Skua-11 ST1 Well Drilling Operational and Scientific Monitoring: Bridging Implementation Plan

TM-70-PLN-I-00009

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Please refer to the Jadestone Energy MIS for the latest revision.

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DEFINITIONS

Term	Definition
AEP	Australian Energy Producers (formerly Australian Petroleum Production and Exploration Association [APPEA]; from 13 September 2023)
AIIMS	Australasian Inter-Service Incident Management System
ALA	Atlas of Living Australia
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
AODN	Australian Data Network
BACI	Before-After Control-Impact
BIP	Bridging Implementation Plan
BIA	Biologically Important Areas
BRUVS	Baited Remote Underwater Video Stations
BTEXN	Benzene, Toluene, Ethylbenzene and Xylenes And Naphthalene
CoA	Commonwealth of Australia
CoC	Chain of Custody
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DBCA	Western Australian Department of Biodiversity Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Cth)
DITT	NT Department of Industry, Tourism and Trade
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environmental Regulation
EMBA	Environment that may be Affected
EP	Environment Plan
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cth)
EPS	Environmental Performance Standard
ESC	Environmental Scientific Coordinator
FOB	Forward Operating Base
GIS	Geographic Information System
GPS	Geographic Positioning System
IAP	Incident Action Plan
ICS	Incident Command System
IMOS	Integrated Marine Observing System
IMSA	Index of Marine Surveys for Assessment
IMT	Incident Management Team

Term	Definition
IMT Leader	Incident Management Team Leader. Equivalent to an Incident Controller or Incident Commander.
KEF	Key Ecological Feature
LOWC	Loss of Well Control
MDO	Marine Diesel Oil
MGO	Marine Gas Oil
Monitoring Service Providers	The subcontracted specialist monitoring service providers subcontracted by OSRL to perform certain operational and scientific monitoring services
MSA	Master Service Agreement
NATA	National Association of Testing Authorities
OM	Operational Monitoring
OMP	Operational Monitoring Plan
OPEP	Oil Pollution Emergency Plan
OPGGS (E)	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 Regulations
OSM	Operational and Scientific Monitoring
OSM Services Provider	The operational and scientific monitoring services to be provided by OSRL via the OSM Supplementary Service Agreement
OSRA	Oil Spill Response Atlas
OSRL	Oil Spill Response Limited
OSTM	Oil Spill Trajectory Modelling
PAH	Polycyclic aromatic hydrocarbons
PPE	Personal Protective Equipment
QA/QC	Quality Assurance and Quality Control
ROV	Remotely Operated Vehicle
SBRUVS	Stereo Baited Remote Underwater Video Stations
SIMA	Spill Impact Mitigation Assessment
SM	Scientific Monitoring
SMP	Scientific Monitoring Plan
TRH	Total Recoverable Hydrocarbons
TPH	Total Petroleum Hydrocarbons
WA	Western Australia
WA DoT	Western Australian Department of Transport
WAMSI	Western Australian Marine Science Institution

PART A – PREPAREDNESS

This Plan is presented in two parts. Part A outlines the relationship between Jadestone Energy (Australia) Pty Ltd ('Jadestone') environmental management document framework and the Joint Industry Operational and Scientific Monitoring (OSM) Framework (APPEA, 2021). Part B provides operationally focussed guidance for Jadestone personnel and OSM Service Providers to coordinate the implementation of monitoring plans.

1. INTRODUCTION

OSM is a key component of the environmental management document framework for offshore petroleum activities, which also include an Environment Plan (EP) and Oil Pollution Emergency Plan (OPEP). Operational Monitoring (OM) is instrumental in providing situational awareness of a hydrocarbon spill, enabling Incident Management Teams (IMT) to mount a timely and effective spill response and continually monitor the effectiveness of the response. Scientific Monitoring (SM) is the principle tool for determining the extent, severity and persistence of environmental impacts from a hydrocarbon spill and for informing resultant remediation activities.

Jadestone will implement OSM, as applicable, for oil spills across both State and Commonwealth waters. In the event that control of scientific monitoring in WA State waters is taken over by the Western Australian Department of Transport (WA DoT) under advice from the State Environmental Scientific Coordinator (ESC), Jadestone will follow the direction of WA DoT as Control Agency and provide all necessary resources (monitoring personnel, equipment and planning) to assist as a supporting agency.

Jadestone has elected to use the Joint Industry OSM Framework and supporting Operational Monitoring Plans (OMPs) and Scientific Monitoring Plans (SMPs) as the foundation of its OSM approach. The Joint Industry OSM Framework is available on the Australian Energy Producers (AEP) Environmental Publications Webpage.

Use of the Joint Industry OSM Framework requires each Titleholder to develop a Bridging Implementation Plan (BIP) (this plan) which fully describes how the Framework interfaces with the Titleholder's own activities, spill risks and internal management systems.

Table 1-1 describes key documents that form Jadestone's environmental management document framework.

Activation of OSM should follow the process listed in Part B: Section 12 Mobilisation and Activation Process.

Table 1-1: Key documents in Jadestone's environmental management framework

Document	Description
Skua-11 ST1 Well Drilling Environment Plan (EP) (TM-50-PLN-I-00007)	The EP describes the activity and the location, the environment, the risks to the environment as a result of the activity and the associated management controls. Of particular relevance to this plan, it identifies sensitive receptors, potential impacts from hydrocarbon spills and the environment that may be affected (EMBA).
Skua-11 ST1 Well Drilling Oil Pollution Emergency Plan (OPEP) (TM-50-PLN-I-00006)	This plan provides the activation and response process for the credible spill scenarios, including incident management, spill impact mitigation analysis (SIMA) process and detailed implementation guidance for individual response options. Of particular relevance to this plan, it identifies the credible spill scenarios and protection priorities
Incident Management Contact List	Contains all internal contact and communications information to enable effective communication amongst response personnel. It also contains details of external Support Agencies, Service Providers and Government Agencies to be contacted as per the reporting requirements in Table 9-1 of the OPEP. It is regularly updated and accessed via the Jadestone IMT Portal.
Incident Management Team Response Plan (JS-70-PLN-F-00008)	Details procedures for responding to an emergency incident, including a hydrocarbon spill event. This plan contains details of the incident management structure, procedures for the activation of the IMT and the roles and responsibilities of the IMT.

2. EMBA AND LOCATIONS FOR BASELINE REVIEW

2.1 EMBA

The EMBA is defined in the Skua-11 ST1 Well Drilling EP (TM-50-PLN-I-00007) (Section 5.7) as the area potentially impacted by hydrocarbons from a spill event above impact concentrations. The EMBA was determined using stochastic modelling results applying the following thresholds:

- ≥1 g/m^2 floating oil thickness, which is considered to be below levels which would cause environmental harm and is more indicative of the areas perceived to be affected due to its visibility on the sea-surface
- ≥10 g/m^2 for accumulated (shoreline) oil, which represents the area visibly contacted by the spill
- ≥10 ppb for dissolved hydrocarbons corresponds generally with potential for exceedance of water quality triggers
- ≥10 ppb entrained hydrocarbons represents the low exposure zone and corresponds generally with potential for exceedance of water quality triggers.

Two credible spill scenarios identified in the Skua-11 ST1 Well Drilling EP (TM-50-PLN-I-00007) (Section 7.5) have been selected to represent worst-case spills from a response perspective, including operational and scientific monitoring:

1. A surface release of 68,027 m^3 of Skua-11 Crude over 90 days following a blowout during redrill operations.
2. A 250 m^3 release of marine gas oil/marine diesel oil (MGO/MDO) over six hours following a vessel tank rupture.

These scenarios have been used to inform the resourcing requirements for this operational and scientific monitoring bridging implementation plan.

2.2 Locations Requiring a Baseline Review

Baseline monitoring provides information on the condition of ecological receptors prior to, or spatially independent (e.g. if used in control chart analyses) of, a spill event and is used for comparison with post-impact scientific monitoring, where required. This is particularly important for scientific monitoring where the ability to detect changes between pre-impact and post-impact conditions and evaluate impact from the spill (compared to natural variation and/or impacts unrelated to the spill) is necessary. Therefore, an enhanced understanding of the extent, quality and suitability of any existing baseline data is required to prioritise the monitoring response.

Locations requiring a review of the baseline data available have been determined from the stochastic modelling results of the loss of well control (LOWC) scenario (RPS, 2024). Locations and associated receptors requiring a baseline review were identified as those sensitive receptors contacted by hydrocarbons at the low threshold for entrained (≥100 ppb), dissolved (≥10 ppb), floating (≥1 g/m^2), and shoreline contact (≥10 g/m^2), within 7.0 days (7 days was used to delineate the first-strike monitoring response) at a probability >5%, as listed in Table 2-1 (note: No receptors were contacted by the MGO/MDO scenario at the low thresholds, within 7.0 days and at a probability > 5%). Table 2-2 lists the key sensitivities associated with these locations.

First-strike monitoring priorities are subsequently identified as those locations and associated receptors predicted to be contacted within 7.0 days at a probability >5%, and where baseline data is either not available or not sufficient (as depicted in Table 4-3 and outlined in Section 4).

In addition to these locations, there are receptors that are transient (i.e. cetaceans, seabirds) and others that are broadscale, such as managed fisheries with large spatial extents, Key Ecological Features (KEFs) and

Biologically Important Areas (BIAs). These receptors are described in detail in the Skua-11 Well Drilling EP (TM-50-PLN-I-00007) and summarised in Table 2-2 and Appendix A.

Table 2-1: Spill Modelling results- surface release of 68,027 m³ of Skua-11 Crude over 90 days following a LOWC with a probability of contact >5% and <7.0 days (RPS, 2024)

Locations requiring a baseline review	Probability (%) of ≥1 g/m² floating	Min. arrival time ≥1 g/m² floating (days)	Probability (%) of ≥10 g/m² shoreline contact	Min. arrival time ≥10 g/m² shoreline contact (days)	Peak volume on shoreline (m³)	Probability (%) of contact of ≥100 ppb entrained	Min. arrival time ≥100 ppb entrained (days)	Probability (%) of contact of ≥10 ppb dissolved
Ashmore Reef Australian Marine Park (AMP)	10 (W)	6.5 (W)	NA	NA	NA	37 (W)	8.0 (W)	1 (W)
Cartier Island AMP	18 (W)	6 (W)	NA	NA	NA	79 (W)	4.3 (W)	10 (W)
Ashmore Reef	7 (W)	6.7 (W)	67 (W)	5.5 (W)	479 (W)	30 (W)	9.8 (W)	1 (W)
Cartier Island	18 (W)	6 (W)	98 (W)	6.3 (W)	312 (W)	76 (W)	4.9 (W)	10 (W)
Barracouta Shoal	44 (W)	2.9 (W)	NA	NA	NA	98 (W)	1.6 (W)	47 (W)
Eugene McDermott Shoal	27 (T)	6.8 (T)	NA	NA	NA	30 (W)	3.9 (W)	10 (T)
Goeree Shoal	66 (T)	2.4 (T)	NA	NA	NA	81 (W)	1.4 (W)	24 (W)
Heywood Shoal	4 (T)	20.9 (T)	NA	NA	NA	22 (W)	6.0 (W)	3 (W)
Jabiru Shoals	2 (S)	12.8 (S)	NA	NA	NA	52 (S)	3.9 (S)	9 (S)
Johnson Bank	5 (W)	5.5 (W)	NA	NA	NA	47 (W)	5.6 (W)	2 (W)
Mangola Shoal	NC	NC	NA	NA	NA	42 (S)	5.0 (S)	4 (S)
Pee Shoal	1 (S)	22.9 (S)	NA	NA	NA	44 (S)	4.1 (S)	8 (S)
Vulcan Shoal	42 (W)	1.8 (W)	NA	NA	NA	91 (W)	1.2 (W)	49 (W)
Woodbine Bank	8 (W)	4.7 (W)	NA	NA	NA	53 (W)	4.9 (W)	4 (W)

S = summer; W = winter, T = transitional season

NA = not applicable as receptor is submerged; NC = no contact

Reported values after listed receptor indicates approximate mean depth (m) with the exception of reefs, banks and shoal receptors (incl. nearshore) which indicates minimum depth (m); submerged receptors are denoted by depths >0 m, while reported depths of 0 m denote intertidal receptors.

Table 2-2: Key sensitivities for locations predicted to be contacted within 7.0 days at the low thresholds, at a probability greater than 5%, and requiring a baseline review

Ashmore Reef AMP: contains two extensive lagoons, mobile channelled carbonate sand flats, shifting sand cays, an extensive reef flat and three vegetated islands, known as East, Middle and West Islands.
Turtles: Significant feeding, breeding, and nesting population of green sea turtles (*Chelonia mydas*). Ashmore Reef and surrounding water are considered critical habitats for nesting and interesting for the genetically distinct population of green turtles (Commonwealth of Australia, 2017): Nesting occurs year-round (peak: Dec – Jan) Some hawksbill turtle (*Eretmochelys imbricata*) nesting occurs at Ashmore Reef (Commonwealth of Australia, 2017).
Birds: Ashmore Reef supports a large population of seabirds, including some of the most important seabird rookeries on the North West Shelf (Milton 2005, Clarke *et al*. 2011). Each year, approximately 100,000 seabirds breed on the three islands. Lage colonies of Sooty Terns (*Onychoprion fuscatus*), Greater Crested Terns (*Thalasseus bergii)*, Common Noddy (*Anous stolidus*), Lesser Frigatebirds (*Fregata ariel*) and Brown Boobies (*Sula leucogaster*) breed on East and Middle Islands. Smaller breeding colonies of Wedge-tailed Shearwaters (*Ardenna pacificus*), Masked Boobies (*Sula dactylatra*) , Red-footed Boobies (*Sula sula*), Great Frigatebirds (*Fregata minor*), Little Egrets (*Egretta garzetta*), Eastern Reef Egrets (*Egretta sacra*), Black Noddy (*Anous minutus*), Lesser Noddy (*Anous tenuirostris*) and Roseate Terns (*Sterna dougallii*) also occur (Clark and Herrod, 2016). Ashmore Reef provides important foraging areas for migratory shorebird which can number in the tens of thousands. Numbers of shorebirds are highest between October and April when non- breeding adults visit from the northern hemisphere. Large numbers of shorebirds are often still present during the remainder of the year as juveniles (first year birds) and immatures (second to third year birds) of many species remain on the non-breeding grounds for the first few years of life (Higgins & Davis 1996).
Marine mammals: Dugong (*Dugong dugon*): Ashmore supports a small dugong population of less than 50 individuals (Commonwealth of Australia, 2014). The seagrass beds of Ashmore AMP and possibly Cartier AMP, are critical habitat for this population (Commonwealth of Australia, 2014). Ashmore Reef lies in the vicinity of the pygmy blue whale (*Balaenoptera musculus brevicauda*) distribution and migration BIA (Commonwealth of Australia, 2023). Pygmy Blue whale migration north: May-Aug; Pygmy Blue whale migration south – Sept-Dec.
Benthic community: Reef is highly diverse, particularly for corals and molluscs, supporting the highest number of coral species of any reef off the west Australian coast (DSEWPaC, 2012).
Seagrass: beds are widespread, but the cover is generally low (most likely due to over grazing by green turtles).
Ramsar Site: recognised as a Ramsar wetland of international significance with an area of 58,300 ha being designated in 2002 (Ramsar Convention Bureau, 2009).
Traditional owner values: Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. At the commencement of the management plan (Director of National Parks, 2018), there is limited information about the cultural significance of this Marine Park.
Indonesia: Subject to the Memorandum of Understanding between Australia and Indonesia (Current resting and staging area from MoU Box) (Director of National Parks, 2018). Indonesian artefacts and graves (Director of National Parks, 2018).
Heritage: Ashmore Reef was listed on the Commonwealth Heritage List in 2004, meeting Commonwealth heritage listing criteria A, B and C (Director of National Parks, 2018).
Socio-economic: Commercial tourism – recreation and scientific research (Director of National Parks, 2018).

Cartier Island AMP: The Marine Park includes an unvegetated sand island (Cartier Island), mature reef flat, a small, submerged pinnacle (Wave Governor Bank), and two shallow pools to the north-east of the island. Covers an area of 172 km^2.
Turtles: Significant feeding, breeding, and nesting population of green sea turtles (*Chelonia mydas*). Cartier Island and surrounding water are considered critical habitats for nesting and interesting for the genetically distinct population of green turtles (Commonwealth of Australia, 2017): Nesting occurs year-round (peak: Dec – Jan) Loggerhead (*Caretta caretta*) and hawksbill (*Eretmochelys imbricata*) turtle are also known to forage around Cartier Island (Limpus, 2008).
Sea snakes: High abundance and diversity (Guinea, 2013).
Whale shark: the Cartier Island Marine Park lies within the foraging BIA for whale sharks (Commonwealth of Australia 2023)
Birds: Several species, including the Pacific reef heron (*Egretta sacra*), brown booby (*Sula leucogaster*), ruddy turnstone (*Arenaria interpres*) and crested tern (*Thalasseus bergii*), are regular visitors to Cartier Island and Cartier Reef (Clarke *et al*. 2017). The crested tern is known to breed on the island in small numbers (Clarke *et al*. 2017). During high tides, the Island provides the only available land within this reef for roosting birds. At lower tides, reef-flats provide additional resting and foraging substrates for species such as egrets and shorebirds (Clarke *et al*. 2017). The waters of the Cartier AMP are considered important foraging grounds for the internationally significant numbers of seabird species that breed on Ashmore Reef (Clarke *et al*. 2017). A total of 34 species of birds have been recorded from the Cartier Island AMP for a list of these species refer to Appendix A of Clarke *et al*. 2017. Breeding: May – June/Oct; Migrating: Feb-Apr/Sept-Oct
Marine mammals: Dugong (*Dugong dugon*): The Ashmore Reef National Nature Reserve supports a small population of dugong and their range possibly extends to Cartier Island (Whiting, 1999). Cartier Island lies in the vicinity of the pygmy blue whale (*Balaenoptera musculus brevicauda*) distribution and migration BIA (Commonwealth of Australia, 2023). Pygmy Blue whale migration north: May-Aug; Pygmy Blue whale migration south – Sept-Dec.
Benthic community: High diversity and abundance of hard and soft corals, gorgonians (sea fans), sponges and a range of encrusting organisms. The overall dominant composition of the shallow reef benthos is hard coral and turf algae (Heyward *et al*. 2010a). Coral bleaching events have been noted within the Cartier Island AMP historically and notably in 2016-2017(AIMS, 2023). In 2021-22, sea surface temperatures in Western Australia remained in the highest 10% of observations since 1900 (AIMS, 2023).
Traditional owner values: Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. At the commencement of the management plan (Director of National Parks, 2018), there is limited information about the cultural significance of this Marine Park.
Indonesia: Subject to the Memorandum of Understanding between Australia and Indonesia (Current resting and staging area from MoU Box) (Director of National Parks, 2018). Indonesian artefacts and graves (Director of National Parks, 2018).
Shipwreck: Ann Millicent (1888)
Socio-economic: Commercial tourism – recreation and scientific research (Director of National Parks, 2018).
Safety Alert: Cartier Island and the surrounding marine area within a 10-kilometre radius was a gazetted Defence Practice Area up to 20 July 2011 and has been used in the past as an air weapons range. Although the site is no longer an active weapons range there is a SUBSTANTIAL RISK that unexploded ordnances remain in the area.

Barracouta, Vulcan, Goeree Shoals, Eugene McDermott Shoal and Heywood Shoal
Prior to the Montara hydrocarbon release, there were no baseline data for benthic habitats and associated fish communities on these shoals. Following the Montara spill three repeat surveys were conducted at Barracouta, Vulcan and Goeree Shoals in 2011, 2013 and 2016 (there was also extensive sampling undertaken across Barracouta and Vulcan shoals in 2010). A variety of algae were the most abundant benthic group encountered on all shoals. Overall mean coral cover differed between individual shoals, within a range of 5-15%, but varied from survey to survey. Both declines and increases in major benthic categories, such as hard corals, other primary producers and filter feeders were recorded between successive surveys at all three shoals. Physical disturbance associated with storms may be an important driver of shoal communities (Heyward *et al*., 2017). The monitoring undertaken in 2011 also included monitoring at Eugene McDermott Shoal and Heywood Shoal. Eugene McDermott Shoal was determined to have the greatest total mean coral coverage: Eugene McDermott 17.7%, Goeree 13%, Heywood 9.6%, Vulcan 7.8%, Barracouta East 11.9% and Barracouta West 6.1% (Heywood *et al*. 2011).
Pee Shoal
The first study the biota of Pee Shoal was undertaken in 2005 (Wienberg *et al*. 2010). The study noted a discrepancy between the living biota and the sediment composition and suggested that this could reflect a disruption by a severe tropical cyclone that had passed through the area six months previously (Wienberg *et al*. 2010). In 2005, at the 320-210 m depth the steep and flat-topped knoll was characterised by soft sediments with scattered debris and scarce sponges, hydrozoans and crinoids, at 210-75 m the hardground outcrops were mainly colonised by octocorals and sponges, at the summit region (75-21 m) was densely colonized by massive and encrusting zooxanthellate corals and the octocoral *Heliopora coerulea* (Wienberg *et al*., 2010).

3. RELEVANT EXISTING BASELINE INFORMATION SOURCES

Jadestone has access to a number of different baseline data sources that are relevant to the high value receptors of the EMBA. These include:

3.1 Data.gov.au

Data.gov.au is the central source of Australian open government data published by federal, state and local government agencies. In addition, it includes publicly-funded research data and datasets from private institutions that are in the public interest.

3.2 Australian Ocean Data Network

The Australian Ocean Data Network (AODN) is the primary access point for search, discovery, access and download of data collected by the Australian marine community. Data is presented as a regional view of all the data available from the AODN. Primary datasets are contributed to by Commonwealth Government agencies, State Government agencies, Universities, the Integrated Marine Observing System (IMOS – an Australian Government Research Infrastructure project), and the Western Australian Marine Science Institution (WAMSI).

3.3 Western Australian Oil Spill Response Atlas

The Western Australian Oil Spill Response Atlas (OSRA) is a spatial database of environmental, logistical and oil spill response data. Using a geographical information system (GIS) platform, OSRA displays datasets collated from a range of custodians allowing decision makers to visualise environmental sensitivities and response considerations in a selected location. Oil spill trajectory modelling (OSTM) can be overlaid to assist in determining protection priorities, establishing suitable response strategies and identifying available resources for both contingency and incident planning. OSRA is managed by the Oil Spill Response Coordination unit within WA DoT Marine Safety and is part funded through the National Plan for Maritime Environmental Emergencies and the Australian Maritime Safety Authority (AMSA).

3.4 The Atlas of Living Australia

The Atlas of Living Australia (ALA) is a collaborative, online, open resource that contains information on all the known species in Australia aggregated from a wide range of data providers. It provides a searchable database when considering species within the EMBA. The ALA receives support from the Australian Government through the National Collaborative Research Infrastructure Strategy and is hosted by the Commonwealth Scientific and Industrial Research Organisation (CSIRO).

3.5 Index of Marine Surveys Assessment

The Index of Marine Surveys for Assessments (IMSA) is an online portal to information about marine-based environmental surveys in Western Australia. IMSA is a project of the WA Department of Water and Environmental Regulation (DWER) for the systematic capture and sharing of marine data created as part of an environmental impact assessment.

3.6 Other Sources

Other sources include:

- the WA Department of Biodiversity and Attractions (DBCA) Biodiversity and Conservation Science Annual Reports;
- Australian Institute for Marine Science (AIMS) Research Data Platform, WA State of Fisheries Report;
- eAtlas.org.au;
- North West Atlas;

- Western Australian Marine Science Institution;
- Geosciences Australia data and publications;
- Australian Marine Parks Science Atlas; and
- Birdlife Data Zone.

Reports and peer reviewed journal articles were also accessed via research and journal databases such as PubMed and Google Scholar, as well as unpublished monitoring reports.

4. BASELINE DATA REVIEW AND IDENTIFICATION OF FIRST-STRIKE MONITORING PRIORITIES

Understanding the presence or absence, suitability and quality of baseline data for locations and associated receptors predicted to be contacted within 7 days is an important preparatory measure for first-strike OSM. During a spill event, the first-strike monitoring capability will be prioritised to those receptors with insufficient baseline data (deemed first-strike monitoring priorities) to collect baseline data post-spill pre-impact. Further, where post-spill pre-impact monitoring is not feasible due to short contact times, understanding which receptors have insufficient baseline data will help quickly guide the finalisation of each SMP design and the need to include alternative designs (e.g. the Gradient Approach and/or Impact versus Control versus Before-After Control-Impact (BACI) design).

The baseline data assessment includes the following steps:

1. **Identification of locations requiring a baseline review:** Receptor locations predicted to be contacted at the low thresholds within 7.0 days, at a probability greater than 5%, are identified and aligned with OMPs and SMPs (as per Table 2-1).
2. **Collection of baseline data:** Environmental baseline monitoring data relevant to the locations and receptors is located (as per sources outlined in Section 3).
3. **Assessment of baseline data:** The relevance of each data source is assessed:
    a) For each data source obtained, a meta-analysis is performed to determine if the parameters and methods align with the key parameters and methods outlined in the Joint Industry SMPs (Table 4-1), the spatial extent of the data, the sampling effort/duration, and the temporal relevance is also noted. Table 4-2 outlines the overall assessment criteria used for each data source.
4. **Assessment of baseline data:** An annual evaluation of the adequacy (in terms of the likely ability to detect changes between pre-impact and post-impact conditions) of the collective baseline data for each location and associated receptors is undertaken. This evaluation takes into consideration the following:
    a) Background historical information on the presence, distribution, seasonality, and if applicable, the reproductive state of the receptor (as outlined in Table 2-2) is compared with the data available from monitoring within the last 5 years. Depending on the receptor and associated Joint Industry SMP, the following is considered:
        i) Does the data collectively cover the required spatial extent of the receptor within a location (taking into consideration any background historical information on the distribution of the receptor)?
        ii) Does the data collectively cover all the species/biological communities required for the relevant Joint Industry SMP and that may be present at the location?
5. **Assessment outcome:** Each location and associated receptor is then categorised as either 'First-Strike Monitoring Priority' or 'Lower Priority for First-Strike Monitoring', as outlined below, and summarised in Table 4-3:
    a) First-Strike Monitoring Priority - current baseline data is not in place, not suitable or not sufficient; and post-spill pre-impact baseline data collection should be prioritised; and
    b) Lower Priority for First-Strike Monitoring – collectively there is substantial baseline data or on-going monitoring from within the last 5 years. This data aligns with the key parameters and methodologies of the relevant Joint Industry SMP, encompasses the required species/biological communities, and covers the required spatial extent of the location. The current baseline data is therefore considered sufficient and could likely be used to detect a level of change in the event of a significant impact. Hence this receptor is considered a lower priority for post-spill, pre-impact data collection.

During an actual spill, the monitoring priorities will vary according to the spill event and it should be noted that the monitoring priorities provided in Table 4-3 are listed for planning and guidance purposes. Monitoring should focus on locations most at risk of consequences, such as in shallow waters, in sensitive habitats, and in areas with protected species. Consequently, shorelines and adjacent nearshore areas will generally take priority over reefs, shoals and banks, unless they are the main locations impacted by a spill event. The WA DoT protection priority rankings, determined as part of the Western Australian Marine Oil Pollution Risk Assessment, may also be consulted to provide further focus and prioritisation.

At the time of a spill, Jadestone will work with its OSM Services Provider, sub-contracted Monitoring Service Providers and key stakeholders in the initial stages of the spill to identify priority monitoring receptors and to assist in the finalisation of the monitoring design, ensuring that resources are allocated appropriately and according to the greatest risk of impact. This process is outlined in Section 13.

While baseline data exists for some of the priority monitoring areas (Appendix B) most of the studies are outdated and post-spill pre-impact baseline data should be prioritised where possible. The most recent survey of Ashmore Reef Marine Park, conducted in 2019, covered benthos, seagrass, sea snakes, turtles, seabirds and shorebirds. However, the relevance of this data may be limited at the time of a spill if physical disturbance from a cyclone event and/or coral bleaching caused by warm water events have occurred. Cyclone events may be an important driver for communities in this area (Heyward *et al*. 2017).

It is noted that it is difficult to obtain absolute statistical proof of oil spill impacts, due to the variability (spatially and temporally) of the natural environment, the lack of experimental control due to the nature of spills and because suitable baseline data may not be available (Kirby *et al*. 2018). Alternative approaches exist for detecting impacts where post-spill, pre-impact monitoring may not be feasible. These include impact versus control design approaches and/or a gradient approach. The Joint Industry OSM Framework provides guidance and considerations for survey designs to enable the acquisition of sufficiently powerful data during SMP implementation.

Once SMP monitoring reports are drafted (post-spill) they will be peer reviewed by an expert panel (Refer to Section 10.10 of the Joint Industry OSM Framework).

Table 4-1: Key parameters and key methodology from the Joint Industry SMPs

SMP	Key parameter	Key methodology
Water quality impact assessment	At least one key parameter: • Total recoverable hydrocarbons (TRH); • Total petroleum hydrocarbons (TPH); • Benzene, toluene, ethylbenzene and xylenes and naphthalene (BTEXN); or • Polycyclic aromatic hydrocarbons (PAH)	In situ UV fluorometer and/or samples analysed at National Association of Testing Authorities (NATA) accredited lab using NATA accredited method
Sediment quality impact assessment	At least one key parameter: TRH, TPH, BTEXN, PAH, heavy metals	Sediment collected by corer/grab and samples analysed at NATA accredited lab using NATA accredited method
Intertidal and coastal habitat assessment	At least one key parameter: presence, diversity, distribution	Any of the following, as appropriate to the parameters: • Ground and vessel-based intertidal surveys (e.g. quadrats, transects, including video and still photography)

SMP	Key parameter	Key methodology
		• Remote sensing • Infauna sampling
Benthic habitat assessment	At least one key parameter: presence, diversity, distribution	Any of the following, as appropriate to the parameters: • Transects • Towed camera • Drop camera • Remotely Operated Vehicle (ROV) camera • Diver-based camera surveys • Remote sensing (coral & seagrass broad scale survey) • Sediment grab for infauna
Marine fish and elasmobranch assemblages assessment	At least one key parameter: species identification, abundance, habitat type	Any of the following, as appropriate to the parameters: • Baited remote underwater video stations (BRUVS) • Stereo Baited Remote Underwater Video Stations (SBRUVS) • ROV • Towed video survey
Fisheries impact assessment	At least one key parameter: Abundance, catch-rate, stock structure, size structure	Catch and effort for stock assessment
Marine megafauna - reptile	At least one key parameter: species identification, abundance / counts, key behaviour (foraging, mating, nesting, internesting)	As appropriate to the species and behaviour / life stage: • Nesting turtles: ground surveys • In water turtles: vessel and aerial surveys • Sea snakes: manta board and snorkel surveys • Estuarine crocodiles: vessel-based spotlight surveys at night
Marine megafauna- whale sharks, dugong and cetaceans	At least one key parameter: species identification, abundance / counts, key behaviour	Aerial or vessel surveys, acoustic monitoring
Seabirds and shorebirds	At least one key parameter: species present, abundance / counts, behaviour (resting, roosting, foraging, nesting)	Ground surveys and standardised methodology for counting birds

Table 4-2: Assessment criteria for environmental baseline data review

Year of most recent data capture	Duration of monitoring program	Frequency of data capture	Similarity of methods to Joint Industry SMP	Similarity of parameters to Joint Industry SMP
High = 2019–2024	High = >4 years	High = 4+ sampling trips per year	High	High
Medium = 2013–2018	Medium = 2–4 years	Medium = 2–3 sampling trips per year	-	-
Low = <2012	Low = <2 years	Low = one-off sampling trip	Low	Low

Table 4-3: Proposed first-strike monitoring priority locations versus SMPs

Location	SMP									
	Water quality impact assessment	**Sediment quality impact assessment**	**Intertidal and coastal habitat assessment**	**Seabirds and shorebirds**	**Marine megafauna assessment – reptiles**	**Marine megafauna assessment – whale sharks, dugong and cetaceans**	**Benthic habitat assessment**	**Marine fish and elasmobranch assemblages assessment**	**Fisheries impact assessment**	**Heritage and social impact assessment**
Ashmore Reef	First-strike monitoring priority	First-strike monitoring priority	First-strike monitoring priority	First-strike monitoring priority	First-strike monitoring priority	First-strike monitoring priority	First-strike monitoring priority	First-strike monitoring priority	Lower priority for first-strike monitoring (Locations to be determined in consultation with key stakeholders to reflect current fishing zones/effort)	First-strike monitoring priority (Locations to be determined in consultation with key stakeholders)
Cartier Island Marine Park										
Barracouta Shoal			N/A							
Eugene McDermott Shoal										
Fantome Shoal										
Goeree Shoal										
Heywood Shoal										
Jabiru Shoals										
Johnson Bank										
Mangola Shoal										
Pee Shoal										
Vee Shoal										

Location	SMP									
	Water quality impact assessment	**Sediment quality impact assessment**	**Intertidal and coastal habitat assessment**	**Seabirds and shorebirds**	**Marine megafauna assessment – reptiles**	**Marine megafauna assessment – whale sharks, dugong and cetaceans**	**Benthic habitat assessment**	**Marine fish and elasmobranch assemblages assessment**	**Fisheries impact assessment**	**Heritage and social impact assessment**
Vulcan Shoal										
Woodbine Bank										

5. OSM ORGANISATIONAL 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. This system aligns with the international Incident Command System (ICS). The Incident Management Team (IMT) will be responsible for coordinating OSM activities, which will be led by the Planning Section within the IMT, with support from each Section, in particular the Operations Section.

Jadestone IMT structure is shown in Figure 5-1. Where the WA DoT is the Control Agency, the IMT will be managed through coordinated command and Jadestone will still be expected to continue monitoring activities in State waters, with oversight from WA DoT.

Figure 5-2 illustrates the structure of the OSM Management Team during the response phase. The IMT Leader is ultimately accountable for managing the response operation, which includes this plan. Depending on the scale of the event, individual people may perform multiple roles; similarly, multiple people may share the same role.

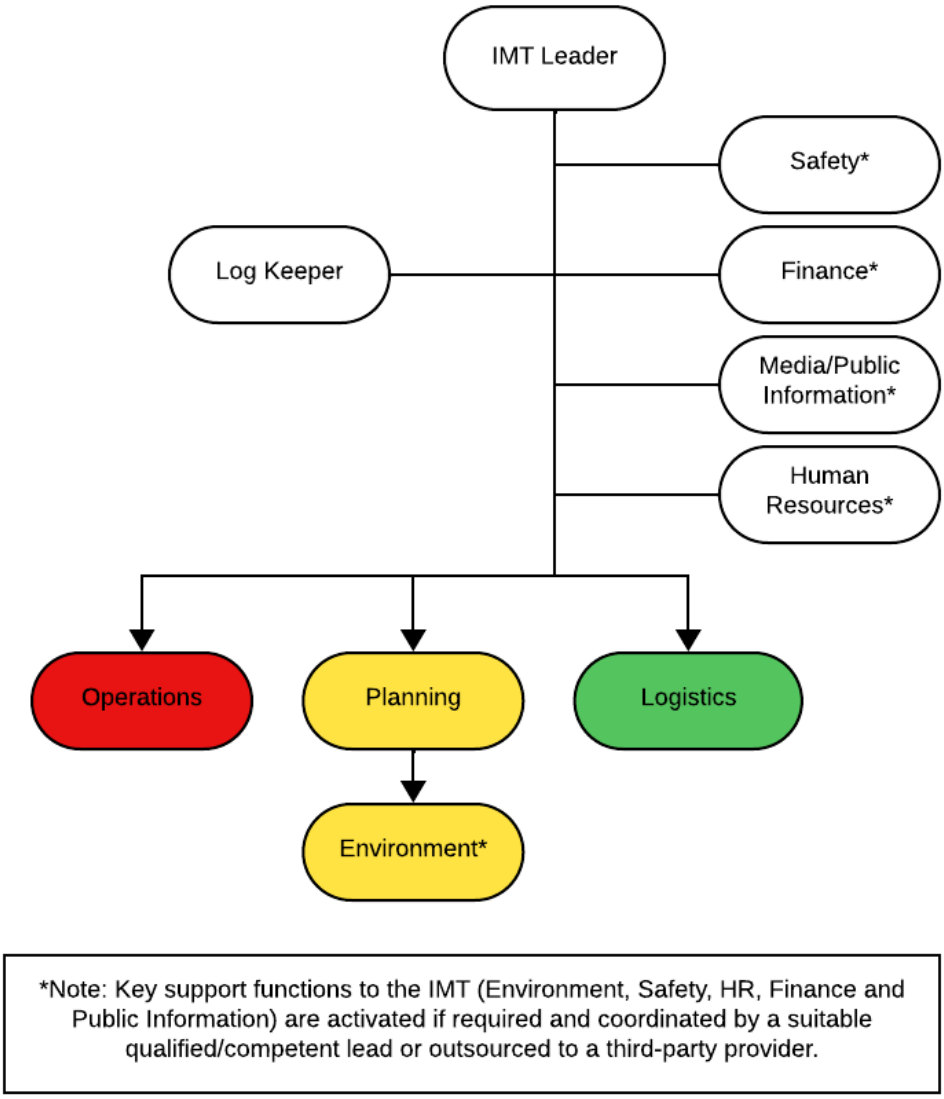

Figure 5-1: Jadestone IMT structure

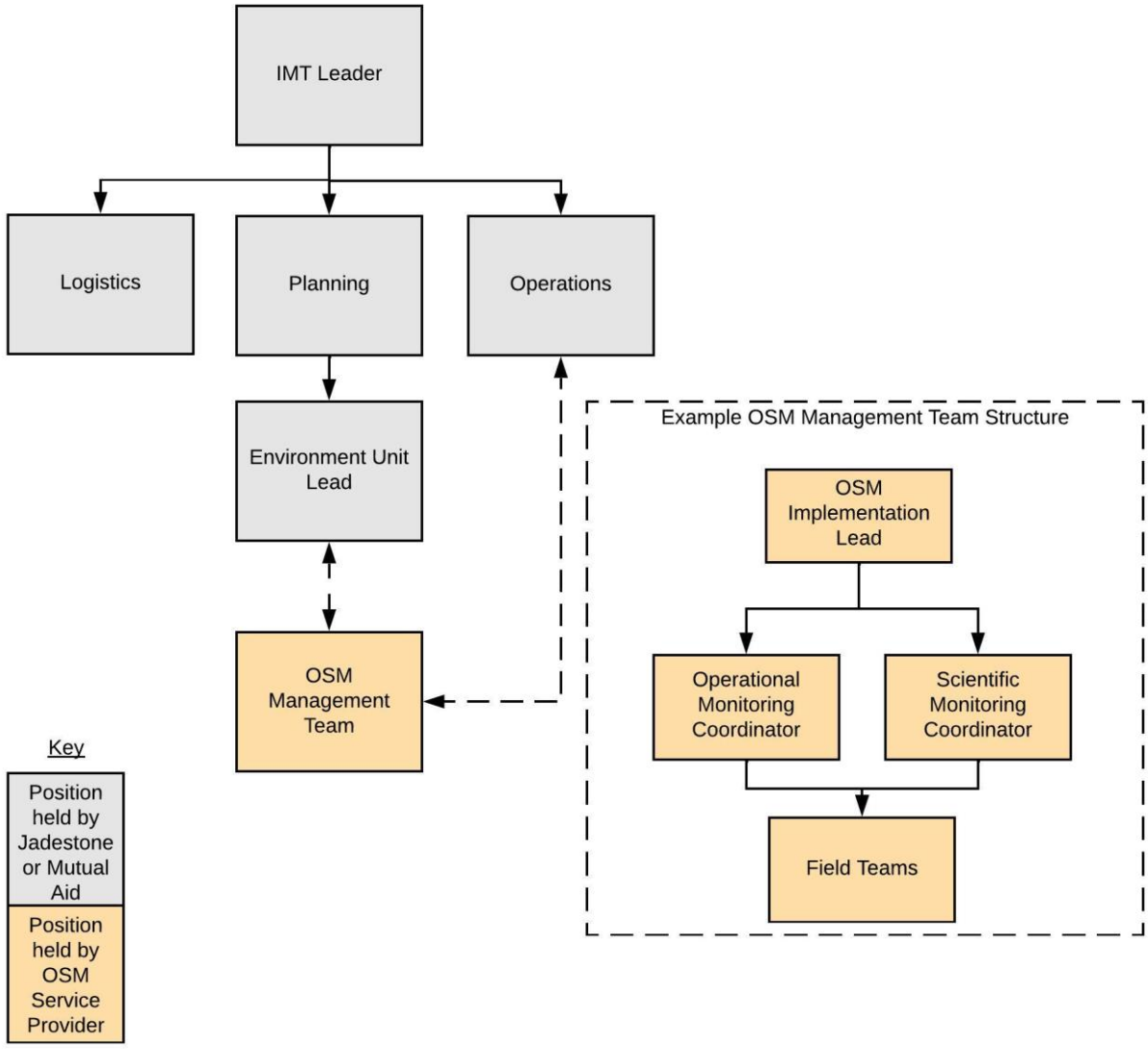

Figure 5-2: Jadestone IMT structure with OSM Team

6. OSM ROLES AND RESPONSIBILITIES

OSM roles and responsibilities are listed in Section 10.13.2 of the Joint Industry OSM Framework. Table 6-1 outlines the key OSM roles held by Jadestone and the OSM Services Provider.

During the post-response phase the Environment Unit Leader and the OSM Services Provider OSM Implementation Lead will continue to be responsible for the coordination and delivery of monitoring plans.

Table 6-1: Roles and responsibilities for OSM

Role	Held by
Environment Unit Lead	Jadestone
OSM Implementation Lead	OSM Services Provider
Operational Monitoring Coordinator and/or Scientific Monitoring Coordinator	OSM Services Provider
OSM Field Operations Manager	OSM Services Provider
OSM Field Teams	OSM Services Provider

7. MOBILISATION AND TIMING OF OMP AND SMP IMPLEMENTATION

Table 7-1 provides an indicative implementation schedule for OMPs and SMPs in the EMBA and adjacent waters. 'Implementation' of an OMP/SMP is defined as being ready, at the point of staging or departure, to mobilise for monitoring. If the monitoring plan is desktop-based, implementation is defined as commencing the work (e.g. computer model inputs). The locations listed are aligned to the initial monitoring priorities described in Section 2.

Due to short contact times, there may be instances where post-spill pre-impact monitoring is not feasible. For these locations, and where baseline data does not exist, or may not be recent and applicable, the application of a BACI (Before-After Control-Impact) design may not be possible. The finalisation of each SMP design will consider this and may need to include alternative designs (e.g. data from an expected BACI design may need to be analysed as an Impact versus Control design and/or Gradient Approach).

Table 7-1: Indicative OMP and SMP implementation schedule for OSM activities if initiation criteria are met

Proximity to spill source	Monitoring type	0–48 hours from OSM activation	Within 72 hours of OSM activation	~5-7 days from OSM activation	Weeks 1-2 from OSM activation	>2 weeks from OSM activation
Spill site and surrounding waters	OM	• Activation of OMP Team Leads. • Finalise OMPs. • Commence activation and mobilisation of OM personnel.	Implement: • OMP: Hydrocarbon Properties And Weathering Behaviour, where resources are available (e.g. Stored at Montara Venture floating production storage and offtake facility). • OMP: Surface Chemical Dispersant Effectiveness and Fate Assessment • OMP: Water Quality Assessment • OMP: Sediment Quality Assessment • Marine Fauna Assessment • OMP: Surface Chemical Dispersant Effectiveness (commencing with Tier 1 SMART Protocol) • Continue to finalise OMPs.	Continued (as per on-going arrangements)	Continued (as per on-going arrangements)	As results from implemented OMPs are available, data are provided to relevant personnel in IMT (e.g. Planning Section) and used in the Incident Action Planning process for the next operational period. OMP is redesigned or reallocated according to the specifics of the actual spill.

Proximity to spill source	Monitoring type	0–48 hours from OSM activation	Within 72 hours of OSM activation	~5-7 days from OSM activation	Weeks 1-2 from OSM activation	>2 weeks from OSM activation
			• Continue to activate and mobilise OM personnel.			
	SM	• Commence activation and mobilisation process. • Activation of SMP Team Leads.	• Continue to activate and mobilise personnel. • Work on finalising SMPs.	Implement: • SMP: Water Quality Impact Assessment • SMP: Sediment Quality Impact Assessment • SMP: Benthic habitat assessment • SMP: Marine Fish and Elasmobranch Assemblages assessment	Continued	Continue SMP monitoring until termination criteria are met
Sensitive receptors where stochastic modelling shows contact within 72 hours (3 days) Skua-11 Crude LOWC spill*: • Barracouta Shoal • Goeree Shoal • Vulcan Shoal MGO/MDO vessel collision spill:	OM	• Activation of OMP Team Leads. • Finalise OMPs. • Commence activation and mobilisation of OM personnel.	Implement: • OMP: Hydrocarbon Properties And Weathering Behaviour at Sea • OMP: Water Quality Assessment • OMP: Sediment Quality Assessment • OMP: Marine Fauna Assessment • Continue to finalise OMPs.	Continued (as per on-going arrangements)	Continued (as per on-going arrangements)	As results from implemented OMPs are available, data are provided to relevant personnel in IMT (Planning Lead) and used in the Incident Action Planning process for the next operational period. OMP is redesigned or reallocated according to the specifics of the actual spill until termination criteria are met

Proximity to spill source	Monitoring type	0–48 hours from OSM activation	Within 72 hours of OSM activation	~5-7 days from OSM activation	Weeks 1-2 from OSM activation	>2 weeks from OSM activation
• Barracouta Shoal • Goeree Shoal • Vulcan Shoal			• Continue to activate and mobilise OM personnel.			
	SM	• Activation of SMP Team Leads and finalisation of SMPs.	• Continue to activate and mobilise personnel. • Work on finalising SMPs.	• SMP: Water Quality Impact Assessment • SMP: Sediment Quality Impact Assessment • SMP: Benthic habitat assessment • SMP: Seabirds and Shorebirds • SMP: Marine Mega-fauna Assessment-cetaceans, Whale Sharks, Dugong • SMP: Marine Fish and Elasmobranch Assemblages assessment • SMP: Commercial and recreational fisheries impact assessment • SMP: Heritage Assessment • SMP: Social Assessment	Continued (as per on-going arrangements)	Continue SMP monitoring until termination criteria are met
Sensitive receptors (including shorelines) where stochastic	OM	-	• Activation of OMP Team Leads.	• Continue to finalise OMPs.	Continued (as per on-going arrangements)	As results from implemented OMPs are available, data are

Proximity to spill source	Monitoring type	0–48 hours from OSM activation	Within 72 hours of OSM activation	~5-7 days from OSM activation	Weeks 1-2 from OSM activation	>2 weeks from OSM activation
modelling shows contact 3-7 days Skua-11 Crude LOWC spill*: • Ashmore Reef • Cartier Island • Eugene McDermott Shoal • Heywood Shoal • Jabiru Shoal • Johnson Bank • Mangola Shoal • Pee Shoal • Vee Shoal • Woodbine Bank MGO/MDO vessel collision spill: • Cartier Island • Jabiru Shoals • Eugene McDermott Shoal			• Commence activation and mobilisation of additional OM personnel.	• Continue to activate and mobilise OM personnel. • OMP: Hydrocarbon Properties And Weathering Behaviour at Sea • OMP: Water Quality Assessment • OMP: Sediment Quality Assessment • OMP: Shoreline clean-up assessment • OMP: Marine Fauna Assessment		provided to relevant personnel in IMT (Planning Lead) and used in the Incident Action Planning process for the next operational period. OMP is redesigned or reallocated according to the specifics of the actual spill until termination criteria are met
	SM	-	• Additional Activation of SMP Team Leads and finalisation of SMPs. • Commence activation and mobilisation of additional SM personnel.	Implement: • SMP: Water Quality Impact Assessment • SMP: Sediment Quality Impact Assessment • SMP: Benthic Habitat Assessment • SMP: Intertidal and Coastal Habitat Assessment • SMP: Seabirds and Shorebirds	Continued (as per on-going arrangements)	Continue SMP monitoring until termination criteria are met

Proximity to spill source	Monitoring type	0–48 hours from OSM activation	Within 72 hours of OSM activation	~5-7 days from OSM activation	Weeks 1-2 from OSM activation	>2 weeks from OSM activation
				• SMP: Marine Mega-fauna Assessment-Reptiles • SMP: Marine Mega-fauna Assessment-Cetaceans, Whale Sharks, Dugong • SMP: Marine Fish and Elasmobranch Assemblages assessment • SMP: Commercial and recreational fisheries impact assessment • SMP: Heritage Assessment • SMP: Social Impact Assessment		

**The receptors listed are based on stochastic modelling, therefore this provides all possible receptors that could be contacted. Deterministic modelling represents a single spill run from the group of stochastic runs to help understand the likely behaviour and impacts of a single simulation of a worst-case spill scenario. Deterministic modelling was undertaken for the Skua-11 Crude LOWC and the run with the most receptors contacted within 7 days for floating oil ≥ 1 g/m² was determined. The maximum number of receptors that could be contacted in 7 days was four (Barracouta Shoal [3.8 days], Woodbine Bank [4.7 days], Johnson Bank [5.5 days] and Ashmore Reef [6.7 days]) (RPS, 2024).*

8. RESOURCE REQUIREMENTS

To guide first-strike resource requirements for OSM, deterministic modelling was undertaken for the surface release of 68,027 m^3 of Skua-11 Crude over 90 days following a LOWC and the run with the most receptors contacted by floating oil ≥1 g/m2 within 7.0 days was selected. Run 91 had the most receptors contacted by floating oil ≥ 1 g/m^2 within 7 days, including Barracouta Shoal, Woodbine Bank, Johnson Bank, and Ashmore Reef; and one additional receptor, Cartier Island, contacted within 7-14 days (RPS, 2024) (Table 8-1).

Jadestone is a member of the OSRL OSM Supplementary Agreement, which provides OSM services for preparedness, activation, and monitoring (Section 9). This service can deploy scientific monitoring personnel within 5-7 days of notification (Table 9-1).

Based on Run 91, considered the worst-case scenario for initial resource requirements, four locations may be affected before scientific monitoring can begin in the field: Barracouta Shoal, Woodbine Bank, Johnson Bank and Ashmore Reef. As a result, post-spill pre-impact monitoring for these locations is unlikely to occur. Table 4-3 indicates a lack of existing baseline data for many of these locations. While baseline data from 2019 exists for Ashmore Reef (Keesing *et al*. 2019), its relevance may be limited at the time of a spill due to the area's high environmental variability caused by warm water events and tropical storms. Given these circumstances, the scientific monitoring (SM) design for these locations will likely require either:

- An Impact versus Control Approach
- A Gradient Approach
- A combination of both approaches

Consequently, at the time of a spill, additional unaffected control locations will need to be identified and monitored for comparison.

The resources required to assist the IMT in the coordination and management of OSM are outlined in Table 8-2. The resources required to implement operational and scientific monitoring components are presented in Table 8-3 and Table 8-4 respectively, which are based on the monitoring priorities in Section 4, the implementation schedule outlined in Table 7-1, and the worst-case deterministic trajectories outlined in Table 8-1, including the resources required for monitoring unaffected control sites.

Table 8-1: Skua-11 LOWC scenario- deterministic trajectory (winter run 91) that resulted in the most receptors contacted by floating oil at ≥1 g/m² within 7 days of the spill commencing (RPS, 2024)

Priority Monitoring Areas	Minimum time to receptor ≥1 g/m² for floating (days)	Minimum time to receptor ≥10 g/m² for shoreline contact (days)	Max accumulated volume (m³) along shoreline ≥10 g/m²	Max length of shoreline (km) with concentration ≥10 g/m²	Minimum time to receptor for 10 ppb entrained	Minimum time to receptor for 10 ppb dissolved
Barracouta Shoal*	3.8	NA	NA	NA	2.8	3.9
Woodbine Bank*	4.7	NA	NA	NA	4.8	8.3
Johnson Bank*	5.5	NA	NA	NA	6.0	10.0
Ashmore Reef	6.7	6.5	479	30	7.5	NC
Cartier Island	NC	9.5	4	8	8.5	NC
Fantome Shoal*	NC	NA	NA	NA	24.5	NC
Vee Shoal*	NC	NA	NA	NA	26.5	NC
Hibernia Reef	33.8	29.5	27	15	31.2	NC

**Submerged receptor*

NA = not applicable as receptor is submerged

NC = no contact

Table 8-2: Resources required for key OSM coordination roles

Role	Resources required	Arrangement
OSM Implementation Lead (OSM Services Provider)	1 x OSM Implementation Lead	Oil Spill Response Limited (OSRL) OSM Supplementary Service Agreement
Operational Monitoring Coordinator and Scientific Monitoring Coordinator (OSM Services Provider)	1 x Operational Monitoring Coordinator 1 x Scientific Monitoring Coordinator	
OSM Field Operations Manager (OSM Services Provider)	1 x OSM Field Operations Manager	

Table 8-3: Resources required for initially implementing OMPs#

OMP	Resources Required (Week 1-2)	Arrangement
Hydrocarbon properties and weathering behaviour at sea*	1 team (spill site and surrounds including shoals in vicinity) 2 teams (Ashmore Reef, Cartier Island and surrounding shoals and banks) Total 3 teams	OSRL OSM Supplementary Service Agreement Marine contractors Laboratory arrangements
Shoreline clean-up assessment	2 teams (Ashmore Reef and Cartier Island)	Australian Marine Oil Spill Centre (AMOSC) Master Services Agreement (MSA) and/or OSRL Service Level Agreement (SLA) Marine contractors State Response Teams and AMSA National Response Team
Surface chemical dispersant effectiveness and fate	1 team for visual observations, which may be performed by trained aerial observers used during monitor and evaluate if trained in observation and verification of chemical dispersant effectiveness For water quality observations, refer to OMP: Water quality assessment	OSRL OSM Supplementary Service Agreement AMOSC MSA Marine contractors
Water quality assessment*	Refer to OMP: Hydrocarbon properties and weathering behaviour at sea resourcing* (all sites)	OSM contractor

OMP	Resources Required (Week 1-2)	Arrangement
		Marine contractors
Sediment quality assessment*	Refer to OMP: Hydrocarbon properties and weathering behaviour at sea resourcing* (all sites)	OSRL OSM Supplementary Service Agreement Marine contractors
Marine fauna assessment	1 team to conduct initial aerial surveys for all sites (2 observers per aircraft) Note: Fauna related SMPs are likely to be initiated simultaneously or following aerial assessment with vessel and ground based fauna surveys carried out as part of the relevant fauna SMP.	OSRL OSM Supplementary Service Agreement Marine contractors Aviation contractors

 # Specific locations are mentioned for planning and guidance purposes based on a worst case planning approach. In the event of an actual spill, other locations and/or receptors may be contacted. This would be identified and managed as part of implementation as per the guidance in Section 13.

** Initial co-mobilisation between OMP: Hydrocarbon properties and weathering behaviour at sea, OMP: Surface chemical dispersant effectiveness and fate, OMP: Water quality assessment and OMP: Sediment quality assessment*

Table 8-4: Resources required for initially implementing SMPs[#]

SMP	Resources Required (Week 1 -2)	Arrangement
Water quality impact assessment	1 team (spill site and surrounds) 2 teams (Ashmore Reef, Cartier Island and surrounding shoals and banks) 1 team (control site(s)) Total 4 teams Note: can initially be performed by the same team as OMP: Water quality assessment. This SMP may replace OMP: Water quality assessment if the OMPs termination criteria are triggered	OSRL OSM Supplementary Service Agreement Marine contractors Laboratory arrangement
Sediment quality impact assessment	Refer to SMP: Water quality impact assessment* (all sites)	OSRL OSM Supplementary Service Agreement Marine contractors Laboratory arrangement
Intertidal and coastal habitat assessment	1-2 teams (Ashmore Reef and Cartier Island) 1 team (control site(s)) Total 2-3 teams	OSRL OSM Supplementary Service Agreement Marine contractors Laboratory arrangement
Seabirds and shorebirds	1 team to conduct aerial surveys for all sites for all fauna (Can initially be performed by the same aerial team as OMP: Marine fauna assessment) 1 teams to conduct vessel-based surveys for all impacted sites 1 team to conduct vessel-based survey at control site(s) Total 2 vessel-based teams (surveys would include all fauna [birds, reptiles, cetaceans, dugong and whale shark]) 2 teams to conduct ground-based surveys at Ashmore Reef and Cartier Island 1 team to conduct ground-based surveys at control site(s) Total 3 ground based teams (at least 1 experienced ornithologist per team)	OSRL OSM Supplementary Service Agreement Marine contractors Laboratory arrangement

SMP	Resources Required (Week 1 -2)	Arrangement
	This SMP may replace the relevant OMP: Marine fauna assessment if the OMPs termination criteria are triggered	
Marine mega-fauna assessment -whale shark, dugong and cetaceans	Aerial surveys refer to SMP: Seabirds and shorebirds Vessel surveys refer to SMP: Seabird and shorebirds This SMP may replace the relevant OMP: Marine fauna assessment if the OMPs termination criteria are triggered	OSRL OSM Supplementary Service Agreement Marine contractors Laboratory arrangement
Marine mega-fauna assessment – reptile	Aerial surveys refer to SMP: Seabirds and shorebirds Vessel surveys refer to SMP: Seabird and shorebirds Ground based survey refer to SMP: Seabird and shorebirds (including 1 member experienced with ground turtle surveys) This SMP may replace the relevant OMP: Marine fauna assessment if the OMPs termination criteria are triggered	OSRL OSM Supplementary Service Agreement Marine contractors Laboratory arrangement
Benthic habitat assessment	2-3 teams (all impacted sites) 1 team (control sites) Total 3-4 teams	OSRL OSM Supplementary Service Agreement Marine contractors Laboratory arrangement
Marine fish and elasmobranch assemblages assessment	2-3 teams (all impacted sites) 1 team (control sites) Total 3-4 teams	OSRL OSM Supplementary Service Agreement Marine contractors Laboratory arrangement
Fisheries impact assessment	1 team	OSRL OSM Supplementary Service Agreement Marine contractors Laboratory arrangement
Heritage features assessment	1 team	OSRL OSM Supplementary Service Agreement Marine contractors Laboratory arrangement

SMP	Resources Required (Week 1 -2)	Arrangement
Social impact assessment	1 team	OSRL OSM Supplementary Service Agreement

 # Specific locations are mentioned for planning and guidance purposes based on a worst case planning approach. In the event of an actual spill, other locations and/or receptors may be contacted. This would be identified and managed as part of implementation as per the guidance in Section 13.

** Initial co-mobilisation between SMP: Water quality impact assessment and SMP: Sediment quality impact assessment.*

9. CAPABILITY ARRANGEMENTS

Jadestone is a Member to the OSRL OSM Supplementary Service Agreement, which provides OSM Annual Services and Response Services to members who have subscribed to this supplementary service. This OSM Supplementary Service Agreement includes access to OSRL's sub-contracted Monitoring Service Providers in Australia and internationally (who will report through OSRL) to deliver monitoring capability.

Details of OSM services are provided in Table 9-1. Jadestone will maintain responsibility for implementing OMP: Air Quality Modelling (responder health and safety).

OSRL (referred to as the OSM Services Provider in this BIP), via the OSM Supplementary Service Agreement is contracted to provide Members with a monthly Capability Register, which details personnel requirements for OMPs/SMPs, numbers of available personnel and competencies for service provider and sub-contracted personnel.

Personnel listed on the monthly update are accessible following a Member's initial activation of OSM Services.

Table 9-1: OSM services provider preparedness and activation / monitoring services

Preparedness[1]
24/7 Duty Manager accessed through 24 hr. hotline
Provision of suitably trained operational monitoring personnel
Monthly reports on personnel and equipment availability
Access to OSM Services Provider's sub-contracted Monitoring Service Providers
Access to OSM Services Provider's network of laboratories and equipment providers
Activation / Monitoring[2]
Provision of an OSM Services Lead and OSM Implementation Lead to the Jadestone IMT within 12 hours of notification
Provision of a first-strike monitoring team within 72 hours of notification, ready to deply from a nominated port(s) or staging location (e.g. Forward Operating Base [FOB])
Assisting Jadestone in finalisation of monitoring plans
Provision of scientific monitoring personnel within 5-7 days of notification
Access to OSM Services Provider personnel and equipment

9.1 Personnel Competencies

The OSRL OSM Supplementary Service Agreement specifies the training and competency requirements for key OSM personnel consistent with the Joint Industry OSM Framework.

In addition and where practicable, Jadestone will engage its consultants in the initial stages of the monitoring program to help activate and mobilise monitoring teams and support the OSM Services Provider in the finalisation of monitoring designs.

[1] Defined as Annual OSM Services in OSM Supplementary Service Agreement

[2] Defined as Response Services in OSM Supplementary Service Agreement

9.2 Equipment

Equipment requirements are listed in the individual OMPs and SMPs. A generalised breakdown of equipment types and the source is listed in Table 9-2.

In accordance with the OSRL OSM Supplementary Service Agreement, the OSM Services Provider will provide all specialised field monitoring equipment to implement individual OMPs and SMPs. Jadestone will remain responsible for support and field logistics, including monitoring platforms (e.g. vessels, vehicles and aircraft), flights and accommodation for personnel and transportation / couriers for samples to be sent back to laboratories.

Availability of key equipment will be listed in the OSM Services Provider's Equipment Register.

Table 9-2: OSM equipment

Equipment type	Source
Jadestone equipment:	
Desktop equipment (e.g. Oil Spill Response Atlas, GIS)	Geospatial Support coordinated through IMT
Logistical equipment (e.g. in-field accommodation, vessels, aircraft)	Marine contracts, aviation contracts coordinated through IMT
OSM Services Provider Equipment:	
In-field specialised monitoring equipment (e.g. fluorometers, sample bottles, ROVs)	Coordinated through the OSM Services Provider's OSM response and implementation services

9.3 Exercises

The OSM Services Provider, via the OSM Supplementary Service Agreement, is contracted to maintain an OSM Services Annual Assurance Program. As part of this program, the OSM Services Provider conducts a number of different exercise types, which are outlined in Table 9-3. The purpose of this testing is to confirm that the response arrangements and capability in place are available when needed and function as intended. Following the Notification and Tabletop excises listed in Table 9-3, the OSM Services Provider will prepare exercise reports and track any action items to completion.

In addition, Jadestone will conduct an annual notification test of the OSM Services Provider, outlined in the Incident Management Exercise and Testing Program (JS-70-PR-F-00001).

Table 9-3: Exercise types

Exercise Type	Description	Frequency
Assurance Program Workshop	The outputs from the annual OSM Services and Assurance Program Workshop will form the basis of the OSM Annual Services and Assurance Program for the coming Contract Year.	Annually
Notification exercise	Test procedures to notify and activate the OSM Services, including subcontracted monitoring service providers.	Annually
Tabletop exercise	A discussion-based exercise that involves no physical deployment of personnel or equipment. The exercise will simulate all actions to validate the enactment of plans, procedures, protocols, roles and tasks during a simulated incident.	Annually
Desktop review	A desktop review of capability for any OMP and/or SMP not tested during the annual table-top exercise. The review can also be based on the outcomes/findings of the OMPs and/or SMPs that were tested.	Annually

10. CAPABILITY ASSESSMENT

Table 10-1 provides a comparison of Jadestone's worst-case capability requirements (as outlined in Table 8-3 and Table 8-4) with the OSRL OSM Supplementary Service Agreement capability to implement each OMP and SMP. Where there are synergies between OMPs and SMPs, the same personnel may implement multiple OMPs/SMPs simultaneously, as identified in Table 10-1. For example, personnel assigned to the OMP for Hydrocarbon Properties and Weathering Behaviour at Sea can also carry out the OMPs for Water Quality Assessment and Sediment Quality Assessment concurrently.

Table 10-1: OSM capability

Component	Total Personnel Required (Weeks 1–2) [3]	Personnel available via OSM Service Provider Contract	Personnel available via OSROs	Total Personnel Available[#]
OSM Personnel embedded in IMT	1 OSM Implementation Lead 1 OM Coordinator 1 SM Coordinator 1 Field Operations Manager	1 OSM Implementation Lead 1 OM Monitoring Coordinator 1 SM Coordinator 1 Field Operations Manager	-	1 OSM Implementation Lead 1 OM Monitoring Coordinator 1 SM Coordinator 1 Field Operations Manager
OMPs				
Hydrocarbon properties and weathering behaviour at sea*	3 teams	7 teams	-	7 teams
Shoreline clean-up assessment	2 teams (Ashmore Reef and Cartier Island)	18 OSRL	60 + AMOSC Core Group 12 AMOSC staff trained in SCAT	60 + AMOSC Core Group 12 AMOSC staff 18 OSRL
Surface chemical dispersant effectiveness and fate (relevant only to a spill involving Skua crude)	Visual observations: 1 team For water quality assessment – refer to SMP: Water quality assessment	1 visual observation team	4 AMOSC Staff 2 AMOSC Core Group trained personnel	Visual observations: 1 team 4 AMOSC Staff 2 AMOSC Core Group trained personnel

[3] If additional resources are required for week 3 onwards then this will be identified early in the monitoring process and Jadestone will activate additional contracted resources through its OSM Services Provider to increase capacity

Component	Total Personnel Required (Weeks 1–2) [3]	Personnel available via OSM Service Provider Contract	Personnel available via OSROs	Total Personnel Available[#]
Water quality assessment*	Refer to OMP: Hydrocarbon properties and weathering behaviour at sea			
Sediment quality assessment*	Refer to OMP: Hydrocarbon properties and weathering behaviour at sea			
Marine fauna assessment (reptiles, cetaceans, dugongs, seabirds and shorebirds, fish)	1 aerial team (including 1 Marine Mammal Observer (MMO) and 1 Aerial survey observer)	2 teams	-	2 teams
SMPs				
Water quality impact assessment	4 teams Note: can initially be performed by the same team as OMP: Water quality assessment. This SMP may replace OMP: Water quality assessment if the OMPs termination criteria are triggered	7 teams	-	7 teams
Sediment quality impact assessment	Refer to SMP: Water quality impact assessment*			
Intertidal and coastal habitat assessment	2-3 teams	6 teams	-	6 teams
Seabirds and shorebirds	1 aerial team (Can initially be performed by the	2 aerial teams	-	2 aerial teams

Component	Total Personnel Required (Weeks 1–2) [3]	Personnel available via OSM Service Provider Contract	Personnel available via OSROs	Total Personnel Available[#]
	same aerial team as OMP: Marine fauna assessment)			
	2 vessel teams (surveys would include all fauna [birds, reptiles, cetaceans, dugong and whale shark])	6 vessel teams	-	6 vessel teams
	3 ground teams (including 1 experienced ornithologist per team)	6 ground based teams	-	6 ground based teams
Marine mega-fauna assessment – whale shark, dugong and cetaceans	Aerial and vessel- Refer to SMP: seabirds and shorebirds			
Marine mega-fauna assessment – reptiles	Aerial and vessel - Refer to SMP: seabirds and shorebirds Ground surveys - Refer to SMP: seabirds and shorebirds (plus 1 team member per team experienced with ground turtle surveys)			
Benthic habitat assessment	3-4 teams	7 teams	-	7 teams
Marine fish and elasmobranch assemblages assessment	3-4 teams	7 teams	-	7 teams
Fisheries impact assessment	1 team	2 teams	-	2 teams

Component	Total Personnel Required (Weeks 1–2) [3]	Personnel available via OSM Service Provider Contract	Personnel available via OSROs	Total Personnel Available[#]
Heritage features assessment	1 team (including either ROV operator or marine diver/s)	1 team	-	1 team
Social impact assessment	1 team	1 team	-	1 team

** Initial co-mobilisation between OMP: Hydrocarbon properties and weathering behaviour at sea, OMP: Water quality assessment and OMP: Sediment quality assessment*

[#] During capability assessment, available personnel were allocated to one monitoring team only

11. REVIEW OF PLAN

As part of the Environment Plan review cycle, this document will be reviewed annually and revised, if required, in accordance with Jadestone's Management of Change Procedure (JS-90-PR-G-00017). This could include changes required in response to one or more of the following:

- When major changes have occurred which affect Operational and/or Scientific Monitoring coordination or capabilities (e.g. change of services providers);
- Changes to the activity that affect Operational and/or Scientific Monitoring coordination or capabilities (e.g. a significant increase in spill risk);
- Changes to legislative context related to Operational and/or Scientific Monitoring (e.g. *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) protected maters requirements);
- Following routine testing of the OSM if improvements or corrections are identified; or
- After a Level 2/3 spill incident.

The extent of changes made to this OSM Bridging Implementation Plan and resultant requirements for regulatory resubmission will be informed by the relevant Commonwealth regulations, i.e. the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS (E) Regulations).

PART B – IMPLEMENTATION

CONTROL AGENCIES AND JURISDICTIONAL AUTHORITIES

Section 2 of the SKUA-11 ST1 Well Drilling OPEP (TM-50-PLN-I-00006) provide detailed information on Control Agency responsibilities, and should be referred to when planning operational and scientific monitoring activities, particularly in WA State Waters and along WA shorelines. Where the WA DoT is the Control Agency, OMP: Shoreline Clean-up Assessment will be implemented under their direction, with resources provided by Jadestone.

In addition, Section 9 of the SKUA-11 ST1 Well Drilling OPEP (TM-50-PLN-I-00006) provides regulatory and stakeholder notification and reporting requirements. Whilst all notification and reporting will be performed by Jadestone IMT personnel, monitoring personnel should be aware of these requirements, and confirm all relevant notifications and reporting have been completed prior to undertaking monitoring activities.

The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) are the designated Jurisdictional Authority for all spills that contact the shorelines within Ashmore Reef AMP and Cartier Island AMP; the Jadestone IMT (as Control Agency for Commonwealth waters) will liaise with DCCEEW to direct resources for the purposes of shoreline assessment (and clean-up) activities.

12. MOBILISATION AND ACTIVATION PROCESS

Jadestone's IMT Planning Lead is responsible for activating OSM components, subject to approval from the IMT Leader. Table 12-1 outlines the Jadestone OSM activation process.

Table 12-1: OSM activation process

Responsibility	Task	Timeframe	Complete
Environment Unit Lead (Jadestone)	Review initiation criteria of OMPs and SMPs (provided in Table 9-1 (OMPs) and Table 9-2 (SMPs) of the Joint Industry Operational and Scientific Monitoring Framework) during the preparation of the initial Incident Action Plan (IAPs) and subsequent IAPs; and if any criteria are met, activate relevant OMPs and SMPs	Within 4 hours of spill notification	☐
	Obtain approval from Incident Commander to activate OSM Services Provider	Within 4 hours of spill notification	☐
	Contact OSM Services Provider and verbally notify their Duty Manager of the incident, requesting provision of OSM Implementation Lead to the IMT. Complete Call Off Order Form (Appendix D) and submit to OSM Services Provider[4] to confirm activation of OSM Services	Within 4 hours of spill notification	☐
	Provide monitor and evaluate data (e.g. aerial surveillance, fate and weathering modelling, tracking buoy data, current IAPs) to OSM Services Provider	Within 1 hour of data being received by IMT	☐
	Liaise directly with Jadestone's Logistics Lead to identify potential staging and departure location/s for monitoring activities. Provide this information to OSM Services Provider	Within 4-6 hours of spill notification	☐
	Record tasks in Personal Log	At time of completion of task	☐
Logistics Lead (Jadestone)	Commence arrangements for vessels, accommodation and transport to mobilise monitoring teams	Within 24 hours of spill notification	☐
OSM Services Provider	Duty Manager to activate relevant Sub-Contracted Monitoring Service Providers	Within 30 minutes of Call Off Order Form being received by OSM Services Provider	☐
	OSM personnel (OSM Implementation Lead and OM/SM Coordinators) requested by Jadestone (via Call Off Order Form) to be sent to Jadestone's IMT	Within 12 hours of notification being made to OSM Services Provider	☐
	Liaise directly with Environment Unit Lead to confirm which OMPs and SMPs are to be fully activated	Within 4 hours of monitor and evaluate data being received from IMT	☐

[4] A copy of the Call Off Order Form is provided in Appendix D however a copy of the Call-off Order Form will also be available via OSRL Duty Manager upon request.

Responsibility	Task	Timeframe	Complete
	Confirm availability of initial personnel and equipment resources	Within 5 hours of monitor and evaluate data being received from IMT	☐

13. FIRST-STRIKE MONITORING PRIORITIES

As described in Section 2 and Section 4, the available stochastic spill trajectory modelling, in conjunction with a desk has been analysed to understand the likely initial monitoring priorities for its activities in the EMBA. In addition, Table 4-3 lists comparability of available baseline data for receptors, to assist in identifying where post-spill, pre-impact monitoring should be prioritised.

The monitoring priorities provided in Section 2 and Table 4-3 are to be used for guidance when confirming monitoring priorities in consultation with key stakeholders and sub-contracted Monitoring Service Providers (including subject matter experts, where available) at the time of the spill. Table 13-1 provides a checklist to assist in the confirmation of monitoring priorities for individual spills.

Table 13-1: Checklist for determining monitoring priorities

Responsibility	Task	Timeframe	Complete
Environment Unit Lead (Jadestone)	Evaluate monitoring priorities in consultation with key stakeholders, including the appointed State/Territory Environmental and Scientific Coordinator	Within 12 hours of monitor and evaluate data being received from IMT	☐
Environment Unit Lead (Jadestone) with input from OSM Services Provider	Confirm monitoring locations for activated OMPs and SMPs based on: • Current monitor and evaluate data (i.e. situational awareness data, including predicted time to receptor impact, aerial/vessel surveillance observations, tracking buoy data, satellite data); • First-strike monitoring locations identified in Section 4; • Nature of hydrocarbon spill (i.e. subsea blow out, surface release, hydrocarbon characteristics, volume, expected duration of release); • Seasonality and presence of receptors impacted or at risk of being impacted; • Current information on transient and broadscale receptors (surface and subsea); • Current operational considerations (e.g. weather, logistics); • Monitoring priorities identified in Section 2; and Section 4. • Existing literature, baseline data, and monitoring programs.	Within 12 hours of monitor and evaluate data being received from IMT	☐
	Using the results of the baseline data analysis in Table 4-3 and the information above, determine first-strike priority locations for post-spill, pre-impact monitoring	Within 12 hours of monitor and evaluate data being received from IMT	☐
	Confirm the need for any additional reactive baseline monitoring data for SMPs and determine suitable locations, noting that suitable control or reference sites may be outside of the EMBA	Within 12 hours of monitor and evaluate data	☐

Responsibility	Task	Timeframe	Complete
		being received from IMT	
	Continually re-evaluate monitoring priorities in consultation with Environment Unit Lead and relevant key stakeholders throughout spill response and relevant key stakeholders throughout spill response	Ongoing	☐

14. PROTECTED MATTERS REQUIREMENTS

Table 14-1 provides a checklist to ensure monitoring personnel consider EPBC Act Protected Matters (Matters of Environmental Significance) and other protected matters requirements in the finalisation of OMPs and SMPs.

Appendix C outlines the management plans, recovery plans and conservation advice statements relevant for the Protected Matters within the EMBA that are likely to be relevant to the final design of the OMPs and SMPs.

Table 14-1: Checklist for inclusion of protected matters into monitoring designs

Responsibility	Task	Complete
Environment Unit Lead with input from OSM Services Provider	Review Monitoring, Evaluation and Surveillance data and available OMP data to determine likely presence and encounter of protected species in predicted trajectory of the spill	☐
	Review the relevant recovery plan/conservation advice/management plan in Appendix C and determine if there have been any updates to the relevant conservation threats/actions. Integrate relevant considerations into the final monitoring design for affected OMPs and SMPs	☐
	Review restrictions on marine mammal buffer distances in SMP: Marine mega-fauna and ensure this is included in all relevant response and monitoring IAPs (e.g. Shoreline Protection Plan, Shoreline Clean-up Plan, OSM Plan), so that response and monitoring field teams maintain required buffer distances from fauna during operations	☐

15. FINALISING MONITORING DESIGN

The methods presented in the Joint Industry OMPs and SMPs are designed to allow the OSM Services Provider and their sub-contracted Monitoring Service Providers with the flexibility to modify the standard operating procedures, so that the latest research, technologies, equipment, sampling methods and variables may be used. Monitoring designs may also be varied in-situ, according to the factors presented in Section 10.6 of the Joint Industry OSM Framework.

Jadestone's checklist for finalising monitoring designs post-spill is provided in Table 15-1. The Environment Unit Lead and OSM Implementation Lead will be responsible for approving the finalised monitoring design used in the OMPs and SMPs.

Table 15-1: Checklist for finalising monitoring design

Responsibility	Task	Timeframe	Complete
Environment Unit Lead (Jadestone) and OSM Implementation Lead with input from OSM Services Provider	Confirm survey objectives, sampling technique, for each initiated OMP and SMP	Within 48 hours of initial monitoring priorities being confirmed by IMT	☐
	Determine suitable sampling frequency	Within 48 hours of initial monitoring priorities being confirmed by IMT	☐
	Finalise standard operating procedures	Within 48 hours of initial monitoring priorities being confirmed by IMT	☐
	Review Table 10-4 of the Joint Industry OSM Framework to ensure potential impacts from response activities are considered and incorporated into relevant OMP/SMP designs	Prior to the finalisation of monitoring designs	☐
	Liaise with Environment Unit Lead (Jadestone) to review the Environmental Performance Standards listed in the SKUA-11 ST1 Well Drilling OPEP (TM-50-PLN-I-00006) and integrate checks into the monitoring design that will help determine if relevant Environmental Performance Standards are being met	Prior to the finalisation of monitoring designs	☐
	Scientific monitoring: • Establish benchmarks and guidelines to be used • Confirm indicator species • Confirm parameters and metrics	Within 96 hours of initial monitoring priorities being confirmed by IMT	☐

16. MOBILISATION OF MONITORING TEAMS

When the monitoring design has been finalised for each OMP and SMP, the OSM Services Provider shall work in conjunction with Jadestone to develop and execute a monitoring mobilisation plan, which will be incorporated into the Incident Action Planning process.

The OSM Services Provider will be required to coordinate the availability of personnel and equipment for all monitoring programs. Jadestone will be responsible for flights, accommodation and victualing for field personnel. Jadestone will also be required to procure all vessels, aerial platforms and vehicles for OMP and SMP implementation.

A checklist for mobilising monitoring teams is provided in Table 16-1.

Table 16-1: Checklist for mobilisation of monitoring teams

Responsibility	Task	Complete
OSM Services Provider with input from Environment Unit Lead (Jadestone)	Confirm availability of all monitoring personnel (noting required competencies in Section 9.1 and individual OMPs/SMPs)	☐
	Allocate number of teams, personnel, equipment and supporting resource requirements	☐
	Undertake HAZIDs as required and consolidate/review field documentation including safety plans, emergency response plans, and daily field reports	☐
	Develop site-specific health and safety plans which are compliant with health safety and environment systems (including call in timing and procedures)	☐
	Conduct pre-mobilisation meeting with monitoring team/s on survey objectives, logistics, safety issues, reporting requirements and data management collection requirements	☐
	Determine data management delivery needs of the IMT and process requirements, including data transfer approach and frequency/timing	☐
	Confirm data formats and metadata requirements with personnel receiving data	☐
	Logistics	
	Confirm Jadestone Logistics have arranged flights, accommodation, and car hire arrangements are in place	☐
	Develop field survey schedules, detailing staff rotation	☐
	Equipment	
	Confirm Jadestone Logistics have arranged survey platforms (vessel, vehicle, aircraft) as required to survey or access survey sites and ensure they are equipped with appropriate fridge and freezer space for transportation of samples (and carcasses if collecting)	☐
	Confirm Jadestone Logistics have arranged vessels with correct fit-out specifications (e.g. winches, Geographic Positioning System (GPS), satellite, deck crane, sufficient deck space, water supplies [fresh and/or salt], accommodation)	☐
	Confirm consumables (including personal protective equipment) have been purchased and will be delivered to required location	☐

Responsibility	Task	Complete
	Liaise with NATA-accredited laboratories to confirm availability, limits of detection, sampling holding times, transportation, obtain sample analysis quotes and arrange provision of appropriate sample containers, Chain of Custody (CoC) forms and suitable storage options for all samples. Make arrangements for couriers (if necessary)	☐
	Confirm specialist equipment requirements and availability (including redundancy)	☐
	Check GPS units and digital cameras are working and that sufficient spare batteries and memory cards are available	☐
	Confirm sufficient equipment to allow integration of survey software and navigational systems (e.g. GPS, additional equipment and adaptors), and additional GPS units prepared	☐
	Confirm GPS survey positions (where available) have been Quality Assurance and Quality Control (QA/QC) checked and pre-loaded into navigation software/positioning system	☐
	Check field laptops, ensuring they have batteries (including spares), power cable, and are functional	☐
	Check if a first aid kit or specialist Personal Protective Equipment (PPE) is required	☐
	Confirm arrangements for freight to mobilisation port is in place	☐

17. PERMITS AND ACCESS REQUIREMENTS

Permit and access requirements apply to Marine Parks, Marine Protected Areas, restricted heritage areas, operational areas of industrial sites, defence locations, certain fauna and managed fisheries. Table 17-1 lists relevant protected areas within the EMBA and the jurisdictional authority to be contacted to obtain the necessary permit or access permission.

The OSM Services Provider will work with Jadestone to request access and permit applications to all relevant Jurisdictional Authorities to conduct monitoring for OMPs and SMPs.

Table 17-1: Permits required in EMBA

Receptor	Location	Jurisdictional Authority	Relevant information on permits
Permits for monitoring fauna	N/A	Department of Climate Change, Energy, the Environment and Water (DCCEEW) WA Department of Biodiversity, Conservation and Attractions (DBCA) NT Parks and Wildlife	Any interactions involving nationally listed threatened fauna may require approval from DCCEEW (http://www.environment.gov.au/biodiversity/threatened/permits) WA- appropriate permits can be found at: https://www.dbca.wa.gov.au/licences-and-permits/fauna NT- permits can be found at: https://nt.gov.au/environment/animals/wildlife-permits/permits-take-interfere-with-wildlife
State Marine Protected Areas	• North Kimberley • Rowley Shoals • Scott Reef Nature Reserve • Lalang-garram/ Camden Sound Marine Park/North Lalang-garram Marine Park	DBCA	No specific permitting requirements exist for monitoring in WA marine protected areas, but additional information is available at: https://www.dbca.wa.gov.au/management/marine-planning
Ramsar wetland	• Ashmore Reef Nature Reserve • Hosnies Spring (Christmas Island) • The Dales (Christmas Island)	DCCEEW	Additional information on Ramsar wetlands and how they are protected as a matter of national environmental significance under the EPBC Act is available at: https://www.environment.gov.au/epbc/what-is-protected/wetlands
Australian (Commonwealth) Marine Parks	• Cartier Island • Argo-Rowley Terrace • Ashmore Reef	Director of National Parks Parks Australia	Permit and licence application information for Marine Protected Areas (including monitoring) can be found at: https://onlineservices.environment.gov.au/parks/australian-marine-parks and https://onlineservices.environment.gov.au/parks/australian-marine-parks/permits

Receptor	Location	Jurisdictional Authority	Relevant information on permits
	• Christmas Island • Kimberley • Oceanic Shoals		Additional information on permitting requirements in Australian Marine Parks can be obtained through Parks Australia via email marineparks@environment.gov.au or phone 1800 069 352 Information on permits to access biological resources in Commonwealth areas can be found at: http://www.environment.gov.au/topics/science-and-research/australias-biological-resources/access-biological-resources-commonwealth Due to the risk posed by unexploded ordnances, landing on Cartier Island or anchoring anywhere within the Cartier Island Marine Park is strictly prohibited without express prior written approval. If anchoring is unavoidable due to emergency (e.g. extreme weather conditions), great care should be taken to ensure anchoring is on sand, and anchors do not drag. Any metal objects or suspicious objects found in the reserve should not be touched or disturbed and reported immediately to the police and the Parks Australia Work Health and Safety Advisor on 02 6274 2369 or ParksHealthAndSafety@dcceew.gov.au.
State/Territory Managed Fisheries	• Mackerel Managed Fishery (WA) • Norther Demersal Scalefish Managed Fishery (WA) • Northern Shark Fishery (WA) • Pearl Oyster (WA) • Kimberley Prawn (WA) • Kimberley Crab (WA) • Specimen Shell (WA) • Abalone (WA) • South-West Coast Salmon (WA)	WA Department of Primary Industries and Reginal Development (DPIRD) NT Department of Industry, Tourism and Trade (DITT)	No specific permitting requirements exist for WA Fisheries, but additional information is available at – https://www.fish.wa.gov.au/Fishing-and-Aquaculture/Pages/default.aspx No specific permitting requirements exist for NT Fisheries, but additional information is available at – https://industry.nt.gov.au/industries/fisheries

Receptor	Location	Jurisdictional Authority	Relevant information on permits
	• Broome Prawn Managed Fishery (WA) • Nichol Bay Prawn (WA) • Marine Aquarium Fish Managed Fishery (WA) • Pilbara Line (WA) • Pilbara Trap (WA) • Pilbara Trawl (WA) • Trochus (WA) • West Coast Deep Sea Crustacean (WA) • Aquarium Fishery (NT) • Demersal Fishery (NT) • Off-shore Net and Lines Fisheries (NT) • Spanish Mackerel Fishery (NT) • Timor Reef Fishery (NT)		
Commonwealth Managed Fisheries	• Western Tuna and Billfish Fishery • Southern Bluefin Tuna	Australian Fishing Management Authority	Commonwealth Managed Fisheries (scientific permit for research/monitoring in an Australian Fishing Zone) https://www.afma.gov.au/fisheries-services/fishing-rights-permits

Receptor	Location	Jurisdictional Authority	Relevant information on permits
	• Western Skipjack Tuna Fishery • North-West Slope Trawl Fishery • Northern Prawn Fishery		
Indigenous Cultural Heritage	No registered Aboriginal sites within the EMBA (noting however that there are two current lodgements near the Maret Islands)	Department of Planning, Lands and Heritage (DPLH) Aboriginal Areas Protection Authority (AAPA)	Entry access permits to Aboriginal Lands in WA: https://www.wa.gov.au/service/aboriginal-affairs/aboriginal-heritage-conservation/apply-permit-access-or-travel-through-aboriginal-land Aboriginal heritage sites in WA: https://www.wa.gov.au/service/aboriginal-affairs/aboriginal-cultural-heritage/search-aboriginal-sites-or-heritage-places Indigenous heritage information in NT: https://nt.gov.au/leisure/arts-culture-heritage/visit-a-cultural-or-heritage-site/indigenous-heritage-information
Defence/restricted military area	North Australian Exercise Area (NAXA) offshore training area Curtin Air-to-Air Air Weapons Range (near Derby)	Department of Defence	Unexploded Ordanances (mapping information): https://www.defence.gov.au/UXO/default.asp Maritime military firing practice and exercise areas: https://www.hydro.gov.au/factsheets/FS_Navigation-Firing_Practice_and_Exercise_Areas.pdf
Industry (e.g. operational zone of offshore oil or gas platform)	• Northern Endeavour Facility (Australian Government) • Bayu-Undan Field (Santos) • Montara Venture FPSO	Operating company	Safety zones (up to 500 m from outer edge of well or equipment) – https://www.nopsema.gov.au/safety/safety-zones/
Shipwrecks	A number of unnamed Indonesian fishing vessels, the Sinar	DCCEEW	Refer to the *Underwater Cultural Heritage Act* 2018 (Commonwealth):

Receptor	Location	Jurisdictional Authority	Relevant information on permits
	Bonerate (1999) and the Ann Millicent (1888) are known to be in the vicinity of Ashmore Reef and Cartier Island. The Argo-Rowley Shoals contains three known shipwrecks: Alfred (1908), Pelsart (1908) and See Taube (1954). The Kimberley AMP contains more than 50 known shipwrecks listed under the Historic Shipwrecks Act 1976.		https://www.dcceew.gov.au/parks-heritage/heritage/underwater-heritage/underwater-cultural-heritage-act

18. USE OF DATA IN RESPONSE DECISION-MAKING

18.1 Operational Monitoring to Inform Response Activities

The OSM Services Provider is responsible for the collection of data by field teams, which shall be QA/QC checked by the Field Team Lead in accordance with the requirements listed in the finalised OMPs and SMPs (where applicable). Table 18-1 provides a checklist to assist in utilising OM data to inform decision making.

The Field Team Lead will be responsible for communicating data back to the OSM Implementation Lead via field reporting forms, debriefs and reports. Laboratory analysis reports should also be directed to the OSM Implementation Lead.

The OSM Implementation Lead is responsible for the interpretation and analysis of data. OM data should be analysed rapidly so that it may be used to inform response planning and decisions in the current and/or next operating period. SM data is designed to be more scientifically robust and long-term in nature and is not relied upon by the IMT for decision-making. Therefore, SM data will be analysed more thoroughly by the OSM Implementation Lead.

Once OM data is analysed and checked by the Field Team Lead, it will be provided to the Planning Section who will then distribute the data from each monitoring component to the relevant IMT Section. Table 18-2 provides guidance on the type of data generated from each OMP, which IMT Section requires the data and how the data may be used during a response. During a response, all SM data will also be provided to the Planning Section.

Analysed data will then be incorporated into the Common Operating Picture (managed by the Planning Lead) and used by the Environment Unit Lead during development of the operational Spill Impact Mitigation Assessment (SIMA), which would be included in the IAP for the current or next operating period.

As ultimately responsible for the IAPs, the Planning Lead will be required to utilise the OM data to aid in decision making and determine if the response strategies can be commenced, continued, escalated, terminated, or if controls need to be put in place to manage impacts of the response activities. These decisions will be communicated to the broader IMT during regular situation debriefs.

Table 18-1: Checklist for utilising OM data to inform IMT decision making

Responsibility	Task	Timeframe	Complete
OSM Services Provider - Field Team Lead	Data collected whilst implementing OMPs and SMPs is checked that it aligns with the requirements listed in the finalised OMPs and SMPs (where applicable)	Ongoing	☐
	OMP data provided to the IMT Planning Lead	Daily and ongoing	☐
Field Team	Reports from OMP: Shoreline Clean-up Assessment will be provided to the IMT daily, detailing the assessed areas to maximise effective utilisation of resources	Daily reporting	☐
Planning Lead	Incorporate OM data into Common Operating Picture	Daily and ongoing	☐
Jadestone Environment Unit Lead	Incorporate OM data into operational SIMA and IAP for the next operating period	Each operational period	☐

Table 18-2: Data generated from each OMP and how this may be used by IMT in decision-making

OMP	Data generated[5]	IMT Section requiring data	How data may be used by IMT
Hydrocarbon properties and weathering behaviour at sea	Hydrocarbon physical characteristics (e.g. viscosity, asphaltene content, fingerprinting, weathering ratios of hydrocarbon chains)	Planning Section to aid in response option selection / modification	Changes to the hydrocarbon properties will affect the window of opportunity for particular responses and the associated logistical requirements of these responses, such as use of chemical dispersants, recovery and pumping equipment suitability, hydrocarbon storage and hydrocarbon disposal requirements
Shoreline clean-up assessment	Assessment of shoreline character; assessment of shoreline oiling; recommendations for response activities; post-treatment surveys	Planning Section to aid in IAP development and response option selection / modification	• Confirmation of shoreline character, habitats and fauna present which may influence selection of response tactics (e.g. no mechanical recovery if turtles are known to be nesting); • Oil deposition and/or removal rate for a shoreline sector will help determine effectiveness of relevant tactics (e.g. shoreline protection and/or clean-up operations); • Assessment teams provide ground truthing of sites that are not possible via satellite imagery, therefore the IMT can rely on the recommendations of Assessment Teams (e.g. flagging access issues, suitable tactics, likely resourcing needs)
Surface chemical dispersant effectiveness and fate	Visual observations of dispersant efficacy; concentration of hydrocarbons in water column (see also water quality assessment)	Environment Unit for use in operational SIMA; Planning Section to aid in IAP development; Operations Section to confirm dispersant effectiveness for decision-making purposes in current operations period.	Determine the effectiveness of dispersant in removing oil from sea surface and how dispersed oil is being distributed through the water column. This information can be used in SIMA to help decide if dispersants are being effective at minimising oil reaching sensitive receptors (SIMA to evaluate any trade-offs between receptors)
Water quality assessment	Distribution of oil in water column and change in hydrocarbon concentrations (e.g. total recoverable hydrocarbons, BETEXN, PAH), physio-chemical	Planning Lead to validate surveillance and modelling data; Planning Section for use in IAP	Confirm spatial extent of spill within the water column and verify spill modelling and surveillance data; extent of spill can in turn influence location of other OMP and SMP monitoring components and sites. Data can also influence ongoing use of dispersant through ongoing operational SIMA.

[5] Summary only. For additional detail, please refer to individual OMPs. Also note data outputs will be reliant on finalised monitoring design.

OMP	Data generated[5]	IMT Section requiring data	How data may be used by IMT
	parameters and dispersant detection		
Sediment quality assessment	Distribution of oil in sediment and change in hydrocarbon concentrations (e.g. Total recoverable hydrocarbons, BETEXN, PAH)	Planning Lead to validate surveillance and modelling data; Planning Section for use in IAP	Confirm spatial extent of spill; extent of spill can in turn influence location of other OMP and SMP monitoring components and sites
Marine fauna assessment • Reptiles • Cetaceans (observational only) • Dugongs • Seabirds and shorebirds • Fish	Rapid assessment of presence and distribution of marine fauna; evaluate impact of spill and response activities on fauna	Planning Section for use in IAP; Oiled Wildlife Section/Division to help in developing Wildlife Response Sub-plan	Understanding of species, populations and geographical locations at greatest risk from spill impacts. IMT can use this information to help qualify locations with highest level of protection priority (e.g. dugong nursery area is at risk of high contact therefore dispersant use closest to spill source may be a preferred option); understanding the impacts of spill response activities can help IMT to modify or terminate activities if they are assessed as creating more harm than the oil alone (e.g. large shoreline clean-up teams and staging areas may disturb shorebird nesting resulting in adults abandoning chicks)

18.2 Impacts from Response Activities

Table 10-4 of the Joint Industry OSM Framework outlines the potential impacts from response activities and the relevant OMP/SMP for monitoring impacts. For example, if shoreline clean-up was being considered as a response option, then possible impacts resulting from that activity could include physical presence, ground disturbance, water/sediment quality decline and lighting/noise impacts to fauna.

When finalising monitoring designs, the OSM Implementation Lead shall review Table 10-4 of the Joint Industry OSM Framework and the Skua-11 ST1 Well Drilling EP (TM-50-PLN-I-00001) to ensure potential impacts from response activities are considered and any suitable mitigation actions are incorporated into relevant OMP/SMP designs.

18.3 Operational Monitoring of Effectiveness of Control Measures and to Ensure Environmental Performance Standards are Met

As stated in Table 15-1, when finalising monitoring designs, the OSM Implementation Lead and Environment Unit Lead (or delegate) shall review the Environmental Performance Standards (EPSs) listed in the Skua-11 ST1 Drilling OPEP (TM-50-PLN-I-00006) and integrate checks into the monitoring design that will help determine if relevant Environmental Performance Standards (EPSs) are being met.

19. DATA MANAGEMENT

Minimum standards for data management are provided in Section 10.11 of the Joint Industry OSM Framework and will be adopted by Jadestone and the OSM Services Provider.

20. QUALITY ASSURANCE AND QUALITY CONTROL

Refer to Section 10.11 of the Joint Industry OSM Framework for QA/QC minimum standards, which will be adopted by Jadestone and the OSM Services Provider.

21. COMMUNICATION PROTOCOLS

21.1 OSM Services Provider/s

Communication protocols between Jadestone and its OSM Services Provider with respect to delivery of the OMPs and SMPs (during both preparedness and implementation) are intentionally defined to ensure clear and consistent information is provided in both directions.

The following communication protocols must be observed:

- Communication between Jadestone and its OSM Services Provider during the preparedness phase (pre-spill) will be between the nominated Industry Member Technical Advisory Group representative and the OSM Services Provider.
- Communication between Jadestone and its OSM Services Provider during activation (prior to deployment) will be between the Environment Unit Lead (or delegate) and the OSM Services Provider representative.
- During implementation (post deployment), primary communication occurs via two pathways:
    - Jadestone Representative and the OSM Services Provider Duty Manager for contractual, management, scientific and general direction matters; and
    - Jadestone's IMT Planning Lead and the OSM Services Provider's Field Operations Manager(s) Field Team Leads for on-site matters.
- All key OSM operational decisions should be logged in an OSM decision log by key personnel, including but not limited to the OSM Services Provider Implementation Lead, OSM Field Operations Manager, Operational Monitoring Coordinator, Scientific Monitoring Coordinator and Field Team Leads.
- All key OSM tasks, actions and requirements should be documented in an IAP during the response phase of the spill.
- The Jadestone Environment Unit Lead will keep the Operations Lead, Logistics Lead and Planning Lead briefed of the OSM status as required.
- All correspondence (copies of emails and records of phone calls) between Jadestone and the OSM Services Provider during a response should be recorded and kept on file.
- All communication received by OSM Services Provider not in line with these protocols should be reported to the Environment Unit Lead who will seek guidance on the accuracy of the information received.
- Unless related to safety (e.g. evacuation), any direction or instruction received by the OSM Services Provider outside of these protocols should be confirmed via the Jadestone Environment Unit Lead or On-Scene Commander prior to implementation.

During the post-response phase all communications shall be between a nominated Jadestone representative and the OSM Services Provider OSM Implementation Lead and/or OSM Services Lead.

21.2 External Stakeholders

Results of OMPs and SMPs will be discussed with relevant stakeholders. Information will be shared with regulatory agencies/authorities as required and inputs received from stakeholders will be evaluated and where practicable, will be used to refine the ongoing spill response and/or ongoing operational and/or scientific monitoring.

Jadestone IMT Media/Public Information Officer will be the focal point for external engagement during the response operation.

Stakeholder communications post-response will be managed by Jadestone HSE Team.

22. STAND-DOWN PROCESS

Monitoring for each component will continue until termination criteria for individual components are reached. Typically, OMPs will terminate when agreement has been reached with the Jurisdictional Authorities relevant to the spill to terminate the response or a relevant SMP has been activated. SMPs will continue after the spill response has been terminated and until such time as their termination criteria are also reached. A list of criteria is provided in the OSM Framework.

After OMPs are terminated, the OM monitoring teams will be advised to stand down. Following this stage, Jadestone is responsible for coordinating a lessons-learnt meeting between the OSM Services Provider, sub-contracted Monitoring Service Providers and other relevant stakeholders. It is the responsibility of Jadestone to ensure that lessons learnt are communicated to the relevant stakeholder groups. The lessons discussed should include both positive actions to be reinforced and lessons for actions that could be improved in future standby or response campaigns. Table 22-1 provides a checklist to assist in terminating the OMPs and SMPs and the monitoring effort.

Table 22-1: Checklist for terminating monitoring components

Responsibility	Task	Complete
Jadestone's Environment Unit Lead with input from OSM Services Provider	Review termination criteria of OMPs and SMPs (provided in Table 9-1 (OMPs) and Table 9-2 (SMPs) of the Joint Industry Operational and Scientific Monitoring Framework) to ensure OMPs and SMPs are terminated in accordance with these criteria	☐
	Ensure all SMP monitoring reports are peer reviewed by an expert panel (Refer to Section 10.10 of the Joint Industry OSM Framework)	☐
	Conduct lessons-learnt/after action review meeting	☐

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APPENDIX A KEY ECOLOGICAL FEATURES

Table A-1: Key Ecological Features in the EMBA

Key Ecological Feature	Description and Values
Carbonate Bank and Terrace System of the Sahul Shelf	• Regionally important because of its likely ecological role in enhancing biodiversity and local productivity relative to its surrounds • Forms a unique seafloor feature, with banks that rise to at least 45 m, and to within 30 m water depth, allow light dependent organisms to thrive and support more biodiversity (Nichol *et al*. 2013; NERP 2014) • Supports a high diversity of organisms including reef fish, sponges, soft and hard corals, gorgonians, bryozoans, ascidians and other sessile filter feeders • The banks are known to be foraging areas for loggerhead, olive ridley and flatback turtles • Cetaceans and green and largetooth sawfish are likely to occur in the area
Ancient Coastline at 125 m Depth Contour	• A unique seafloor feature with ecological properties of regional significance • Migratory pelagic species (e.g. humpback whales and whale sharks) may use this escarpment as a guide • The topographic complexity of escarpments associated with this feature may facilitate vertical mixing of the water column, providing nutrient-rich and enhanced productivity.
Continental Slope Demersal Fish Communities	• Valued for its high degree of endemism as the diversity of demersal fish assemblages is high compared to elsewhere along the continental slope
Ashmore Reef and Cartier Island and Surrounding Commonwealth Waters	• Regionally important for feeding and breeding aggregations of birds and other marine life • Areas of enhanced primary productivity in an otherwise low-nutrient environment • Ashmore Reef supports the highest number of coral species of any reef off the WA coast
Seringapatam Reef and Commonwealth Waters in the Scott Reef Complex	• Coral communities occur across shallow (<30 m) and deep (>30 m) habitats • 306 hard coral species from 60 genera and 14 families having been identified; all were predominantly widespread Indo–Pacific species (Gilmour *et al*. 2009) • Coral species diversity comparable to other reefs in the region, such as Ashmore, Seringapatam and Mermaid Reef/Rowley Shoals • Green turtle nesting at Sandy Islet (Guinea 2006) • Shallow atoll reef forms an intertidal platform at low tide • High primary productivity relative to other parts of the region and coral communities are largely self-seeded and rely on the reproductive output of resident corals

Key Ecological Feature	Description and Values
	• Relatively pristine and has a high species richness, which apply to both the benthic and pelagic habitats, attracting aggregations of marine life including whale and dolphin species
Pinnacles of the Bonaparte Basin (North and North West)	• The Pinnacles rise steeply from depths of ~80 m to within 30 m of the water surface. Supported communities include sessile benthic invertebrates, including hard and soft corals, sponges, whips, fans, bryozoans and aggregations of demersal fish species such as snappers, emperors and groupers • Recognised as a unique seafloor feature and a biodiversity hotspot for sponges
Carbonate Bank and Terrace System of the Van Diemen Rise	• Unique seafloor feature with ecological properties of regional significance • While reef-forming corals are sparse throughout the region, some locally dense hard corals can be found on the banks of the Van Diemen Rise. These include near threatened, vulnerable and endangered species on the IUCN Red List. Coral communities on the Van Diemen rise are believed to be genetically distinct from those elsewhere in northern Australia. • Pelagic fish such as mackerel, red snapper and a distinct gene pool of gold band snapper are also found on the Van Diemen rise
Canyons Linking the Argo Abyssal Plain with the Scott Plateau	• Scott Plateau connects with the Argo Abyssal Plain via a series of canyons, the largest of which are the Bowers and Oates canyons (DSEWPaC 2012) • High productivity of the region is believed to be led by topographically induced water movements through the canyons and the action of internal waves in these canyons as well as around islands and reefs • The canyons are thought to be linked to small and periodic upwellings that enhance this biological productivity (DEWHA 2008a) • The canyons are likely to be important features due to their historical association with sperm whale aggregations (DSEWPaC 2012). Historical records indicate that the number of sperm whales was high. Although current numbers are unknown, it is possible that they congregate around the canyon heads, encouraged by the high biological productivity, supporting stocks of their prey (DEWHA 2008a) • Anecdotal evidence that the Scott Plateau may be a breeding ground for sperm and beaked whales • Likely that important demersal communities occur in the canyons, as they do in the Scott Plateau supported by the nutrient upwelling (DEWHA 2008a)
Mermaid Reef and Commonwealth Waters Surrounding Rowley Shoals	• The Rowley Shoals are a group of three atoll reefs—Clerke, Imperieuse and Mermaid reefs—located ~300 km north-west of Broome • Mermaid Reef lies 29 km north of Clerke and Imperieuse reefs and is totally submerged at high tide • Regionally important in supporting high species richness, higher productivity and aggregations of marine life associated with the adjoining reefs themselves (Done *et al*. 1994) • Contains 214 coral species and approximately 530 species of fishes (Gilmour *et al*. 2007), 264 species of molluscs and 82 species of echinoderms (Done *et al*. 1994; Gilmour *et al*. 2007)

Key Ecological Feature	Description and Values
	• Both coral communities and fish assemblages differ from similar habitats in eastern Australia (Done *et al*. 1994)
Shelf break and slope of the Arafura Shelf	• The Arafura Shelf is an important ecological feature that creates a unique seafloor which enhances biological productivity on the edge of the shelf and attracts feeding aggregations of pelagic marine organisms • The physical characteristics of this shelf break and slope comprise of continental slope, patch reefs and hard substrate pinnacles (Harris *et al*., 2005). • Phytoplankton and invertebrates have been sampled at this KEF and phytoplankton is thought to be the basis for offshore food webs in the area (DEWHA, 2007). • Contains approximately 280 demersal fish species in the area (Last *et al*. 2005) and other marine species that have been recorded include marine turtles, whale sharks and predatory fish species including sharks (DEWHA, 2008).

APPENDIX B BASELINE DATA SOURCES

Table B-1: Baseline data sources

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
Benthic communities and fish assemblages	Kospartov MC, Beger, M, Ceccarelli DM and Richards ZT. (2006). An assessment of the distribution and abundance of sea cucumbers, trochus, giant clams, coral, fish and invasive marine species at Ashmore Reef National Nature Reserve and Cartier Island Marine Reserve: 2005. Report prepared by UniQuest Pty Ltd, University of Queensland, Brisbane, Queensland, for the Department of the Environment and Heritage, Canberra, ACT.	University of Queensland (Link to report)	Ashmore Reef Marine Park Cartier Island Marine Park
	Willan RC. (2005). The molluscan fauna from the emergent reefs of the northernmost Sahul Shelf, Timor Sea: Ashmore, Cartier and Hibernia reefs—biodiversity and zoogeography. The Beagle, Records of the Museums and Art Galleries of the Northern Territory, Supplement 1: 51–81.	Western Australian Museum (Link to article)	Ashmore reef Cartier reef Hibernia reef
	Rees MM, Colquhoun JJ, Smith LL, Heyward AA. (2003). Survey of Trochus, Holothuria, Giant Clams and the Coral Communities at Ashmore, Cartier Reef and Mermaid Reef, Northwestern Australia. Darwin, NT: Environment Australia, 64.	Australian Institute of Marine Science (AIMS) (Link to report)	Ashmore reef Cartier reef Mermaid reef
	Richards Z, Beger M, Hobbs JP, Bowling T, Chong-Seng K, Pratchett M. (2009). Ashmore reef National Nature Reserve and Cartier Island Marine Reserve Marine Survey 2009. ARC Centre of Excellence for Coral Reef Studies. Sydney, NSW: Department of the Environment, Water, Heritage and the Arts.	Commonwealth of Australia (Link to the report)	Ashmore reef Cartier Island Marine Park
	Parks Australia (2022). Satellite mapping of bathymetry and habitats of Ashmore Reef and Cartier Island Marine Parks. Accessed via Australian Ocean Data Network (AODN)	Parks Australia (Link to metadata)	Ashmore reef Cartier Island Marine Park
	Heyward A., Radford B. (2019). Northwest Australia. In: Loya Y., Puglise, K., Bridge T. (eds) Mesophotic Coral Ecosystems. Coral Reefs of the World, vol 12. Springer, Cham. https://doi.org/10.1007/978-3-319-92735-0_19	AIMS (Link to article)	Northwest Australia

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Skewes TD, Dennis DM, Jacobs DR, Gordon SR, Taranto TJ, Haywood M, Pitcher CR, Smith GP, Milton D, Poiner IR. (1999). Survey and stock size estimates of the shallow reef (0–15 m deep) and shoal area (15–50 m deep) marine resources and habitat mapping within the Timor Sea MOU74 Box. Vol. 1. Stock estimates and stock status. CSIRO Division of Marine Research, Hobart, Tasmania.	Commonwealth Scientific and Industrial Research Organisation (CSIRO) (Link to report)	Ashmore Reef Browse Island Cartier Island Hibernia Reef Scott North Reef Scott South Reef Seringapatam Reef Johnson Bank Woodbine Bank
	Edgar G, Stuart-Smith R (2018). Reef Life Survey (RLS): Global Reef Fish Dataset. Battery Point, TAS: Institute for Marine and Antarctic Studies (IMAS).	Institute for Marine and Antarctic Studies (Link to Reef Life Survey)	Ashmore reef Cartier reef Scott reef Seringapatam Hibernia
	Allen GR (1993). Part 7 - Fishes of Ashmore Reef and Cartier Island. Pages 67-91 in P. F. Berry, editor. Marine faunal surveys of Ashmore Reef and Cartier Islands, north-western Australia. Records of the Western Australian Museum, Perth.	Western Australian Museum (Link to article)	Ashmore reef Cartier Island
	Heyward A, Moore C, Radford B, Colquhoun J (2010). Monitoring program for the Montara well release Timor Sea: final report on the Nature of Barracouta and Vulcan Shoals. Report prepared by AIMS for PTTEP Australia (Ashmore Cartier) Pty Ltd.	AIMS (Link to report)	Barracouta Shoal Vulcan Shoal
	Heyward A (2011) Monitoring study S% banks and shoals, Montara 2011 offshore banks assessment survey. Report prepared by AIMS for Report prepared by AIMS for PTTEP Australia (Ashmore Cartier) Pty Ltd.	AIMS (Link to report)	Eugene McDermott Goeree Shoal Vulcan Shoal Shoal 25 Barracouta Shoal Echuca Shoal Heyward Shoal

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Heyward A, Case M, Cappo M, Colquhoun J, Curry L, Fisher R, Radford B, Stowar M, Wakeford M, Wyatt M (2017) The Barracouta, Goeree and Vulcan Shoals Survey 2016. Report prepared by AIMS for PTTEP Australia (Ashmore Cartier) Pty Ltd.	AIMS (Link to report)	Barracouta Shoal Vulcan Shoal Goeree Shoal
	Moore C, Cappo M, Radford B, Heyward A. (2017) Submerged oceanic shoals of north Western Australia are a major reservoir of marine biodiversity. Coral Reefs 36: 719-734.	AIMS (Link to article)	Barracouta Shoal Wave Governor Bank Shoal 25 Vulcan Shoal Goree Shoal Eugene McDermott Shoal Heywood Shoal Echuca Shoal
	Australian Institute of Marine Science (AIMS). (2017). Towed Video deployments in Timor Sea Banks and Shoals (Montara 2). https://apps.aims.gov.au/metadata/view/cd084dc6-12f8-4d50-83ba-ec0512313544, accessed 19-Nov-2023.	AIMS (Link to the data)	Baracuda East and West Shoals Sheldon Shoal Wave Governor Bank Heywood Shoal Echuca Shoal Goeree Shoal Eugene McDermott Shoal Vulcan Shoal
	Wienberg C, Westphal H, Kwoll E, Hebbeln D (2010). An isolated carbonate knoll in the Timor Sea (Sahul Shelf, NW Australia): facies zonation and sediment composition. Facies 56, 179-193.	University of Bremen (Link to article)	Pee Shoal
	Keesing JK, Webber BL, Hardiman LK (Eds) Ashmore Reef Marine Park Environmental Assessment 2021. Report to Parks Australia. CSIRO, Crawley, Australia	CSIRO (Link to report)	Ashmore Reef Marine Park
	Adam, A., Thomas, L., Underwood, J., Gilmour, J., & Richards, Z. (2022). Population connectivity and genetic offset in the spawning coral Acropora digitifera in Western Australia. Molecular Ecology.	Curtin University (Link to article)	Ashmore Reef Lalang-garram Marine Park Reefs Beagle Reef

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Adele Island Clerke Reef Mermaid Reef Imperieuse Reef Ningaloo Station Gnaraloo Quobba
	Miller K, Speed C, Parnum I, Wilson N, Kok J, Colquhoun J, Case M (2022). 2021 Ashmore Reef Mesophotic Reef Survey and Sampling: Voyage Report. Report prepared for Parks Australia. May 2022. 21pp.	AIMS (Link to metadata)	Ashmore Reef
	National Reef Monitoring Network	The IMOS National Reef Monitoring Network (Link to site)	Houtman Abrolhos Islands Ningaloo Coast World Heritage Area Exmouth Gulf Dampier Archipelago Island Group Barrow Island Montebello Islands Group Ashmore Reef Cartier Island Darwin Harbour Arafura Arnhem Marmion Rottnest Island Geographe Bay
	Gilmour JP, Cook KL, Ryan NM, Puotinen ML, Green, RH, Shedrawi G, Hobbs J-P A, Thompson, DP, Badcock, R, Buckee J, Foster T, Richards ZT, Wilson SK, Barnes PB, Coutts TB, Radford BT, Piggott CH, Depczynski M, Evans SN, Schoepf V, Evans RD, Halford AR, Nutt CD, Bancroft KP, Heyward AJ, Oades D (2019) The state of Western Australia's coral reefs. Coral Reefs https://doi.org/10.1007/s00338-019-01795-8	AIMS (Link to article)	Western Australia Cocos Keeling Islands Ashmore Reef Scott Reef Rowley Shoals

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Montebello Islands Group Barrow Island Ningaloo Reef Shark Bay
	Keesing J, Thomson D, Haywood M, Babcock R, Doropoulos C, Bessey C; Tonks M, Westlake E, Miller M, Ceccarelli D, Hardiman L (2020): Child Ashmore Reef Marine Park Environmental Assessment 2019 - Marine. v1. CSIRO. Data Collection. https://doi.org/10.25919/0kfd-az26	CSIRO (Link to metadata)	Ashmore Reef
Marine reptiles	Guinea ML. (2013). Surveys of the sea snakes and sea turtles on reefs of the Sahul Shelf, monitoring program for the Montara well release Timor Sea (Darwin, NT: Charles Darwin University).	Charles Darwin University (Link to report)	Ashmore reef Scott reef Cartier Island Hibernia reef Seringapatam reef Browse Island Montgomery reef
	Guinea ML. (2006). Final Report Survey 2005: Sea Snakes of Ashmore Reef, Hibernia Reef and Cartier island. Darwin, NT: Charles Darwin University.	Charles Darwin University	Ashmore reef Cartier reef Hibernia reef
	Guinea ML. (2008). Sea snakes of Ashmore Reef and Cartier Island: Final Report Survey 2008 to DEWHA Canberra. Darwin, NT: Charles Darwin University.	Charles Darwin University	Ashmore reef Cartier reef
	Edgar G, Stuart-Smith R. (2018). Reef Life Survey (RLS): Global Reef Fish Dataset. Battery Point, TAS: Institute for Marine and Antarctic Studies (IMAS). (Survey included sea snake observations)	Institute for Marine and Antarctic Studies (Link to Reef Life Survey)	Ashmore reef Cartier reef Scott reef Seringapatam Hibernia
	Limpus CJ (2008). A biological review of Australian marine turtles, 2. Green turtle *Chelonis mydas* (Linnaeus). Environment Protection Agency, Queensland.	Queensland Government (Link to article)	Ashmore and Cartier Islands

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Commonwealth of Australia (2017) Recovery Plan for Marine Turtles in Australia 2017–2027.	Commonwealth of Australia (Link to management plan)	Australia wide
	Keesing J, Thomson D, Haywood M, Babcock R, Doropoulos C, Bessey C; Tonks M, Westlake E, Miller M, Ceccarelli D, Hardiman L (2020): Child Ashmore Reef Marine Park Environmental Assessment 2019 - Marine. v1. CSIRO. Data Collection. https://doi.org/10.25919/0kfd-az26	CSIRO (Link to metadata)	Ashmore Reef
	Liston J (21 April 2021) "Thought to be lost forever": locally extinct sea snake re-discovered during deep-sea expedition [media release], Australian Institute of Marine Science, accessed December 2023	AIMS (Link to media release)	Ashmore Reef
	Keesing JK, Webber BL, Hardiman LK (Eds) Ashmore Reef Marine Park Environmental Assessment 2021. Report to Parks Australia. CSIRO, Crawley, Australia	CSIRO (Link to report)	Ashmore Reef Marine Park
Seabirds and shorebirds	Clark RH, Herrod A. (2016). The status of seabirds and shorebirds at Ashmore, Cartier Island and Browse Island. Final impact assessment of the Montara Oil Spill. Prepared on behalf of PTTEP Australasia and the Department of the Environment. Monash University, Melbourne, Australia	Commonwealth of Australia (Link to report)	Cartier Island Ashmore Reef Browse Island
	Clarke RH, Swann G, Carter MJ, Mott RM, Herrod A. (2017), The avifauna of Cartier Island Commonwealth Marine Reserve, north-western Australia. Australian Field Ornithology, 34: 18-25.	Monash University (Link to article)	Cartier Island
	Lavers JL., Miller MGR, Carter MJ, Swann G, Clarke RH. (2014). Predicting the Spatial Distribution of a Seabird Community to Identify Priority Conservation Areas in the Timor Sea. Conservation Biology, 28(6), 1699–1709. http://www.jstor.org/stable/24482133	Monash University (Link to article)	Ashmore Reef Cartier Island Browse Island Scott Reef Adele Island Lacepede Islands Broome Timor Sea
	Keesing J, Thomson D, Haywood M, Babcock R, Doropoulos C, Bessey C; Tonks M, Westlake E, Miller M, Ceccarelli D, Hardiman L (2020): Child	CSIRO (Link to metadata)	Ashmore Reef

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Ashmore Reef Marine Park Environmental Assessment 2019 - Marine. v1. CSIRO. Data Collection. https://doi.org/10.25919/0kfd-az26		
	Cannell B, Surman C (2021). Ashmore Reef: seabirds and shorebirds, pages 122-148, in Keesing JK, Webber BL, Hardiman LK (Eds) Ashmore Reef Marine Park Environmental Assessment. Report to Parks Australia. CSIRO, Crawley, Australia	CSIRO	Ashmore Reef
Marine mammals	Whiting SD (1999). Use of the remote Sahul Banks, Northwestern Australia, by dugongs, including breeding females. Marine Mammal Science 15 (2): 609-615.	Scott Whiting (Department of Biodiversity, Conservation and Attractions) (Link to article)	Ashmore reef Cartier reef
	Whiting S (2005) Dugongs of Ashmore Reef and the Sahul Banks: a review of current knowledge and a distribution of sightings. The Beagle: Records of the Museums and Art Galleries of the Northern Territory, Supplement 1, 207-210	Scott Whiting (Department of Biodiversity, Conservation and Attractions) (Link to article)	Ashmore Reef Sahul Banks
Commercial fisheries	State of the Fisheries Report (Western Australia) DPIRD (2022)	DPIRD (Link to report)	Western Australia
	Ryan KL, Lai EKM, Smallwood CB (2022). Boat-based recreational fishing in Western Australia 2020/21. Fisheries Research Report No. 327 Department of Primary Industries and Regional Development, Western Australia. 221pp.	DPIRD (Link to report)	Western Australia

APPENDIX C PROTECTED MATTERS IN THE EMBA

Table C-1: Protected matters in the EMBA, relevant monitoring plans and priority sites

Species or group	Relevant Plan/ Conservation Advice	Relevant threats and conservation actions	Relevant OMPs and SMPs
Fish, sharks and rays			
Great White Shark (*Carcharodon carcharias*)	Recovery plan for the White Shark (*Carcharodon carcharias*) (DSEWPaC 2013a)	Ecosystem effects as a result of habitat modification	• OMP: Marine fauna assessment – Fish • SMP: Marine mega-fauna assessment • SMP: Marine fish and elasmobranch assemblages assessment
Dwarf sawfish (*Pristis clavata*)	Approved Conservation Advice on *Pristis lavate* (sawfish) (DoE 2014a) Sawfish and River Sharks Multispecies Recovery Plan (CoA 2015)	Habitat degradation and modification, marine debris	
Freshwater/ Largetooth Sawfish (*Pristis pristis*)	Approved Conservation Advice for *Pristis pristis* (largetooth sawfish) (DoE 2014b) Sawfish and River Sharks Multispecies Recovery Plan (CoA 2015)	Habitat degradation and modification	
Green Sawfish (*Pristis zijsron*)	Approved Conservation Advice for *Pristis zijsron* (green sawfish) (DEWHA 2008b) Sawfish and River Sharks Multispecies Recovery Plan (CoA 2015)	Habitat degradation and modification, marine debris	
Whale Shark (*Rhincodon typus*)	Approved Conservation Advice for *Rhincodon typus* (whale shark) (TSSC 2015a)	Boat strike from large vessels	
		Habitat disruption from mineral exploration, production and transportation	
Northern River Shark (*Glyphis garricki*)	Approved Conservation Advice for *Glyphis garricki* (northern river shark) (DoE 2014c)	Marine debris	
Scalloped Hammerhead (*Sphyrna lewini*)	-	Marine debris	
Grey Nurse Shark (*Carcharias taurus*)	Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (Commonwealth of Australia 2014)		

Species or group	Relevant Plan/ Conservation Advice	Relevant threats and conservation actions	Relevant OMPs and SMPs
Southern Bluefin Tuna (*Thunnus maccoyii*)	-	-	
Reef Manta Ray (*Manta alfredi*)	-	-	
Giant Manta Ray (*Manta birostris*)	-	-	
Narrow sawfish (*Anoxypristis cuspidata*)	-	-	
Oceanic Whitetip Shark (*Carcharhinus longimanus*)	-	-	
Shortfin Mako (*Isurus oxyrinchus*)	-	-	
Longfin Mako (*Isurus paucus*)	-	-	
Speartooth Shark (*Glyphis glyphis*)	Approved Conservation Advice for *Glyphis glyphis* (speartooth shark) (DoE 2014d) Sawfish and river shark multispecies recovery plan (Commonwealth of Australia 2015)	Marine debris	
Marine mammals			
Sei Whale (*Balaenoptera borealis*)	Approved Conservation Advice for *Balaenoptera borealis* (sei whale) (TSSC 2015b) Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (DoEE 2018)	Anthropogenic noise and acoustic disturbance Habitat degradation including pollution (increasing port expansion and coastal development) Pollution (persistent toxic pollutants) Vessel strike	• OMP: Marine fauna assessment – Cetaceans • SMP: Marine mega-fauna assessment – Whale sharks, dugongs and cetaceans

Species or group	Relevant Plan/ Conservation Advice	Relevant threats and conservation actions	Relevant OMPs and SMPs
Blue whale (*Balaenoptera musculus*) Including Pygmy Blue Whale	Blue Whale Conservation Management Plan 2015–2025 (DoE 2015a) Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (DoEE 2018)	Noise Interference	
		Habitat Modification	
		Vessel Disturbance/ strike	
Fin whale (*Baleenoptera physalus*)	Approved Conservation Advice for *Balaenoptera physalus* (fin whale) (TSSC 2015c) Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (DoEE 2018)	Anthropogenic noise and acoustic disturbance	
		Habitat degradation including coastal development, port expansion and aquaculture	
		Pollution (persistent toxic pollutants)	
		Vessel strike	
Humpback whale (*Megaptera novaeangliae*)	Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (DoEE 2018)	Habitat degradation including coastal development and port expansion	
		Entanglement	
		Vessel disturbance and strike	
Bryde's whale (*Balaenoptera edeni*)	Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (DoEE 2018)	Marine debris	
Orca, Killer whale (*Orcinus orca*)			
Spotted bottlenose dolphin (Arafura/Timor Sea populations) (*Tursiops aduncus*)			
Sperm whale (*Physeter macrocephalus*)			

Species or group	Relevant Plan/ Conservation Advice	Relevant threats and conservation actions	Relevant OMPs and SMPs
Australian Snubfin Dolphin (*Orcaella heinsohni*)			
Australian Humpback Dolphin (also known as *Sousa chinensis*)			
Dugong (*Dugong dugon*)			
Marine reptiles			
Short-nosed seasnake (*Aipysurus apraefrontalis*)	Approved Conservation Advice on *Aipysurus apraefrontalis* (Short-nosed seasnake) (DSEWPaC 2011a)	Habitat degradation, marine debris	• OMP: Marine fauna assessment – Reptiles • SMP: Marine mega-fauna assessment – Reptiles
Leaf-scaled seasnake (*Aipysurus folipsquama*)	Approved Conservation Advice on *Aipysurus foliosquama* (Leaf-scaled seasnake) (DSEWPaC 2011b)	Degradation of reef habitat	
All marine turtles including: • Loggerhead Turtle • Green Turtle • Leatherback Turtle • Hawksbill Turtle • Flatback Turtle • Olive Ridley	Recovery plan for marine turtles in Australia 2017–2027 (DoEE 2017) National Light Pollution Guidelines for Wildlife including Marine Turtles, Seabirds and Migratory Shorebirds (DoEE 2020) Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (DoEE 2018)	Light pollution	
		Habitat modification/ loss	
		Chemical and terrestrial discharge/ deteriorating water quality	
		Marine debris	
		Vessel disturbance/ strike	
		Noise interference	
Leatherback Turtle (*Dermochelys coriacea*)	Approved Conservation Advice on *Dermochelys coriacea* (DEWHA 2008c)	As above	
Salt-water crocodile (*Crocodylus porosus*)	-	-	

Species or group	Relevant Plan/ Conservation Advice	Relevant threats and conservation actions	Relevant OMPs and SMPs
Birds			
All seabirds and migratory shorebirds	National Light Pollution Guidelines for Wildlife including Marine Turtles, Seabirds and Migratory Shorebirds (DoEE 2020)		• OMP: Shoreline clean-up assessment • OMP: Marine fauna assessment – Seabirds and shorebirds • SMP: Seabirds and shorebirds
All seabirds	Wildlife Conservation Plan for Seabirds (CoA 2020a)		
Migratory species within the combined EMBA	Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015)		
Australian Lesser Noddy (*Anous tenuirostris melanops*)	Conservation advice *Anous tenuirostris melanops* Australian lesser noddy (Threatened Species Scientific Committee 2015e)		
Red Knot (*Calidris canutus*)	Conservation advice *Calidris canutus* red knot (Threatened Species Scientific Committee 2016a)		
Curlew Sandpiper (*Calidris ferruginea*)	Conservation advice *Calidris ferruginea* curlew sandpiper (Department of the Environment 2015c)		
Eastern Curlew (*Numenius madagascariensis*)	Conservation advice *Numenius madagascariensis* eastern curlew (Department of the Environment 2015d)		
Abbott's Booby (*Papasula abbotti*)	Conservation advice *Papasula abbotti* Abbott's booby (Threatened Species Scientific Committee 2015h)		
Common Sandpiper (*Actitis hypoleucos*)	Wildlife Conservation Plan for Seabirds (Commonwealth of Australia 2020)		
Common/brown Noddy (*Anous stolidus*)	Wildlife Conservation Plan for Seabirds (Commonwealth of Australia 2020)		
Sharp-tailed Sandpiper	Wildlife Conservation Plan for Seabirds (Commonwealth of Australia 2020)		

Species or group	Relevant Plan/ Conservation Advice	Relevant threats and conservation actions	Relevant OMPs and SMPs
(*Calidris acuminata*)			
Pectoral Sandpiper (*Calidris melanotos*)	Wildlife Conservation Plan for Seabirds (Commonwealth of Australia 2020)		
Streaked Shearwater (*Calonectris leucomelas*)	Wildlife Conservation Plan for Seabirds (Commonwealth of Australia 2020)		
Lesser Frigatebird (*Fregata ariel*)	Wildlife Conservation Plan for Seabirds (Commonwealth of Australia 2020)		
Great Frigatebird (*Fregata minor*)	Wildlife Conservation Plan for Seabirds (Commonwealth of Australia 2020)		
White- tailed tropicbird (*Phaethon lepturus*)	Wildlife Conservation Plan for Seabirds (Commonwealth of Australia 2020)		
Greater Sand Plover, Large Sand Plover (*Charadrius leschenaultii*)	Conservation Advice *Charadrius leschenaultii* Greater sand plover (Threatened Species Scientific Committee 2016c)		
Christmas Island Frigatebird (*Fregata andrewsi*)	Conservation Advice for the Christmas Island Frigatebird – *Fregata andrewsi* (Threatened Species Scientific Committee 2020b) National recovery plan for the Christmas Island Frigatebird (*Fregata andrewsi*) (Hill and Dunn 2004)		
Western Alaskan Bar-tailed Godwit (*Limosa lapponica baueri*)	Conservation Advice *Limosa lapponica baueri* Bar-tailed godwit (western Alaskan) (Threatened Species Scientific Committee 2016f)		
Northern Siberian Bar-tailed Godwit (*Limosa lapponica menzbieri*)	Conservation Advice *Limosa lapponica menzbieri* Bar-tailed godwit (northern Siberian) (Threatened Species Scientific Committee 2016g)		

Species or group	Relevant Plan/ Conservation Advice	Relevant threats and conservation actions	Relevant OMPs and SMPs
Christmas Island White-tailed Tropicbird, (*Phaethon lepturus fulvus*)	Conservation Advice *Phaethon lepturus fulvus* white-tailed tropicbird (Christmas Island) (DoE 2014f)	Predation by feral cats	
Oriental Reed-Warbler (*Acrocephalus orientalis*)	-		
Fork-tailed Swift (*Apus pacificus*)	-	Predation by feral cats	
Wedge-tailed Shearwater (*Ardenna pacifica*)	-	Impacts of marine debris Incidental catch (or bycatch) of seabirds	
Caspian Tern (*Hydroprogne caspia)*	-		
Asian Dowitcher (*Limnodromus semipalmatus*)	-		
Bar-tailed Godwit (*Limosa lapponica*)	-		
Bridled Tern (*Onychoprion anaethetus*)	-		
Red-tailed Tropicbird (*Phaethon rubricauda*)	-	Predation by feral cats	
Roseate Tern (*Sterna dougallii*)	-		
Little Tern (*Sternula albifrons*)	-		

Species or group	Relevant Plan/ Conservation Advice	Relevant threats and conservation actions	Relevant OMPs and SMPs
Masked Booby (*Sula dactylatra*)	-		
Brown Booby (*Sula leucogaster*)	-	Impacts of marine debris	
Red-footed Booby (*Sula sula*)	-		
Greater Crested Tern (*Thalasseus bergii*)	-		
Common Greenshank *(Tringa nebularia)*	Conservation Advice for *Tringa nebularia* (common greenshank) (DCCEEW, 2024f)		
Commonwealth Heritage Places (refer to EP for additional description of key receptors for each location)			
Ashmore Reef National Nature Reserve	N/A	N/A	• OMP: Water quality assessment • OMP: Sediment quality assessment • OMP: Marine fauna assessment – Seabirds and shorebirds • SMP: Water quality impact assessment • SMP: Sediment quality impact assessment • SMP: Seabirds and shorebirds • OMP: Marine fauna assessment – Dugongs • SMP: Marine mega-fauna assessment – Whale sharks, cetaceans and dugongs • SMP: Benthic habitat assessment • SMP: Marine fish and elasmobranch assemblages assessment
Christmas Island Natural Areas	N/A	N/A	
South Point Settlement (Christmas Island)	N/A	N/A	
Scott Reef and Surrounds – Commonwealth Area	N/A	N/A	

Species or group	Relevant Plan/ Conservation Advice	Relevant threats and conservation actions	Relevant OMPs and SMPs
Wetlands of International Importance (refer to EP for additional description of key receptors for each location)			
Ashmore Reef National Nature Reserve	N/A	N/A	• OMP: Water quality assessment • OMP: Sediment quality assessment • OMP: Shoreline clean-up assessment • OMP: Marine fauna assessment – Seabirds and shorebirds • SMP: Water quality impact assessment • SMP: Sediment quality impact assessment • SMP: Intertidal and Coastal Habitat Assessment • SMP: Seabirds and shorebirds • OMP: Marine fauna assessment – Dugongs • SMP: Marine mega-fauna assessment – Whale sharks, cetaceans and dugongs • SMP: Benthic habitat assessment • SMP: Marine fish and elasmobranch assemblages assessment
Hosnies Spring	N/A	N/A	
The Dales	N/A	N/A	
Australian Marine Parks (refer to EP for additional description of key receptors for each location)			
Agro-Rowley Terrace	North-west Marine Parks Network Management Plan 2018 (Director of National Parks 2018)	Relevant management actions: Park protection and management—timely and appropriate preventative and restorative actions to protect natural, cultural and heritage values from impacts	• OMP: Water quality assessment • OMP: Sediment quality assessment • OMP: Shoreline clean-up assessment • OMP: Marine fauna assessment – Seabirds and shorebirds
Ashmore Reef			
Cartier Island			
Christmas Island			
Cocos (Keeling) Islands			

Species or group	Relevant Plan/ Conservation Advice	Relevant threats and conservation actions	Relevant OMPs and SMPs
Kimberley Mermaid Reef Oceanic Shoals			• SMP: Water quality impact assessment • SMP: Sediment quality impact assessment • SMP: Intertidal and Coastal Habitat Assessment • SMP: Seabirds and shorebirds • OMP: Marine fauna assessment – Dugongs • SMP: Marine mega-fauna assessment – Whale sharks, cetaceans and dugongs • SMP: Benthic habitat assessment • SMP: Marine fish and elasmobranch assemblages assessment
State and Territory Marine Reserves (refer to EP for additional description of key receptors for each location)			
North Kimberley	North Kimberley Marine Park Joint Management Plan 2016. Uunguu, Balanggarra, Miriuwung Gajerrong, and Willinggin management areas (Department of Parks and Wildlife 2016)	• Relevant management issues: oil spills, physical disturbance to reefs, anchoring from vessels, boat strike (turtles/cetaceans), lighting (turtles) • Relevant management actions: ensure the values of the park are fed into predictive models for oil spills, apply appropriate anchoring controls	• OMP: Water quality assessment • OMP: Sediment quality assessment • OMP: Shoreline clean-up assessment • OMP: Marine fauna assessment – Seabirds and shorebirds • SMP: Water quality impact assessment • SMP: Sediment quality impact assessment • SMP: Intertidal and Coastal Habitat Assessment • SMP: Seabirds and shorebirds
Scott Reef Nature Reserve	North-west Marine Parks Network Management Plan 2018 Zoning and rules (Australian Marine Parks)		
Lalang-garram/ Camden Sound Marine Park/North Lalang-garram Marine Park	Lalang-garram Marine Park Joint Management Plan (DBCA 2022)		
Rowley Shoals	Rowley Shoals Marine Park Management Plan 2007-2017 (Department of Environment and Conservation 2007)		

Species or group	Relevant Plan/ Conservation Advice	Relevant threats and conservation actions	Relevant OMPs and SMPs
			• OMP: Marine fauna assessment – Dugongs • SMP: Marine mega-fauna assessment – Whale sharks, cetaceans and dugongs • SMP: Benthic habitat assessment • SMP: Marine fish and elasmobranch assemblages assessment

APPENDIX D OSM SERVICES PROVIDER CALL OFF ORDER FORM

Oil Spill Response

Operational and Scientific Monitoring (OSM) Services Call-Out Order Form

Please do not hesitate in contacting the Duty Manager at the earliest opportunity in the event of an incident or potential incident. Please ensure you telephone the Duty Manager before e-mailing or faxing this completed form

Oil Spill Response Limited's safety policy requires us to work closely with the mobilising party to ensure all aspects of safety and security are addressed for our personnel.

To	Duty Manager
OSRL Base	Southampton, UK Loyang, Singapore Fort Lauderdale, USA
Telephone	+65 6266 1566
Emergency Fax	+65 6266 2312
Email	dutymanagers@oilspillresponse.com, osm@oilspillresponse.com

Details of Authorised Contact				
Mobilising Company				
Name of Person Authorising OSRL				
Position of Authorising Representative				
Direct Phone Number	Country Code	+	Number	
Email Address				

Operational Monitoring service to be activated (X)		**Scientific Monitoring service to be activated (X)**	
OM1 Hydrocarbon Properties and Weathering Behaviour at Sea		**SM1** Water Quality Impact Assessment	
OM2 Water Quality Assessment		**SM2** Sediment Quality Impact Assessment	
OM3 Sediment Quality Assessment		**SM3** Intertidal and Coastal Habitat Assessment	
OM4a Surface Chemical Dispersant Effectiveness and Fate Assessment		**SM4** Seabirds and Shorebirds	
OM4b Subsea Dispersant Injection Monitoring		**SM5** Marine Mega-fauna Assessment	
OM5 Marine Fauna Surveillance		**SM6** Benthic Habitat Assessment	
OM6 Shoreline Clean-up Assessment		**SM7** Marine Fish and Elasmobranch Assemblages Assessment	
		SM8 Fisheries Impact Assessment	
		SM9 Heritage Features Assessment	
		SM10 Social Impact Assessment	

Location of Port of Staging/ Departure – Port (X)		Additional Information
Ashburton		
Barrow Island		
Broome		
Cape Preston		
Dampier		
Darwin		
Derby		
Exmouth		
Onslow		
Port Hedland		
Port Walcott		
Varanus Island		
Wyndham		
Yampi Sound		

Location of Port of Staging/ Departure – Airport (X)		Additional Information
Barrow Island		
Broome		
Cape Preston		
Darwin		
Derby		
Karratha		
Learmonth		
Lombardina		
Onslow		
Pardoo		
Perth		
Port Hedland		
Roebourne		
Wallal Downs		

Request for OSM position to IMT/EMT (X)		IMT/EMT Address
OSM Implementation Lead		
OSM Field Operations Manager		
SM Coordinator		
OM Coordinator		

Invoice Address if available	
Purchase Order Number	

I, the above-named Authorising Representative for the Mobilising Company, approve activation of Oil Spill Response Limited and its resources for OSM Services under the terms of the SUPPLEMENTARY SERVICE AGREEMENT FOR OPERATIONAL AND SCIENTIFIC MONITORING (OSM) SERVICES Agreement in place between the above stated Company and Oil Spill Response PTY Limited.

Signature:		Date / Time (UTC+8):		

Please telephone the Duty Manager to confirm receipt the completed form after sending this completed form.