational period following the initial first-strike IAP, notifications, and activations defined in OPEPs. An operational period is the period scheduled for execution of actions specified in the IAP. The IAP is refreshed when conditions change and can have multiple objectives, strategies and tactics.

### 11.5 Monitoring Performance of IAP

As IAPs are implemented their performance is monitored through IMT communication with in-field response personnel (e.g. surveillance personnel, vessel masters, air-attack supervisors, team leaders etc.) who report on the effectiveness of the response strategies. Communication to the IMT is both verbally and through logs/ reports/ photos sent throughout the response.

The performance objectives and standards for response strategies and tactics are documented in the IAP. Performance against the objectives and standards are assessed through field observations and response monitoring and recorded in the IAP in the next operational period. Through this method, the performance measurement results (gathered from scientific reports and verbal communication/ logs/ photos/ reports provided by response Team Leaders) are fed back into the IMT to provide the IMT with greater situational awareness to enable the effective formulation of following IAPs i.e. the response strategies that are effective in obtaining the IAP objectives are continued or increased, while ineffective strategies are scaled back or ceased.

### 11.6 Net Environmental Benefit Analysis (NEBA)

The IMT use NEBA to inform the development and refinement of IAPs, so the most effective response strategies with the least detrimental environmental impacts can be identified, documented and executed. The Planning Lead is responsible for reviewing the priority receptors identified within the EP and OPEP and application of the NEBA to identify which response options are preferred for the situation, oil type and behaviour, environmental conditions, direction of plume and priorities for protection. The EP describes the Strategic NEBA which has directed the selection of response strategies in this OPEP to the sensitivities of the priority receptors.

When a spill occurs, NEBA is applied to the current situation, or operationalised, using the Operational NEBA'S provided in the IMTRP Appendix D – Operational NEBA Form.

- All ecological and socioeconomic sensitivities identified within the spill trajectory area are inserted; and
- Potential effects of response strategies on each sensitivity are assessed and assigned a positive, negative or no change rating.

The Operational NEBA Form documents the decisions behind the recommendation to the IMT Leader on which resources at risk to prioritise, and the positives and negatives of response strategies to deploy.

To maintain flexibility, response information is used by the IMT to redefine and revalidate the operational NEBA on a daily basis and is fed into the IAP process. Sources of data for the NEBA include:

- Vessel & aerial surveillance;
- Ongoing operational oil and oil in water monitoring (visual);
- Trajectory modelling;
- Tracking Buoy location updates;
- Satellite imagery (if required);
- UAV imagery (if required);
- Fluorometer readings (Entrained oil monitoring);
- Weather and ocean conditions;

- Source Control reports;
- Megafauna Reports;
- Containment and recovery boom effectiveness ($m^3$/day);
- Skimmer effectiveness ($m^3$/day and water cut);
- Nearshore ocean currents and tides (direction & strength);
- Shoreline Assessment reports;
- Oiled wildlife response reports; and
- Scientific monitoring reports.

The NEBA matrix table prioritises environmental sensitivities and assesses the individual net effect that each response option may have on it. This process enables the trade-off effect to be achieved and provides the ability for an informed decision to be made. NEBA is an integral part of the decision-making process and will ultimately result in a trade-off between priorities and response strategies. The outcome of the response however will result in an overall net environment benefit.

## 12. Further IMT Management Guidance

Further guidance on Jadestone IMT and response strategies are detailed in the IMTRP and supporting documentation. This is a controlled document and restricted to Jadestone. Refer to Jadestone Energy management information system for further details.

## 13. IMT Training and Competency

Internal drills/exercises to demonstrate competency are undertaken as per the Incident Management Exercise and Testing Program (JS-70-PR-F-00001). Jadestone IMT will undertake training in their respective roles and responsibilities as provided by an Australian Registered Training Organisations (RTO) or internationally accredited training provider.

Competencies for IMT members will be maintained and managed by the ER Lead. Training requirements and core competencies for Jadestone key IMT response staff are outlined in Table A7-11.

**Table A7-11: IMT Roles – Training and Competency Requirements**

| IMT Role | Training | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | IMO 3 - Oil Spill Response – Command & Control<br>Priority Level (1) | IMO 2 - Oil Spill Response Management<br>Priority Level (1) | Coordinate Incident Response (PMAOMIR418)<br>Priority Level (1) | Manage Incident Response Information (PMAOMIR322/PMAOMIR320)<br>Priority Level (1) | Jadestone Incident Management Team Introduction (Online Module)<br>Priority Level (2) | IMT Duty Roster Orientation Priority Level (2) | IMT Oil Spill Response Workshop (Annual)<br>Priority Level (3) | *IMT MAE Drill (Quarterly)<br>Priority Level (3) | ** Oil Spill Response Functional Exercise (Annual)<br>Priority Level (3) | ***Targeted Oil Spill Refresher Workshop (as required)<br>Priority Level (3) | Media Awareness |
| **IMT Leader** | M | | M | M | M | M | M | M | M | R | R |
| **Operations Lead** | | M | | M | M | M | M | M | M | | |
| **Planning Lead** | | M | | M | M | M | M | M | M | M | |
| **Logistics Lead** | | M | | M | M | M | M | M | M | | |

**Priority Levels** - (1) Pre-join; (2) 0-3 months; (3) 0-12 months

**Key:** M – mandatory R – recommended

***** - to participate **or** be an observer in a minimum of one drill per year

****** - to attend a minimum of one within 3 year IMO certification period

***- to attend a minimum of three per year pro rata from starting time

### 13.1 IMT Exercise and Testing Program

To maintain the organisation's ability to react to and manage major incidents, a three-year exercise cycle shall be implemented. Over the course of a 3-year period it is intended that all major incident events including key MAEs and oil spills will be exercised using a stand-alone IMT drill or as part of an annual functional exercise.

The exercise cycle shall be planned to include a quarterly MAE scenario, oil spill response workshop and exercises to test the IMT and will alternate between offshore facilities. A quarterly MAE scenario can be substituted for or combined with the Annual Oil Spill exercise. Exercises program shall align with facility exercise programs wherever practical. All completed IMT exercises shall be recorded in BASSNET.

The Incident Management Exercise & Testing Program (JS-70-PR-F-00001) provides information on drill and exercises (types and documentation)

## 14. Scientific Monitoring

Scientific monitoring activities are the principle tool for monitoring environmental impacts from hydrocarbon exposure and allows operators to determine when their termination goals have been met during a response. Jadestone has prepared the Framework for Scientific Monitoring JS-70-PR-I-00038 (the Framework) to guide scientific monitoring activities in an oil spill response.

### 14.1 Objectives

The objective of the Framework is to describe scientific monitoring studies to quantify impacts to the environment and their subsequent recovery.

### 14.2 Industry Guidelines

The NOPSEMA Information Paper N-04750-IP1349: Operational and Scientific Monitoring Programs (OSMPs) sets out general principles and practical advice to assist operators in their planning for, and application of, fit-for-purpose SMPs.

Features of these documents have provided the basis for which the Framework has been developed, with specific guidance utilised in the development of the monitoring program designs and application considerations.

### 14.3 Monitoring Background

Scientific monitoring activities have very different objectives to operational monitoring which significantly influence the monitoring methods likely to be used, the degree of scientific rigour required to meet the monitoring objectives, and the scope of studies.

Operational monitoring is monitoring undertaken in OPEPs to obtain information which will assist in the planning and execution of the oil spill response. Scientific monitoring is undertaken to provide indicative or quantitative data for short term and longer-term environmental effects assessment. Table A7-12 provides the characteristics of each of the monitoring types.

**Table A7-12: Characterisation Summary of Spill Monitoring Types**

| Monitoring Classification | Character / Criteria |
|---|---|
| Operational | • Results required short term;<br>• Lower requirement for statistical strength;<br>• Lower requirement for the identification of control sites or to demonstrate baseline conditions;<br>• Concentration on key habitats or species that are indicators of biological community health, are of particular value or have slow recovery times; and<br>• Includes monitoring to help predict environmental effects or define the sensitivity of resources to guide spill response actions. |
| Scientific | • May be longer-term studies and monitoring may extend beyond the time and location of the clean-up response;<br>• Need for high statistical strength (e.g. potentially large number of samples or sample sites); and Need for high quality 'control' areas. |

## 14.4 Revision of Monitoring Programs

Following a hydrocarbon spill, subsequent impacts to sensitive receptors will be apparent (e.g. oiling of habitats/fauna visible; surveillance activities confirm contact over time at receptor locations). Therefore, the requirement for long-term monitoring will be based on the nature of the spill and monitoring data collected for the short-term phase on the impact and recovery of sensitivities impacted.

Scientific monitoring activities will be assessed for their applicability and organised by the Environmental Team Lead. Using surveillance and spill fate modelling information collected as part of the operational monitoring, the IMT will assess and decide on the final suite of scientific response monitoring programs. Table A7-13 describes the linkages between the OMPs and the SMPs.

**Table A7-13: Matrix of SMPs Triggered by OMPs**

| Operational Monitoring Strategy | SMP1 | SMP2 | SMP3 | SMP4 | SMP5 | SMP6 | SMP7 | SMP8 |
|---|---|---|---|---|---|---|---|---|
| Satellite tracking buoy | X | X | X | X | X | X | X | X |
| Aerial surveillance | X | X | X | X | X | X | X | X |
| Vessel surveillance | | X | X | X | X | X | X | X |
| OSTM | X | X | X | X | X | X | X | X |
| Fluorometry | X | | | | | | X | X |
| Shoreline habitat assessment | | X | X | X | X | X | X | |

SMP1 – Water Quality

SMP2 – Sediment Quality

SMP3 – Intertidal Mudflats, Sandy Beaches and Rocky Shores

SMP4 – Mangroves

| |
|---|
| SMP5 – Benthic Habitats |
| SMP6 – Marine Fauna |
| SMP7 – Seafood Quality, Fisheries and Aquaculture |
| SMP8 – Fish, Invertebrates (Crustaceans and Cephalopods) |

### 14.5 Scientific Response Monitoring Service Providers

During and post a spill requiring scientific response, monitoring activities require resources external to Jadestone which include specialist technical capabilities. Jadestone has a monitoring service provider on contract for scientific response monitoring activities. The service provider has an implementation plan for the Operational and Scientific Monitoring Program which outlines how the provider will coordinate its response arrangements for Jadestone including procedures, logistics and coordination, resourcing and preliminary study specifications.

The service provider can increase resourcing for SMPs through the hiring of personnel and equipment through sub-contracted companies, as may be required to provide for the varied disciplines and fields of expertise for each of the SMPs, and to accommodate the scaling up of monitoring that may be required as the spatial extent of a spill increases. This is considered normal practice for environmental monitoring providers given the limited ability of any single provider to provide all expertise and equipment across the multitude of marine and coastal scientific disciplines. In support of this requirement the monitoring service provider provides three monthly reporting of available personnel to support Jadestone.

Vessels to mobilise field teams to monitoring sites or for on-water sampling activities will be mobilised through Jadestone existing MSAs through multiple vessel providers. Given that sampling locations for the SMPs would in many instances be coincident to sites targeted for operational monitoring and spill response strategies, there exists opportunities for shared vessel usage during a spill.

### 14.6 Consultation

In the event of a level 2/3 hydrocarbon spill, Jadestone will notify all identified relevant persons within 72 hours of the event (refer to Appendix A6 – Regulatory Notifications). In addition, for each scientific monitoring program (SMP) triggered, a review of relevant persons and/or groups with a direct interest in either the area monitoring will occur or values that may be affected, will be undertaken. Any identified relevant persons/groups will be contacted prior to the SMP activities being undertaken and provided with a summary of the activities that will occur and an invitation to comment. Thereafter, relevant persons/groups will be provided with periodic updates while the SMP is being undertaken and notification prior to termination, again with an invitation to comment.