Woodside Energy

Woodside Operational and Scientific Monitoring Bridging Implementation Plan

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Part A – Preparedness

This Plan is presented in two parts. Part A outlines the relationship between the Woodside Energy Ltd ("Woodside") environmental management document framework and the Joint Industry Operational and Scientific Monitoring (OSM) Framework (AEP, 2021). Part B provides operationally focused guidance for Woodside personnel, OSM Services Providers and subcontracted Monitoring 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), or Oil Spill Preparedness and Response Mitigation Assessment (OSPRMA). Operational Monitoring (OM) is instrumental in providing situational awareness of a hydrocarbon spill, enabling the Corporate Incident Management Team (CIMT) or site-based 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 principal tool for determining the extent, severity and persistence of environmental impacts from a hydrocarbon spill and for informing resultant remediation activities.

Woodside 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 and Major Infrastructure (WA DTMI) under advice from the State Environmental Scientific Coordinator (ESC), Woodside will follow the direction of WA DTMI as Control Agency and provide all necessary resources (monitoring personnel, equipment and planning) to assist as a supporting agency.

Woodside 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.

As outlined in NOPSEMA's Regulatory Advice Statement (RAS) regarding APPEA's Joint Industry OSM Framework, each Titleholder is required to develop a Bridging Implementation Plan (BIP) (this plan) that explains how the Framework aligns with their specific activities, spill risks and internal management systems. This plan and Annex C of the OSPRMA fulfil that requirement.

Part A (of this plan) describes Woodside's overarching preparedness process across all activities. Annex C of the OSPRMA contains the detailed OSM preparedness planning for each activity. Part B (of this plan) outlines Woodside's mobilisation and activation process for OSM, including relevant operational information.

APPENDIX A provides guidance on the RAS requirements and reference to the relevant section of this document (or the broader suite of documents) which addresses that requirement.

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

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

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

Document	Description
Activity specific Environment Plan (EP)	Each activity-specific 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, each EP identifies sensitive receptors, potential impacts from hydrocarbon spills and the environment that may be affected (EMBA).
Oil Pollution Emergency Arrangements (OPEA) – Australia	Describes the arrangements, legislative framework and processes adopted by Woodside when responding to a hydrocarbon spill from a petroleum activity in Commonwealth and State waters.
OSPRMA (an appendix of the EP)	Evaluates response options to address the potential environmental impacts resulting from an unplanned loss of hydrocarbon containment associated with the petroleum activities program described in the EP.

Document	Description
	Performance outcomes, standards and measurement criteria related to hydrocarbon spill preparedness and response are included in this document. Of particular relevance to this plan, the OPRMA contains the activity specific preparedness planning and capability requirements, OSM Performance Standards, and OSM ALARP Assessment.
Oil Pollution First Strike Plan (an appendix of the EP and a component of the Oil Pollution Emergency Plan)	Facility specific document providing details and tasks required to mobilise a first strike response. Primarily applied to the first 24 hours of a response until a full Incident Action Plan (IAP) specific to the event is developed. Oil Pollution First Strike Plans are intended to be the first document used to provide immediate guidance to the responding IMT.
Corporate Incident Management Guideline	Provides the Corporate Incident Management Team (CIMT) team members with the resources and guidance to manage a Level 2 or 3 incident effectively.

1.1 Scope

This Operational and Scientific Monitoring – Bridging Implementation Plan (OSM-BIP) addresses the requirements of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 and Western Australian Petroleum (Submerged Lands) (Environment) Regulations 2012 for all Woodside activities within Western Australia and has been submitted with the North Rankin Complex Operations EP. This OSM-BIP applies to all Woodside activities which have an EP accepted by Commonwealth and State regulators. This Plan supersedes Woodside's Operational and Scientific Monitoring Programs and OMPs and SMPs within existing OSPRMAs. A Management of Change (MoC) has been completed to document Woodside's transition to, and adoption of, the Joint Industry OSM Framework via the OSM-BIP.

Woodside's OSM-BIP (this plan) contains the information that generally remains consistent across all activities:

- Part A outlines Woodside's planning process and available capability arrangements
- Part B details the mobilisation, activation and implementation process for OSM

Activity-specific OSM preparedness information, including detailed capability requirements, is provided in Annex C of the OSPRMA.

Together, this plan and the activity-specific OSPRMA address all relevant components of the Joint Industry OSM-BIP Template.

Prior to submission for regulatory approval, each new/revised EP shall document whether the OSM-BIP adequately covers the OSM requirements. If additional operational and/or scientific monitoring capability is required for a new activity above the OSM capability described in Section 10, the Environment Advisers in the Line, Environment Plan Delivery Coordinators and associated Project Team will follow Woodside's EP MOC and risk assessment process, to determine if new performance standards or separate resourcing is justified. Corporate Environment will support the assessment and recommendation to obtain any additional capability (if required) before the activity commences.

2 EMBA and Monitoring Priorities

2.1 EMBA and OSM Planning Area

The EMBA is defined in all Woodside EPs as the area potentially impacted by hydrocarbons from a spill event above impact concentrations. This OSM-BIP provides monitoring guidance and arrangements for all Woodside activities in Western Australia. Therefore, a Combined OSM Planning Area has been prepared to represent the geographical extent of this OSM-BIP (Figure 2-1). The Combined OSM Planning Area 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, which 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.

The OSM Planning Area has been determined based on the modelling results for all activities and worst-case credible spill scenarios outlined in Table 2-1. These spill scenarios are considered representative of Woodside's worst-case credible scenarios in Western Australia given the extent of their EMBAs, hydrocarbon types, proximity to receptors, minimum time to contact and their representation of Woodside's activity locations within Western Australia.

A description of the environment is provided in the activity-specific EPs and the Woodside Master Description of the Existing Environment. In accordance with Regulation 56 of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations (Cth) 2023, this Master Description of the Existing Environment was accepted on 30 November 2023 as Appendix D in the Griffin Gas Export Pipeline Decommissioning EP. The Master Description of the Existing Environment includes the following pertinent information: EPBC Act protected matters of national environmental significance including threatened and migratory species and any associated Part 13 Instruments: recovery plans/conservation advices, biologically important areas designations, key ecological features (KEFs), protected areas, significant socio-economic industries, and cultural-heritage significant places.

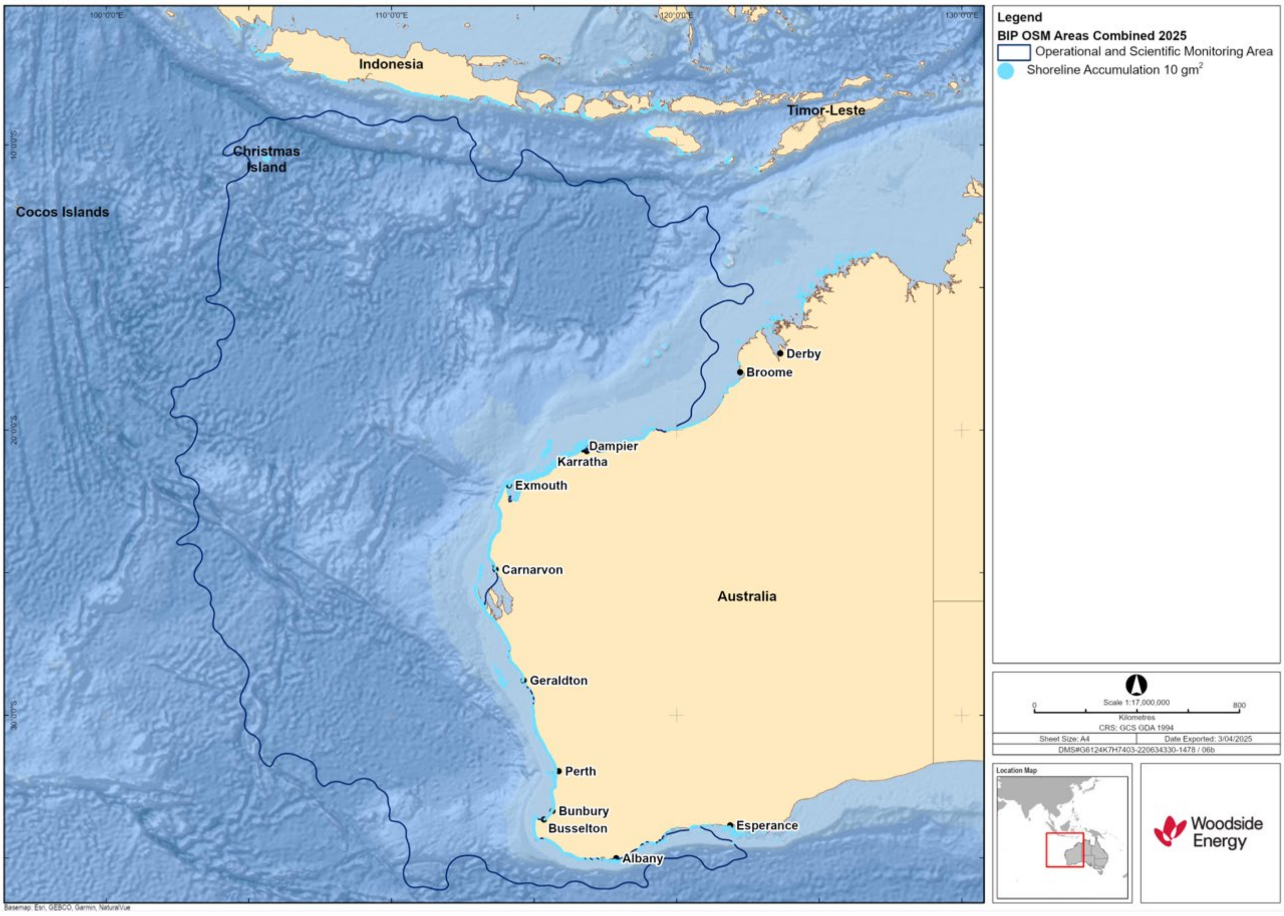

Figure 2-1: Woodside OSM Planning Area for activities in Western Australia

Table 2-1: Worst-case spill scenarios used for determining the OSM Planning Area

Environment plan (EP)/ Offshore project proposal (OPP)	Hydrocarbon type	Scenario
Goodwyn Area Infill Development OPP	PYA-01 condensate	Goodwyn area infill development surface/subsurface release of 745,012 m^3 of PYA-01 Condensate over 77 days from a loss of well integrity in the Wilcox Prospect
Scarborough Operations EP	Marine Diesel Oil (MDO)	Instantaneous surface release of 250 m^3 of MDO from a loss of vessel fuel tank integrity after a collision outside Mermaid Sound
North Rankin Complex Facility Operations EP	Goodwyn Alpha Export Condensate	16-hour subsea release of 6,371 m^3 of GWA Export Condensate at 29.89 km of Trunkline 2 Export Pipeline from shore (State waters boundary)
Okha FPSO Operations	Cossack Light Crude	Okha subsea release of 83,212 m^3 of Cossack Light Crude over 77 days from a loss of well integrity from Lambert Well LH3
Okha FPSO Operations	Cossack Light Crude	A short-term (24-hour) uncontrolled surface release of 30,302 m^3 representing loss of containment after a vessel cargo tank rupture
Pluto Operations EP	Pluto Condensate	8-hour subsea release of 662 m^3 of Pluto Condensate due to loss of export trunkline containment at state water boundary
Ngujima-Yin Floating Production Storage and Offloading (FPSO) Facility Operations EP	Cimatti Crude	Ngujima-Yin subsea release of 184,369 m^3 of Cimatti Crude over 77 days from a loss of well integrity from Cimatti-01 (CIM01) Well
Ngujima-Yin FPSO Facility Operations EP	Ngujima-Yin Topside Blend	Ngujima-Yin short-term (16 hours) surface release of 40,828 m^3 Ngujima-Yin Topside Blend caused by a vessel collision with the FPSO
Pyrenees FPSO Facility Operations EP	Pyrenees Crude	Pyrenees subsea release of 29,618 m^3 ^{o}of Pyrenees Crude over 69 days from a loss of well intergrity from Stickle-4H1 well
Pyrenees FPSO Facility Operations EP	Pyrenees Crude	Pyrenees instantaneous surface release of 14,600 m^3 ^{o}of Pyrenees Crude caused by a vessel collision with the FPSO

2.2 Monitoring Priorities

The selection of monitoring priorities is subject to the analysis of a number of criteria, with the aim of directing the available resources to those receptors and key sensitivities with the greatest need. Woodside uses the following criteria to determine monitoring priorities for each activity. The monitoring priorities relevant to each activity can be found in Annex C (OSM Activity Specific Assessment) of the OSPRMA.

2.2.1 Conservation Value

Monitoring priorities are initially informed by identifying receptors with high environmental and conservation value, including:

- Protected areas: including State and Commonwealth Marine Parks, International Union of Conservation of Nature (IUCN) marine protected area categories;
- Protected species (e.g. cetaceans, turtles, seabirds, whale sharks);
- Ecologically sensitive benthic and pelagic habitats;
- Key Ecological Features (KEFs);
- Biologically Important Areas (BIAs); and
- Cultural, heritage, and socio-economic values.

These receptors are identified in Section 4 of the activity-specific Environment Plan (EP).

2.2.2 Assess Spill Exposure Risk Using Trajectory Modelling and Receptor Vulnerability to Floating/Shoreline or Dissolved Oil

Oil spill trajectory modelling outputs for the activity's worst-case spill scenario are evaluated to determine the likelihood and timing of contact for each receptor. Monitoring priority is based on:

- Probability of contact: >10%;
- Time to contact : ≤14 days; and
- Type of exposure : floating (≥1 g/m^2), shoreline contact (≥10 g/m^2), entrained (≥10 ppb) and dissolved (≥10 ppb).

In reality, metocean conditions at the time will determine which receptors are affected and will likely comprise a smaller subset of the receptors that were identified through stochastic modelling.

The inclusion of entrained hydrocarbons at concentrations greater than 10 ppb is used to denote exposure to hydrocarbons, but does not necessarily imply toxicity. For entrained whole-oil droplets, the toxic fraction is small, as many hydrocarbon constituents remain sequestered and not bioavailable (French-McCay 2024). During the initial monitoring response, emphasis will be placed on receptors contacted by floating, shoreline, and dissolved hydrocarbon phases. If a receptor is only contacted by low concentrations of entrained hydrocarbons and not by any other hydrocarbon phase, it will be considered a lower priority during the initial monitoring response.

Another important consideration is the receptor's vulnerability to different forms of oil exposure (floating, shoreline, or dissolved) as well as its inherent sensitivity. For example, coral is highly sensitive to marine oil, but its vulnerability depends on the form of exposure. If oil is floating on the sea surface during calm conditions, it may pass over the coral without causing harm. However, if the oil is dissolved in the water column, the coral becomes directly vulnerable to its toxic effects.

2.2.3 Evaluate Availability of Adequate of Baseline Data

The extent and quality of existing baseline data is critical for determining scientific monitoring feasibility and impact assessment potential. This includes:

- Spatial and temporal coverage;
- Methodological consistency with the Joint Industry SMPs; and
- Relevance to predicted exposure areas and receptor sensitivities.

Where receptors have little or no existing baseline, they are given higher scientific monitoring priority to facilitate effective post-impact comparisons. Section 4 outlines Woodside's baseline review and evaluation process and the OSPRMA provides an assessment for each activity.

2.2.4 Consideration of Key Ecological Features, Biologically Important Areas and Transient Receptors

The marine environment includes receptors that are transient (i.e. cetaceans, seabirds, whale sharks) and other recognised elements that are broadscale, such as managed fisheries with large spatial extents, Key Ecological Features (KEFs) and Biologically Important Areas (BIAs).

It is important that these receptors and elements are recognised in OSM planning and resourcing. The activity-specific EPs list all KEFs, BIAs, fisheries and protected species that either overlap the operational area or occur with the EMBA and OSM Planning Area. The activity-specific OSPRMA provides a summary of these receptors and the relevance of OSM.

2.2.5 Initial Monitoring Priorities

As suggested in Section 2 of the Joint Industry OSM-BIP Template, Woodside has incorporated the State-based protection prioritisation evaluation into its monitoring prioritisation process. The WA DTMI protection priority rankings were established through the Western Australian Marine Oil Pollution Risk Assessment. These rankings evaluate each receptor's vulnerability to marine oil spills, considering impacts from both floating and dissolved oil. The assessment framework examines Protected Fauna; Protection Areas including Nature Reserves, Important Wetlands, Mangroves, and Sheltered intertidal flats; Cultural Heritage; Economic resources; and Social, Amenity and Recreation values.

Annex C (Table C-4) of the OSPRMA provides a list of receptors, key sensitivities and their WA DTMI rankings, along with the results of the baseline assessment provided in Annex C, Table C-2. This information is then used to determine the resultant initial monitoring priorities for the activity.

NOTE: the monitoring priorities provided in Annex C of the activity-specific OSPRMA are listed for planning purposes only. Woodside will work with its monitoring providers and key stakeholders in the initial stages of the spill regarding priority receptors and to assist in the finalisation of the monitoring design. This process is outlined in Section 13.

3 Relevant Existing Baseline Information Sources

Woodside has access to a number of different baseline data sources that are relevant to the high-value receptors in the EMBA. These include the Woodside Geographic Information System (GIS) (including habitat/fauna distribution layers and satellite imagery) and the following external data sources.

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 DTMI 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;
- Commonwealth 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.

Other sources of information including Woodside commissioned studies, 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

4.1 Baseline Data Review

Baseline monitoring provides information on the condition of receptors prior to, or spatially independent (e.g. if used as an unaffected control site) 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 and quantify environmental impact from the spill (compared to natural variation and/or impacts unrelated to the spill) is necessary. Knowing the extent, quality and suitability of existing baseline data is important in helping to prioritise the scientific monitoring response, as priority should be given to those receptors where there is no or insufficient baseline.

Understanding the presence or absence, suitability and quality of baseline data for receptors predicted to be contacted within 14 days is an important preparatory measure for OSM. During a spill event, prioritisation of the monitoring capability may be given to those receptors with insufficient baseline data 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 versus Before-After Control-Impact (BACI) design).

Woodside is part of a Joint Industry Collaborative Group who are working together to determine the extent, quality and suitability of existing baseline data for the marine environments in the North West Shelf, Browse and Timor Sea Regions of Australia. The Marine Environment Baseline Database includes available data for all receptors relevant to the Joint Industry OSM Framework and has assessed the spatial and temporal relevance of this data and comparison of methods and parameters to those outlined in the Joint Industry SMPs.

Using the Marine Environment Baseline Database, Woodside has reviewed the baseline data for all of the receptors listed in in Annex C of the OSPRMAs to help determine which receptors and key features have insufficient or no baseline data available and should be given a higher monitoring priority.

An overview of the process used to assess baseline data is provided in the steps below:

1. **Identification of receptors requiring a baseline review:** Receptors predicted to be contacted at the low thresholds within 14 days, at a probability greater than 10%, are identified and aligned with OMPs and SMPs (as per Annex C, Table C-2 in the OSPRMA).
2. **Collection of baseline data:** Environmental baseline monitoring data relevant to the receptors is located (as per sources outlined in Section 3) and included (if it is not already included) in the Marine Environment Baseline Database. A summary of the data included in the baseline assessment is provided in APPENDIX C.
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 receptor 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 APPENDIX B) is compared with the data available from studies and monitoring activities 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 follows, and summarised in Annex C, Table C-2 of the OSPRMA:
   a. Current baseline data is not in place, not suitable or not sufficient; and post-spill pre-impact baseline data collection should be prioritised; or
   b. Collectively there is substantial baseline data or on-going monitoring from within the last 5 years. These data align 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 and quantify 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.

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.

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

SMP	Key parameter	Key methodology
SM1: 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
SM2: 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
SM3: 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) • Remote sensing • Infauna sampling
SM4: 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
SM5: Marine megafauna – reptiles	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
SM5: Marine megafauna- whale sharks, dugong and cetaceans	At least one key parameter: species identification, abundance / counts, key behaviour	Aerial or vessel surveys, acoustic monitoring
SM6: 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

SMP	Key parameter	Key methodology
SM7: 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
SM8: Fisheries impact assessment	At least one key parameter: Abundance, catch-rate, stock structure, size structure	Catch and effort for stock assessment

Table 4-2: Assessment criteria for quality of environmental baseline data

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= <5 years old	High= >4 years	High= 4+ sampling trips per year	High	High
Medium= 5–10 years old	Medium= 2–4 years	Medium= 2–3 sampling trips per year	-	-
Low = >10 years old	Low= <2 years	Low= one-off sampling trip	Low	Low

5 OSM Organisational Structure

Woodside uses the Incident Command System (ICS) to respond to incidents and therefore adopts the key roles and responsibilities used in this system, as described in the activity EPs and/or OSPRMAs. The IMT will be responsible for coordinating OSM activities, which will be led by the Planning Section, with support from each Section, in particular the Operations Section.

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

Figure 5-2 illustrates the hierarchy of key OSM roles during the response phase. The IMT Incident Commander 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.

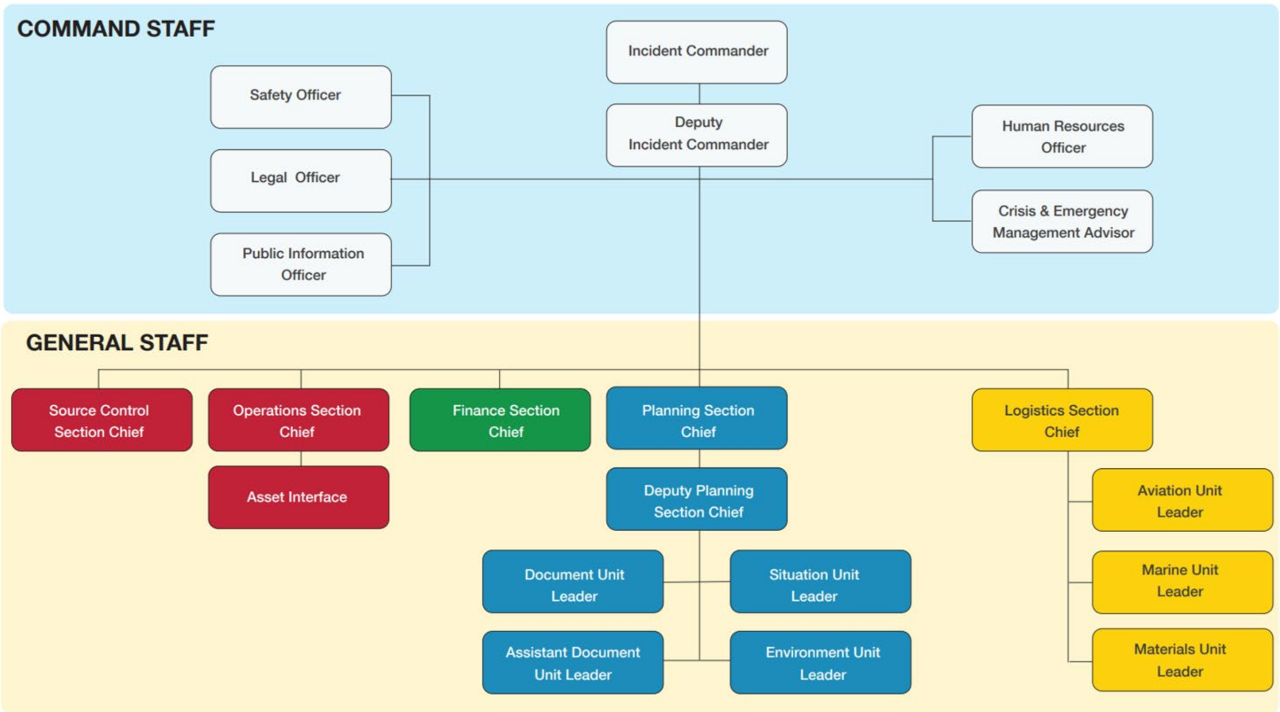

Figure 5-1: Woodside IMT Structure

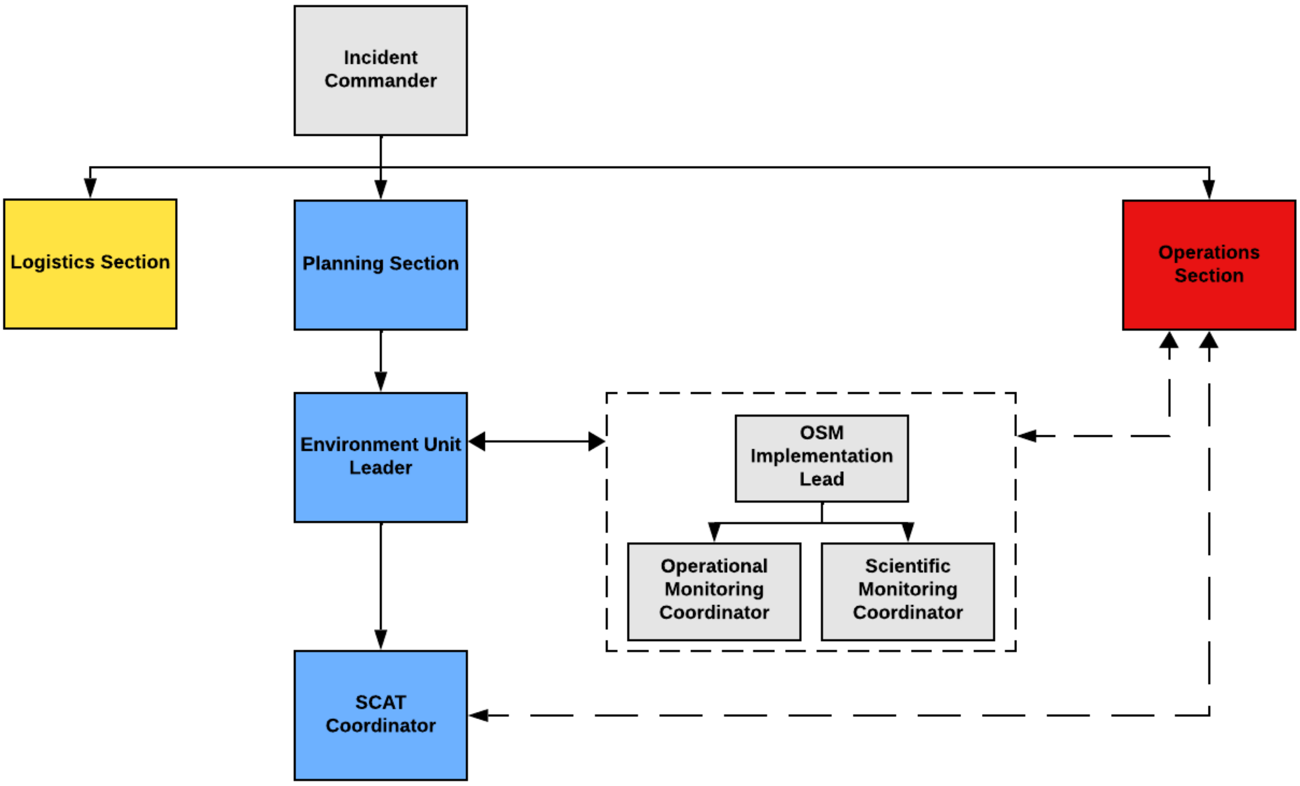

Figure 5-2: Woodside IMT Structure with OSM Team

6 OSM Roles and Responsibilities

OSM roles and responsibilities are listed in Section 10.13.2 of the Joint Industry OSM Framework, which will be adopted by Woodside and its OSM Services Provider. Table 6-1 outlines the key OSM roles held by Woodside and the OSM Services Provider.

During the post-response phase the Woodside 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 Leader	Woodside
OSM Implementation Lead	Woodside to hold position initially (0 to12 hours of notification being made to OSM Services Provider), followed by OSM Services Provider (12 hours from notification to ongoing)
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

The activity-specific OSPRMA provides an indicative implementation schedule for OMPs and SMPs in the OSM Planning Area and adjacent waters. These timeframes are an indication of worst-case minimum contact times based on stochastic modelling (stochastic modelling represents all possible outcomes that could potentially occur, in reality, only a subset of receptors will likely be contacted during a spill event). ‘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).

Due to short contact times, there may be instances where post-spill pre-impact monitoring is not feasible. For these receptors, and where baseline data does not exist, or may not be recent and applicable, the application of a BACI 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 a Gradient Approach).

8 Resourcing Requirements

OSM requires specialist personnel and equipment to coordinate activities and implement at the field level. The resources required to assist the IMT in the coordination and management of OSM are outlined in Table 8-1.

The resources required to commence operational and scientific monitoring components during weeks 1-2 are presented in Annex C of each activity-specific OSPRMA, which are based on the activity-specific monitoring priorities; the implementation schedule and the worst-case oil spill modelling trajectories for the activity – all of which are provided in the OSPRMA. Where applicable, deterministic modelling has been used in the OSPRMA to guide resourcing requirements where stochastic modelling indicates the spill may come into contact with a number of receptors.

Where monitoring programs share compatible objectives, spatial footprints, sampling methods or logistical dependencies, co-mobilisation of OMP and/or SMP teams may be undertaken to maximise efficiency and minimise vessel movements, provided that safety, data integrity and analytical objectives are not compromised. Annex C, Section C-4 of each activity-specific OSPRMA outlines when co-mobilisation of OMP and/or SMP teams may be undertaken. Co-mobilisation is particularly applicable where monitoring programs:

- target the same or adjacent environmental compartments (e.g. water column and sediment);
- use comparable sampling and analytical techniques (e.g. grab or water sampling, fluorometry, or visual transects);
- operate within the same geographic area or under the same environmental conditions (e.g. similar tidal or meteorological windows); and
- are required within a comparable timeframe following the spill (e.g. within 0–14 days post-activation).

Compatibility of OMPs and SMPs arises because many operational and scientific monitoring elements are designed to be complementary rather than sequential. For example, data collected under OM1–OM3 (hydrocarbon characterisation, water and sediment assessments) provide the initial exposure information required to inform SMPs such as SM1 and SM2 (water and sediment impact assessments). These programs use consistent sample media, laboratory protocols and QA/QC chains, enabling co-deployment without compromising scientific rigour. Similarly, concurrent vessel-based aerial or visual surveys for OM5 (Rapid Marine Fauna Surveillance) can support the early stages of SM4 and SM5 (Seabird, Shorebird and Marine Megafauna Assessments) through shared platforms and observation windows.

This approach reduces duplication of mobilisation logistics, minimises transit times between sites and sample transport while maintaining representative spatial and temporal coverage. It also supports ALARP principles by limiting the number of concurrent field assets, thereby reducing SIMOPs, vessel congestion, and overall operational risk. Where subsequent SMP phases require extended sampling or increased replication, these will be implemented independently once initial monitoring is underway.

Co-mobilisation decisions will be confirmed post-spill through the Incident Action Planning process, in consultation with the OSM Services Provider, monitoring specialists and relevant stakeholders, taking into account safety, receptor access, timing and data-quality considerations.

Through Woodside's membership in the OSRL OSM Supplementary Agreement, OSM services are available for preparedness, activation, and monitoring (Section 9). This agreement ensures operational monitoring personnel can deploy within 72 hours of notification, and scientific monitoring personnel within 5–7 days. If additional resources are required to be scaled in to support the monitoring effort, this will be identified as soon as practicable following the spill and mobilised via the OSM Services Provider Contract, which includes provision of scale-up resources.

Table 8-1: Resources required for key OSM coordination roles

Role	Resources required	Arrangement
OSM Implementation Lead (OSM Services Provider / Woodside)	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	

Role	Resources required	Arrangement
OSM Field Operations Manager (OSM Services Provider)	1 x OSM Field Operations Manager	

9 Capability Arrangements

Woodside 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 (who will report through OSRL) to deliver monitoring capability. In addition, OSRL's OSM Supplementary Service Agreement includes provision for scale-up capability in the event of response activation, allowing for scalability and adaptability of OSM resourcing.

Details of OSM services are provided in Table 9-1. Woodside will maintain responsibility for implementing air quality modelling (responder health and safety).

OSRL (referred to as the OSM Services Provider in this OSM-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-hour hotline
Provision of a suitably trained operational and scientific monitoring personnel
Monthly reports on personnel and equipment availability
Access to OSM Services Provider's sub-contracted Monitoring Service Providers
Access to OSM Sevices Provider's network of laboratories and equipment providers
Activation / Monitoring[2]
Provision of an OSM Services Lead and OSM Implementation Lead to the Woodside IMT within 12 hours of notification
Provision of an initial monitoring team within 72 hours of notification, ready to deploy from a nominated port(s) or staging location (e.g. Forward Operating Base [FOB])
Assisting Woodside 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 training and competencies held by key OSM personnel via the OSRL OSM Supplementary Service Agreement are consistent with the specified training and competencies stated in Table 11-1 of the Joint Industry OSM Framework. In addition, competencies of SMP Field Teams are consistent with Appendix D of the Joint Industry OSM Framework. The OSM Supplementary Service Agreement commits to nominated monitoring personnel providing copies of their CVs, along with certificates or evidence meeting the competency requirements. This information is stored in the OSRL Operational and Scientific Monitoring Document Management System for capability tracking and assurance purposes. The Monthly Capability Register is updated so that it reflects changes to personnel availability or gaps in competency and training. The role of the OSM Implementation Lead aligns with the responsibilities listed in the Joint Industry OSM Framework.

In addition and where practicable, Woodside will engage its most qualified local environmental advisors 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 specialised field monitoring equipment to implement individual OMPs and SMPs. Woodside 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 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
Woodside equipment	
Rapid oil sampling kits located on in-field support vessels	Woodside
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 Service 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 will conduct at least one of 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, Woodside will conduct an annual notification test of the OSM Services Provider, as outlined in the Woodside Testing of Arrangements Register.

Table 9-3: Exercise types

Exercise Type	Responsibility	Description	Frequency
Assurance Program Workshop	OSRL, Industry Member Technical Advisory Group (IMTAG) and Monitoring Service Providers	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	Woodside with OSRL	Test procedures to notify and activate the OSM Services, including subcontracted Monitoring Service Providers.	Annually
Tabletop exercise	IMTAG and OSRL to agree a lead Titleholder for each Calendar Year	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	Monitoring Service Providers & OSRL	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

Each activity-specific OSPRMA provides Woodside's worst-case capability requirements for that activity, which is assessed against the available OSRL OSM Supplementary Service Agreement capability presented in Table 10-1. If the activity-specific capability requirements exceed that available via the OSRL OSM Supplementary Service Agreement, then Woodside will follow the process described in Section 1.1.

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 OM1: Hydrocarbon Characterisation can also carry out OM2: Hydrocarbon in water assessment and OM3: Hydrocarbon in sediment assessment concurrently.

Table 10-1: Available OSM capability

Component	Personnel available via OSM Services Provider	Personnel available via OSROs	Woodside	Total Personnel Available#
OSM Personnel embedded in IMT	1 OSM Implementation Lead 1 OM Monitoring Coordinator 1 SM Coordinator 1 Field Operations Manager	-	-	1 OSM Implementation Lead 1 OM Coordinator 1 SM Coordinator 1 Field Operations Manager
OMPs				
OM1: Hydrocarbon characterisation*	6 teams	-	-	6 teams
OM2: Hydrocarbons in water	Refer to OM1: Hydrocarbon characterisation			
OM3: Hydrocarbons in sediment	Refer to OM1: Hydrocarbon characterisation			
OM4a: Surface dispersant effectiveness monitoring	1 visual observation team Refer to OM2: Hydrocarbon in water assessment*	4 AMOSC Staff 2 AMOSC Core Group trained personnel	-	Visual observations: 1 team 4 AMOSC Staff 2 AMOSC Core Group trained personnel
OM4b: Subsea dispersant injection effectiveness monitoring	1 team	-	-	1 team
OM5: Rapid marine fauna surveillance	2 teams	-	-	2 teams
OM6: Shoreline clean-up assessment	18 OSRL	60 + AMOSC Core Group 12 AMOSC staff trained in SCAT	10 staff trained in SCAT	60 + AMOSC Core Group 12 AMOSC staff 18 OSRL 10 Woodside
OM7: Air quality modelling (responder health and safety)	-	3rd party modelling provider / OSRO	-	3rd party modelling provider / OSRO
SMPs				
SM1: Water quality impact assessment	6 teams	-	-	6 teams

Component	**Personnel available via OSM Services Provider**	**Personnel available via OSROs**	**Woodside**	**Total Personnel Available[#]**
SM2: Sediment quality impact assessment	Refer to SM1: Water quality impact assessment*			
SM3: Intertidal and coastal habitat assessment	6 teams	-	-	6 teams
SM4: Seabirds and shorebirds	2 aerial teams	-	-	2 aerial teams
	5 vessel teams			4 vessel teams
	5 ground based teams			5 ground based teams
SM5: Marine mega-fauna assessment – whale shark, dugong and cetaceans	Refer to SM4: seabirds and shorebirds			
SM5: Marine mega-fauna assessment – reptiles	Aerial and vessel – Refer to SM4: seabirds and shorebirds Ground surveys – Refer to SM4: seabirds and shorebirds (plus 1 team member per team experienced with ground turtle surveys)	-		
SM6: Benthic habitat assessment	6 teams	-	-	6 teams
SM7: Marine fish and elasmobranch assemblages assessment	6 teams	-	-	6 teams
SM8: Fisheries impact assessment	2 teams	-	-	2 teams
SM9: Heritage features assessment	1 team	-	-	1 team
SM10: Social impact assessment	1 team	-	-	1 team

** Initial co-mobilisation between OM1: Hydrocarbon characterisation, OM2: Hydrocarbon in water assessment and OM3: Hydrocarbon in sediment assessment*

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

11 Document Review

As part of the Environment Plan review cycle, this document will be reviewed annually and revised, if required, in accordance with the Woodside EP Management of Change Manual. 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 provider);
- 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 matters 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 2023 Regulations (OPGGS (E) Regulations).

Part B – Implementation

Control Agencies and Jurisdictional Authorities

The Oil Pollution First Strike Plan of each Woodside EP provides 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 DTMI is the Control Agency, OM6: Shoreline Clean-up Assessment will be implemented under their direction, with resources provided by Woodside.

In addition, Section 1 of all Woodside Oil Pollution First Strike Plans provides regulatory and stakeholder notification and reporting requirements. Whilst all notification and reporting will be performed by Woodside CIMT/ 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 within Commonwealth waters.

12 Mobilisation and Activation Process

Woodside's IMT Environment Unit Leader is responsible for activating OSM components, subject to approval from the Incident Commander. Table 12-1 outlines the Woodside OSM activation process.

Table 12-1: OSM Mobilisation and Activation Process

Responsibility	Task	Timeframe[3]	Complete
Woodside Environment Unit Leader	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 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 or Deputy 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 with Woodside Logistics Section Chief 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 Individual Log	At time of completion of task	☐
Safety Officer (Woodside)	Develop a Site Safety and Control Plan	Prior to mobilisation of personnel to the field	☐
Logistics Section Chief (Woodside)	Commence arrangements for vessels, accommodation and transport to mobilise monitoring teams	Within 24 hours of spill notification	☐

[3] All timeframes stated in Part A are based on best endeavours as per the OSRL OSM Supplementary Service Agreement.

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

Responsibility	Task	Timeframe[3]	Complete
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 Woodside (via Call Off Order Form) to be sent to Woodside's IMT	Within 12 hours of notification being made to OSM Services Provider	☐
	Liaise directly with Environment Unit Leader to confirm which OMPs and SMPs are to be fully activated	Within 4 hours of monitor and evaluate data being received from IMT	☐
	Confirm availability of initial personnel and equipment resources	Within 5 hours of monitor and evaluate data being received from IMT	☐

13 Monitoring Priorities

As described in Sections 2 and 4, the available stochastic and deterministic spill trajectory modelling, in conjunction with a desktop review of any current baseline data, has been analysed to understand the likely monitoring priorities. Section C-2 (Determine activity-specific monitoring priorities) of the OSPRMA provides a review and categorisation of baseline data to assist in identifying where post-spill, pre-impact monitoring should be focused.

The information provided in Section C-2 (Determine activity-specific monitoring priorities) of the OSPRMA will be used as 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
Woodside Environment Unit Leader (or delegate)	Evaluate monitoring priorities in consultation with key stakeholders, including the appointed State/Territory Environmental Scientific Coordinator	Within 12 hours of monitor and evaluate spill data being received from IMT	☐
Woodside Environment Unit Leader (or delegate) with input from OSM Services Provider	Confirm monitoring receptors 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); • Availability of baseline data and initial monitoring priorities identified in Section C-2 (Determine activity-specific monitoring priorities) of the OSPRMA; • 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, safety and SIMOPs); and • Existing literature, baseline data, and monitoring programs.	Within 12 hours of monitor and evaluate spill data being received from IMT	☐

Responsibility	Task	Timeframe	Complete
	Using the results of the initial monitoring prioritisation assessment in Section C-2 (Determine activity-specific monitoring priorities) of the OSPRMA and the information above, determine receptors for initial 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 being received from IMT	☐
	Continually re-evaluate monitoring priorities in consultation with Environment Unit Leader and relevant key stakeholders throughout spill response	Ongoing	☐

14 Protected Matters Requirements

Table 14-1 provides a checklist to ensure monitoring personnel consider protected matters requirements in the finalisation of OMPs and SMPs.

The Woodside Master Description of the Existing Environment outlines the management plans, recovery plans and conservation advice statements relevant for the EPBC Act MNES (protected matters) within the EMBA of all Western Australian Woodside activities. This information is likely to be important for the final design of the OMPs and SMPs. The Master Description of the Existing Environment and APPENDIX B also includes relevant locations where these receptors are known to occur in order to expedite consideration of relevant information into finalised monitoring designs.

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

Responsibility	Task	Complete
Environment Unit Leader with input from OSM Services Provider	Review Monitoring, Evaluation and Surveillance data and available OM 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 the Master Description of the Existing Environment (G2000RH1401743486) and online protected matters search tool 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 fauna 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.

Woodside's checklist for finalising monitoring designs post-spill is provided in Table 15-1. The OSM Implementation Lead, in liaison with the Environment Unit Leader, will be responsible for approving the finalised monitoring design used in the OMPs and SMPs upon first deployment and ongoing monitoring.

Table 15-1: Checklist for finalising monitoring design

Responsibility	Task	Timeframe	Complete
OSM Implementation Lead in liaison with EUL and 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	Before finalising monitoring designs	☐
	Liaise with the Woodside Environment Unit Leader to review the Environmental Performance Standards listed in the activity-specific OSPRMA and integrate checks into the monitoring design that will help determine if relevant Environmental Performance Standards are being met	Before finalising monitoring designs	☐
	Scientific monitoring: • Establish the OMPs and SMPs 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 Woodside 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. Woodside will be responsible for flights, accommodation and victualing for field personnel. Woodside 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.

Note: OM7: Air quality modelling is a desk top assessment and should be mobilised as soon as practicable as it is not reliant on any mobilisation of field personnel.

Table 16-1: Checklist for mobilisation of monitoring teams

Responsibility	Task	Complete
OSM Services Provider with input from Woodside Environment Unit Leader	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	☐
	If additional resources are likely to be required to implement monitoring from week 2 onwards, this should be raised by the OSM Implementation Lead with the Environment Unit Leader and arranged via the OSM Services Provider	☐
	As part of the Incident Action Planning Process, liaise with CIMT regarding co-mobilisation of monitoring teams, giving due consideration to safety, access to sensitive receptors, timing, and data quality requirements	☐
	Undertake HAZIDs as required and consolidate/review field documentation including safety plans, emergency response plans, and daily field reports	☐

Responsibility	Task	Complete
	Develop site-specific health and safety plans which is 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 Woodside Logistics Section have arranged flights, accommodation, and car hire arrangements are in place	☐
	Develop field survey schedules, detailing staff rotation	☐
	Equipment	
	Confirm Woodside Logistics Section 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 Woodside Logistics Section 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	☐
	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 as listed in Table 17-1. For a list of locations and fisheries, refer to the Woodside Master Description of the Existing Environment and relevant sub-section of Section 4 (Description of the Existing Environment) within each activity's Environment Plan.

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

Safety Note: Due to the risk posed by unexploded ordnance, 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.

Table 17-1: Permits required in EMBA

Receptor	Jurisdictional Authority	Relevant information on permits
Permits for monitoring fauna	DCCEEW DBCA	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
State Marine Protected Area	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	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	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 Additional information on permitting requirements in Australian Marine Parks can be obtained through Parks Australia. 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
State Managed Fisheries	Department of Primary Industries and Regional Development (DPIRD)	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
Commonwealth Managed Fisheries	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
Indigenous Cultural Heritage	Department of Planning, Lands and Heritage (DPLH)	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
Defence/restricted military area	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/n2m/2010/annual/n2m/9.pdf
Industry (e.g. operational zone of offshore oil or gas platform)	Operating company	Safety zones (up to 500 m from outer edge of well or equipment) – https://www.nopsema.gov.au/safety/safety-zones/
Shipwrecks	DCCEEW	Refer to the *Underwater Cultural Heritage Act 2018* (Commonwealth): 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 CIMT/ IMT for spill response 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 Unit and/or Section. Table 18-2 provides guidance on the type of data generated from each OMP, which IMT Section/Unit 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, when available.

Analysed data will then be incorporated into the Common Operating Picture (managed by the Situation Unit Leader) and used by the Environment Unit Leader during development of the operational Spill Impact Mitigation Assessment (SIMA) (also referred to as a Net Environmental Benefit Analysis (NEBA)), which would be included in the IAP for the current or next operating period.

As ultimately responsible for the IAPs, the Planning Section Chief 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 using 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	☐
	OM data provided to the IMT Situation Unit Leader	Daily and ongoing	☐
Field Team	Reports from OM6: Shoreline Clean-up Assessment will be provided to the IMT daily, detailing the assessed areas to maximise effective utilisation of resources	Daily reporting	☐
Woodside Situation Unit Leader	Incorporate OM data into Common Operating Picture	Daily and ongoing	☐
Woodside Environment Unit Leader	Incoporate OM data into operational SIMA/NEBA 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
OM1: Hydrocarbon characterisation	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
OM2: Hydrocarbon in water assessment	Distribution of oil in water column and change in hydrocarbon concentrations (e.g. total recoverable hydrocarbons, BETEXN, PAH), physio-chemical parameters and dispersant detection	Situation Unit Leader 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.
OM3: Hydrocarbon in sediment assessment	Distribution of oil in sediment and change in hydrocarbon concentrations (e.g. Total recoverable hydrocarbons, BETEXN, PAH)	Situation Unit Leader 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
OM4a: Surface dispersant effectiveness monitoring	Visual observations of dispersant efficacy; flurometric readings 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)
OM4b: Subsea dispersant injection effectiveness monitoring	Visual observations of dispersant efficacy; flurometric readings in water column (see also water quality assessment)	Source Control Section to aid decision-making for other source control operations; Environment Unit for use in operational SIMA; Planning Section to aid in IAP development.	Determine efficacy of subsea dispersant in treating oil to help understand if injection should continue or be modified; understand the nature and extent of the subsea plume; and provide an initial assessment of potential ecological effects. 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) and also if subsea dispersants are effectively reducing volatile organic compound (VOC) levels so that operations are within lower explosive limits (LEL)
OM5: Rapid marine fauna surveillance	Rapid assessment of presence and distribution of marine fauna;	Planning Section for use in IAP; Oiled Wildlife Unit / Division to help	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

[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
	evaluate impact of spill and response activities on fauna	in developing wildlife portion of the IAP	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)
OM6: 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)
OM7: Air quality modelling (responder health and safety)	Modelled outputs of VOCs	Operations Section to help determine safe zones in close vicinity of spill; Planning Section for use in IAP	Determine safe distances from spill source for response personnel; determine the presence and persistence of volatile organic compounds to know if response areas are safe for personnel

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 relevant activity EP to ensure potential impacts from response activities are considered and 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 Woodside Environment Unit Leader (or delegate) shall review the Environmental Performance Standards (EPSs) listed in the activity-specific OSPRMA and integrate checks into the monitoring design that will help determine if relevant EPSs are being met.

Table 18-3 provides relevant EPSs listed in Woodside's activity-specific OSPRMAs and how operational monitoring may be able to confirm they are being met.

Table 18-3: Environmental Performance Standards

Environmental Performance Standard	Confirmation that EPS is being met
Shoreline Clean-up	
Clean-up operations for shorelines in line with results and recommendations from shoreline clean-up assessment outputs	Ongoing implementation of OM6: Shoreline Clean-up Assessment will involve a continual assessment of the Shoreline Clean-up operations
All shoreline clean-up sites will be zoned and marked before clean-up operations commence to prevent secondary contamination and minimise the mixing of clean and oiled sediment and shoreline substrates.	Implementation of OM6: Shoreline Clean-up Assessment will involve assessment teams mapping any demarcation zones in sensitive habitat areas
Vehicle access will be restricted on dunes, turtle nesting beaches and in mangroves.	Implementation of OM6: Shoreline Clean-up Assessment will involve assessment teams determining suitable access routes, including utilisation of existing roads and tracks
Oiled Wildlife Response	
Initiate a wildlife first strike response within a minimum of 24 hours (if required) prior to confirmed or imminent wildlife contact as directed by OM5: Rapid Marine Fauna Assessment and in liaison with DBCA	Implementation of OM5: Rapid Marine Fauna Assessment will involved a rapid assessment of fauna including species, populations, habitats and geographical locations at greatest risk from potential spill impacts

19 Data Management

Minimum standards for data management are provided in Section 10.10 of the Joint Industry OSM Framework and will be adopted by Woodside 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 Woodside and the OSM Services Provider.

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).

21 Communication Protocols

21.1 OSM Services Provider

Communication protocols between Woodside 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 Woodside 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 Woodside and its OSM Services Provider during activation (prior to deployment) will be between the Environment Unit Leader (or delegate) and the OSM Services Provider representative.
- During implementation (post deployment), primary communication occurs via two pathways:
    - Environment Unit Leader and the OSM Services Provider Duty Manager for contractual, management, scientific and general direction matters; and
    - Woodside's On-Scene Commander and the OSM Services Provider's Field Operations Manager/s / Field Team Leaders for on-site matters.
- All key OSM decisions should be logged in an ICS 214a Individual Log maintained by the OSM Implementation Lead.
- All key OSM tasks, actions and requirements should be documented in an IAP during the response phase of the spill
- The Woodside Environment Unit Leader will keep the Operations Section Chief, Logistics Section Chief and Planning Section Chief briefed of the OSM status as required.
- All correspondence (copies of emails and records of phone calls) between Woodside 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 Leader 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 Woodside Environment Unit Leader or On-Scene Commander prior to implementation.

During the post-response phase, all communications shall be between a nominated Woodside representative and the OSM Services Provider.

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.

The Woodside CIMT Public Information Officer will be the focal point for external engagement during the response operation.

Stakeholder communications post-response will be managed by the Woodside Corporate Affairs.

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, Woodside 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 Woodside 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
Woodside's Environment Unit Leader / Environment Advisor 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 drafted 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	☐

23 References

AEP (2021) Joint Industry Operational and Scientific Monitoring Plan Framework. Rev D. Report prepared by BlueSands Environmental for AEP Marine and Environmental Science Working Group.

French-McCay D (2024) Considerations for Development of Entrained Oil Thresholds for Oil Spill Risk Assessments. RPS Ocean Science. Australian Energy Producers. Available at: https://energyproducers.au/wp-content/uploads/2024/09/Oil-in-Water-Threshold-Review_French-McCay_2024Feb19-002.pdf

Kirby MF, Brant J, Moore J, Lincoln S (eds) (2018) PREMIAM – Pollution Response in Emergencies – Marine Impact Assessment and Monitoring: Post-incident monitoring guidelines. Second Edition. Science Series Technical Report. Cefas, Lowestoft.

24 Abbreviations and Acronyms

Abbreviation/Acronym	Definition
AEP	Australian Energy Producers (formerly Australian Petroleum Production and Exploration Association [APPEA]; from 13 September 2023)
AIMS	Australian Institute for Marine Science
ALA	Atlas of Living Australia
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
AODN	Australian Ocean Data Network
BACI	Before-After Control-Impact
BIA	Biologically Important Areas
BIP	Bridging Implementation Plan
BRUV	Baited Remote Underwater Video
BTEXN	Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene
CIMT	Corporate Incident Management Team
CoC	Chain of Custody
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DBCA	Western Australian Department of Biodiversity Conservation and Attractions
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DPIRD	Department of Primary Industries and Reginal Development
DPLH	Department of Planning, Lands and Heritage
DWER	WA 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
FPSO	Floating Production, Storage and Offloading
GIS	Geographic Information System
GPS	Geographic Positioning System
IAP	Incident Action Plan
ICS	Incident Command System
IMOS	Integrated Marine Observing Systemm
IMSA	Index of Marine Surveys for Assessments
IMT	Incident Management Team
KEF	Key Ecological Feature
Monitoring Service Providers	The subcontracted specialist monitoring service providers subcontracted by OSRL to perform certain operational and scientific monitoring services
MP	Marine Park
NATA	National Association of Testing Authorities
NP	National Park
NR	Nature Reserve

Abbreviation/Acronym	Definition
OM	Operational Monitoring
OMP	Operational Monitoring Plan
OPEA	Oil Pollution Emergency Arrangements- Australia
OPEP	Oil Pollution Emergency Plan
OPGGS (E)	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023
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
OSM-BIP	Operational and Scientific Monitoring-Bridging Implementation Plan
OSPRMA	Oil Spill Preparedness and Response Mitigation Assessment
OSRA	Oil Spill Response Atlas
OSRL	Oil Spill Response Limited
OSTM	Oil Spill Trajectory Modelling
PAHs	Polycyclic Aromatic Hydrocarbons
PPE	Personal Protective Equipment
QA/QC	Quality Assurance and Quality Control
ROV	Remotely Operated Vehicle
SBRUV	Stereo Baited Remote Underwater Video
SIMA	Spill Impact Mitigation Assessment
SIMOPS	Simultaneous Operations
SM	Scientific Monitoring
SMP	Scientific Monitoring Plan
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
VOC	Volatile Organic Compound
WA	Western Australia
WA DTMI	Western Australian Department of Transport and Major Infrastructure
WAMSI	Western Australian Marine Science Institution
WH	Wold Heritage

APPENDIX A DEMONSTRATION OF MEETING OSM FRAMEWORK REGULATORY REQUIREMENTS

Table A-1: RAS Requirements and Relevant Section of Woodside Documentation that Addresses the Requirement

RAS Requirement	Relevant Section of Documentation that Addresses the Requirement
Conducted an appropriate risk assessment of worst-case oil pollution scenario(s) supported by spill modelling.	Section 2.2 of the OSPRMA details the potential hydrocarbon release scenarios from the activity that were identified during the risk assessment process and that apply to that activity.
Evaluated and adopted all reasonably practicable measures to reduce oil pollution risks by preventing incidents and preparing for a timely and effective response to pollution events.	Section 6 of the EP provides a quantatative oil spill risk assessment. Sections 5 and 6 of the OSPRMA provide a detailed assessment of the control measures used to reduce consequences from spills and response activities.
Identified monitoring arrangements and resource requirements based on the worst-case oil pollution scenario(s).	The worst-case oil pollution scenarios presented in each OSPRMA have been used to determine each activity's resource requirements in Annex C (Section C-4) of the OSPRMA. Where relevant to the nature and scale of the activity, determinisitic modelling has been used to guide this assessment. Monitoring arrangements, including contracted and internal capability are presented in Sections 9 Capability Arrangements and 10 Capability Assessment.
Presented monitoring arrangements and capability that are scalable and adaptable and will provide timely information.	Section 9 Capability Arrangements outlines Woodside's monitoring arrangements via OSRL's OSM Supplementary Service Agreement, including scalable resourcing, if it is required.
Identified suitably qualified personnel who will be in decision making roles and implementing the monitoring and who are prepared for their responsibilities in advance of the incident occurring.	Section 6 OSM Roles and Responsibilities outlines personnel who will fill key OSM decision making roles. Roles filled by the OSM Services Provider are managed via the OSRL OSM Supplementary Services Agreement which specifies responsibilities for OSM response.
Established operational monitoring requirements based on the response needs and capacity reasoning applied to demonstrate ALARP for the response control measures detailed in the OPEP	Woodside has assessed the activity response needs for each spill scenario listed in Table 2-1: Worst-case spill scenarios used for determining the OSM Planning Area, range of control measures and identified capability in preparing this OSM-BIP. In addition, Woodside has undertaken an activity-specific OSM ALARP assessment in Section 6 of the OSPRMA (Operational and Scientific Monitoring – ALARP Assessment) to determine if any improvements could be made to the existing suite of control measures. Additional control measures have been adopted as part of the ALARP assessment and are listed in Section 6 of the OSPRMA (Operational and Scientific Monitoring – ALARP Assessment).
Demonstrated all feasible preparatory actions to improve reliability, effectiveness and timeliness of response arrangements and capability (including operational monitoring), have been implemented where costs are not grossly disproportionate to the environmental benefit gained	Section 6 of the OSPRMA (Operational and Scientific Monitoring – ALARP Assessment) demonstrates a detailed control measure options analysis was undertaken and all feasible control measures have been implemented.

RAS Requirement	Relevant Section of Documentation that Addresses the Requirement
Set environmental performance standards that reflect the level of performance required of the response control measures (including monitoring) to achieve the defined environmental performance outcomes.	Section 5 of the OSPRMA (OSM Environmental Performance) details all OSM Performance Standards, many of which relate directly to the RAS Requirements. Section 18.3 Operational Monitoring of Effectiveness of Control Measures and to Ensure Environmental Performance Standards are Met outlines tasks for the OSM Implementation Lead and Woodside Environment Unit Leader to ensure environmental performance standards are met via operational monitoring activities.
The EP clearly commits to initiate all OMPs as listed in Table 5-1 as per initiation criteria listed in Table 9-1.	Table 12-1: OSM Mobilisation and Activation Process provides guidance during mobilisation and Section 5 of the OSPRMA (OSM Environmental Performance) commits to OM activation in accordance with the initiation criteria in the Framework.
The EP clearly commits to initiate all SMPs as listed in Table 6-1 as per initiation criteria listed in Table 9-2.	Table 12-1: OSM Mobilisation and Activation Process provides guidance during mobilisation and Section 5 of the OSPRMA (OSM Environmental Performance) commits to SM activation in accordance with the initiation criteria in the Framework.
The EP clearly commits to the Termination Criteria listed in Table 9-1 for operational monitoring and Table 9-2 for scientific monitoring.	Table 22-1: Checklist for terminating monitoring components provides guidance during termination of monitoring and Section 5 of the OSPRMA (OSM Environmental Performance) commits to termination in accordance with the termination criteria in the Framework.
The EP clearly commits to the quality assurance and quality control items listed in Section 10.11 of the framework.	Section 20 Quality Assurance and Quality Control commits that Woodside and the OSM Services Provider will use Section 10.11 of the Joint Industry OSM Framework for QA/QC minimum standards.
The EP includes a clear commitment to use the same description of the roles and responsibilities for key emergency response personnel presented in the framework in Table 10-6.	Section 6 OSM Roles and Responsibilities commits that Woodside and the OSM Services Provider will use the key roles and responsibilities provided in Section 10.13.2 of the Framework.
The EP clearly commits to emergency response personnel having the competencies outlined in Table 11-1. However, titleholders need to ensure that regardless of the university qualifications that personnel may have, ultimately the monitoring undertaken must be of suitable experimental design, and with personnel who are trained and competent in experimental design and in situ monitoring implementation, irrespective of their qualifications, this may not be achieved.	Section 9.1 Personnel Competencies commits that Woodside and the OSM Services Provider will use the competencies outlined in Table 11-1 of the Framework.
The EP clearly commits to the minimum standards identified in Appendix A, with the addition of replacing language in the form of “should” and “where possible” with “will”. EPs that commit to the standards identified in this appendix without replacing the text described above with more definitive language will likely to be subject to a more comprehensive assessment of the arrangements in accordance with the risk factors particular to the EP and receive requests for clarification from NOPSEMA during the assessment process.	Section 5 of the OSPRMA (OSM Environmental Performance) commits that Woodside will comply with the minimum standards listed in Appendix A of the Joint Industry OSM Framework. In addition, all of the minimum standards have been reviewed and integrated into this OSM-BIP and/or supporting OSPRMA.
The EP clearly commits to meet the competencies identified for teams in Appendix D Table D1.	Section 9.1 Personnel Competencies commits that Woodside and the OSM Services Provider will use the competencies for SMP Field Teams as outlined in Appendix D of the Framework.

RAS Requirement	Relevant Section of Documentation that Addresses the Requirement
The EP clearly commits to an annual review and reviews where all the suggested triggers apply as advised in the template.	Section 11 Document Review and Section 5 of the OSPRMA (OSM Environmental Performance) commit to conducting an annual review of the OSM-BIP, providing the criteria for the review.
The EP uses the process described in Sections 2 and 13 of the template to identify the environment that may be affected and the protection and monitoring priorities, including the application of oil concentration thresholds consistent with the exposure values for oil spill modelling presented in NOPSEMA's oil spill modelling bulletin, and fully justifies the outcome.	Section 2 EMBA and Monitoring Priorities demonstrates that Woodside has applied the NOPSEMA oil spill modelling bulletin thresholds for determining the OSM Planning Area. This section also outlines the process Woodside uses for identifying monitoring priorities, as required by Section 2 of the BIP Template (step 3). This process incorporates the key elements listed in the BIP Template, including analysis of spill modelling results with receptors of high conservation value (especially receptors predicted to be contacted at higher probabilities and a rapid timeframe), availability of baseline data and transient and broadscale receptors (i.e. BIAs and KEFs). This process has then been applied in each OSPRMA (ANNEX C, Section C-2) to determine activity-specific monitoring priorities. As noted in Section 2 of the BIP template, the monitoring priorities listed are for planning purposes only and Woodside and its OSM Services Provider will follow the process outlined in Section 13 Monitoring Priorities when confirming monitoring priorities in the event of a spill.
The EP adheres to the process described in Sections 3 and 4 of the template to undertake baseline data analysis and fully justifies the outcome.	Sections 3 Relevant Existing Baseline Information Sources and 4 Baseline Data Review follow the guidance provided in the BIP Template, with the addition of more information to support continuous improvement in this area. Woodside is part of a Joint Industry Collaborative Group who are working together to determine the extent, quality and suitability of existing baseline data for the marine environments in the North West Shelf, Browse and Timor Sea Regions of Australia. The Marine Environment Baseline Database includes available data for all receptors relevant to Woodside's activities and has assessed the spatial and temporal relevance of this data and comparison of methods and parameters to those outlined in the Joint Industry SMPs, as recommended in Section 7 and Appendix A of the Framework and Section 4 of the BIP Template.
The EP makes clear, unambiguous commitment that scientific monitoring reports "will be" peer reviewed by an expert panel (Section 4, p10).	Section 5 of the OSPRMA (OSM Environmental Performance) commits that draft OSM data reports will be peer reviewed by an expert panel for data integrity. This is also stated in Section 20 Quality Assurance and Quality Control.
The EP includes clear, unambiguous activation, mobilisation, and implementation timeframes, which are relevant to the predicted time to contact of the pollution with sensitive receptors, baseline data available, sensitivities affected, practicability of implementation and/or other factors. Indicative mobilisation timeframes for OSM activities presented as worked examples in the template, for example, activation timeframes in Table 7-1 and Section 12 and implementation timeframes in Sections 13 and 15, should be revised to reflect each activity's oil pollution scenario(s) and specific response requirements.	Section 12 Mobilisation and Activation Process provides the mobilisation and activation process and timeframes for the OSRL OSM Supplementary Services Agreement. Annex C (Section C-3) of each OSPRMA provides activity-specific timeframes for mobilisation and activation that are relevant to the predicted time to contact to sensitive receptors, availability of baseline data and practicability of implementation (i.e. remote environments, timeframes for mobilising specialised equipment and personnel). In addition, Annex C (Section C-3) of each OSPRMA includes details on any monitoring components that may be required to support initial IMT decisions and aid response strategy implementation for each activity, such as SCAT to support shoreline clean-up

RAS Requirement	Relevant Section of Documentation that Addresses the Requirement
	and deployment of Tier 1 SMART Monitoring to support dispersant application effectiveness.
Monitoring implementation timeframes consider any time requirements to finalise SMPs prior to implementation being required or take actions to reduce timeframes during the pre-spill (preparedness) phase.	The timeframes for finalising SMPs have been accounted for in the timeframes provided in Part B of the OSM-BIP, in particular, Section 15 Finalising Monitoring Design and Annex C, Section C-3 (Mobilisation and timing of OMP and SMP implementation).
The EP includes OMPs that are sufficiently developed and/or finalised to ensure that they are ready to implement in the identified timeframes for operational monitoring to provide information to support initial and ongoing response decision-making.	The Joint Industry Framework includes well developed OMPs that have been socialised with the OSM Services Provider and will be finalised in the event of a spill. The timeframe for finalising the OMPs is factored into the implementation timeframes provided in Annex C (Table C-5) of the OSPRMA.
The EP identifies that operational monitoring detailed in the OMPs will be initiated, monitoring teams deployed, and information provided to the incident management team (IMT) in timeframes that match those identified and applied to the oil pollution emergency response planning in the development of the OPEP.	Annex C, Section C-3 of the OSPRMA provides indicative timeframes for initiating OMPs, taking into account the timeframe to activate and mobilise teams and finalise OMPs. This section also describes how monitor and evaluate activities and initial vessel surviellance will be used to capture operational monitoring data which will be provided to the IMT, as per the process outlined in Section 18.1 Operational Monitoring to Inform Response Activities.
The EP identifies monitoring resources in the BIP that match the monitoring and response needs in terms of numbers of personnel, teams, equipment, sites etc. Tables 8-2, 8-3 and 10-1 in the template provide a suitable method of presenting the number of personnel and teams required to resource a monitoring program, however, the content of these tables will be assessed by NOPSEMA in the context of the oil pollution scenario(s), response needs analysis and capacity reasoning presented in the EP.	The activity-specific OSPRMAs include an assessment of the OSM resourcing requirements (Tables C-8 and C-9) that are based on the individual activity's worst-case spill scenario.
The EP adheres to the exercise and testing process described in Section 9.3. Additionally, the BIP should identify the specific objectives of the testing of monitoring arrangements, ensure the frequency of the schedule of testing is consistent with the regulatory requirements and provide information on any aspects of the testing of monitoring that differ to the OPEP testing arrangements described elsewhere in the EP.	Section 9.3 Exercises is aligned to the BIP Template, outlining the types of exercises that shall be conducted by the OSM Services Provider, as per the OSRL OSM Supplementary Services Agreement; and also by Woodside.
The EP confirms that the aims and objectives of the OMPs and SMPs are appropriate for a titleholder's monitoring requirements and address the potential impacts and risks and response activities.	Section 5 (Operational and Scientific Monitoring) of the OSPRMA confirms which OMPs and SMPs are relevant to the activity and that the aims and objectives of these monitoring plans are appropriate to the needs of the spill, its risks and response activities.
The EP uses the method provided in the template for titleholders to ensure special requirements for Matters Protected Under Part 3 of the EPBC Act are met through the proposed monitoring (Section 14). However, the method indicates that this would be done prior to finalisation of OMPs and SMPs, which may not be completed in a titleholder's EP. Titleholders should ensure that relevant requirements are at least identified in the EP. This process would also be repeated during finalisation of OMPs and SMPs in the event of an oil pollution emergency to ensure any changes to requirements since submission of the EP or the latest review are included.	Woodside lists special requirements for Matters Protected Under Part 3 of the EPBC Act in Section 4 of the activity-specific EP. The relevant Protected Matters for each activity are summarised in Appendix C-2 of the activity-specific EP and also in Annex C of each OSPRMA and the process for ensuring all relevant Protected Matters are integrated into the final monitoring design is outlined in Section 14 Protected Matters Requirements.

RAS Requirement	Relevant Section of Documentation that Addresses the Requirement
The EP sets environmental performance outcomes, standards and measurement criteria that relate to the environmental impacts and risks and required level of performance of the proposed monitoring arrangements (preparedness and implementation) defined in the BIP.	Section 5 of the OSPRMA (OSM Environmental Performance) outlines a number of environmental performance outcomes, standards and measurement criteria committing Woodside to OSM preparedness and implementation performance relevant to this OSM-BIP.

APPENDIX B BACKGROUND INFORMATION FOR KEY SENSITIVITIES

Table B-1: Background information for key sensitivities for receptors predicted to be contacted within 14 days, at a probability >10%

Receptor	Receptor	Background	Key locations	Seasonality
Barrow Island	Birds	Barrow Island is recognised as a nationally significant site for migratory shorebirds, serving both as a key staging area during migration and as a non-breeding destination. It qualifies as an Important Bird Area (IBA) under the East Asian–Australasian Flyway for supporting more than 1% of the flyway populations of Grey-tailed Tattler (*Tringa brevipes*) and Ruddy Turnstone (*Arenaria interpres*) (Weller et al. 2020). The island also meets national significance thresholds for several other species, including the Red-necked Stint (*Calidris ruficollis*), Greater Sand Plover (*Charadrius leschenaultii*), Lesser Sand Plover (*Charadrius mongolus*), and Sanderling (*Calidris alba*) (Weller et al. 2020). High shorebird counts recorded outside peak migration periods suggest the island also provides important overwintering habitat for non-breeding individuals (Bamford et al. 2011). Foraging area for seabirds.	Extensive intertidal mudflats occur along the southern and south-eastern shores of Barrow Island, where sheltered coastal areas allow sand or mud to accumulate over rocky platforms. These largely unvegetated flats offer important foraging habitat for migratory shorebirds (Weller et al. 2020). Beyond the shoreline, offshore intertidal reefs also contribute valuable habitat. Notably, Bandicoot Bay in the island's south contains a large intertidal reef that provides important shorebird habitat (Weller et al. 2020).	Migratory shorebird abundances increase on the island as the birds arrive from the north during September to December. The abundances of some migratory shorebirds continue to increase in January and February, suggesting local movements of birds from the mainland to Barrow Island. Abundances decrease as the migratory species leave the region to return north at the end of summer. Summer Seabird foraging (Terns and Shearwaters)
	Turtle	The reproductive population of green turtles (*Chelonia mydas*) on Barrow Island is estimated at around 20,000 females, with nesting concentrated on high-energy beaches along the west and northeast coasts. In contrast, the flatback turtle (*Natator depressus*) nests predominantly on the east coast, where deep, low-energy sandy beaches with wide intertidal zones provide suitable habitat. Track-count data indicate a population of approximately 3,600 adult female flatbacks, of which 1,800–1,900 are estimated to nest in any given year (Chevron, n.d.). Only a small proportion	Flatback: nesting activity is concentrated on the east coast of the island on sandy, low-sloped, low-energy beaches with wide, shallow intertidal zones (Pendoley 2005; Pendoley et al. 2014). Limited nesting activity has also been recorded on the south-west, south-east, north, and north-east beaches of Barrow Island (Pendoley Environmental 2010). The approximate internesting interval (duration between a successful nest and subsequent nest or nesting attempt) of Flatback Turtles on Barrow Island is similar to other Flatback Turtle rookeries in the Pilbara region with a mean of	Flatback: nesting on Barrow Island occurs between October and March, with peak nesting activity occurring between December and January (Chevron Australia 2015; Chevron Australia 2016) Substantial aggregations of mating Green Turtles can occur in waters and on beaches along the west, north, and north-east coasts of Barrow Island between September and December (Chevron Australia 2005). Green Turtle nesting usually occurs between October and March each year, with a remigration interval of

Receptor	Receptor	Background	Key locations	Seasonality
		of green turtles nest on the south and east coast beaches (Pendoley Environmental, 2018). Green turtle nesting abundance is also known to fluctuate cyclically in response to El Niño–Southern Oscillation (ENSO) events (Limpus and Nicholls, 2000). Hawksbill turtle (*Eretmochelys imbricata*) nesting populations were estimated at approximately 100 individuals on Barrow Island, with a further 1,000 in the Lowendal Islands and 1,300 in the Montebello Islands, based on track count surveys from 1998 to 2005 (Pendoley 2005). Hawksbill nesting on Barrow Island is more temporally and spatially diffuse than flatback or green turtle nesting.	approximately 14 days, and varying year to year (Pendoley et al. 2014). Satellite tracking of 33 Flatback Turtles from Barrow Island identified four patterns of inter-nesting movement, including interesting periods where turtles travelled east, south-east, or to the mainland from Barrow Island. The slight majority of movements stayed in the nearshore area surrounding Barrow Island, within 10 km (Whittock et al. 2014). Green Turtle nesting usually occurs on the west and north-east coasts of Barrow Island. The west coast nesting beaches are high-energy, steeply sloped, sandy, and with an unobstructed foreshore approach (Chevron Australia 2005), in contrast to the low-energy beaches preferred by nesting Flatback Turtles (Pendoley 2005). Annually, only a very small percentage of these Green Turtles nest on the south and east coast beaches of Barrow Island (Pendoley Environmental 2018). Shallow foraging habitat used by adult and juvenile Green Turtles typically comprises seagrass beds or algae mats, and both juvenile and adult Green Turtles have been observed feeding year-round on algae-covered, rocky intertidal and subtidal platforms, off the west and east coasts of Barrow Island (DoE 2015a; Chevron Australia 2005). Analysis of satellite tracking data for Barrow Island Green Turtles suggests interesting habitat occurs throughout the rocky intertidal and subtidal platforms common on the west coast, around to the north-eastern beaches and waters (Chevron Australia 2005; Pendoley 2005)	approximately five years (Bjorndal 1997) and peak nesting activity occurring between December and February (Chevron Australia 2005; Pendoley 2005). Hawksbill Turtle nesting in WA occurs from September/October to January, peaking in October, but the entire breeding season remains undefined (DCCEEW 2024; Pendoley 2005). Hawksbill Turtles typically have an internesting interval of approximately 14 days and a remigration interval of approximately three years (Chevron Australia 2005; DoE 2015b).

Receptor	Receptor	Background	Key locations	Seasonality
			Surveillance of Barrow Island Hawksbill Turtle nesting has found that nesting activity is more temporally and spatially diffuse than Flatback and Green Turtle nesting activity and occurs predominantly on small, rocky, north-east coast beaches, extending down to Mushroom Beach. Very low numbers of Hawksbill Turtles nest further south along the east coast (Chevron 2015).	
	Marine mammals	Humpback whales (*Megaptera novaeangliae*) are regularly observed in the waters around Barrow Island during both their northward and southward migrations. Other whale species that may occasionally visit the area include the short-finned pilot whale (*Globicephala macrorhynchus*), false killer whale (*Pseudorca crassidens*), killer whale (*Orcinus orca*), minke whale (*Balaenoptera acutorostrata*), Bryde's whale (*Balaenoptera edeni*), sei whale (*Balaenoptera borealis*), pygmy blue whale (*Balaenoptera musculus brevicauda*), fin whale (*Balaenoptera physalus*), melon-headed whale (*Peponocephala electra*), sperm whale (*Physeter macrocephalus*), and blue whale (*Balaenoptera musculus musculus*) (DEC 2007).		Humpback whale migration: June to end of October
		Resident populations of bottlenose dolphins (*Tursiops truncatus*) and Australian humpback dolphins (*Sousa sahulensis*) are present in the shallow coastal waters of the inner Rowley Shelf, including the Barrow Island region (DEC 2007). Spinner dolphins (*Stenella longirostris*), common dolphins (*Delphinus delphis*), and striped dolphins (*Stenella coeruleoalba*) are also considered abundant in surrounding waters (DEC 2007).	Spinner dolphins, common dolphins, and striped dolphins are generally oceanic species and are likely to be most abundant on the west coast of the island (DEC 2007).	

Receptor	Receptor	Background	Key locations	Seasonality
		Significant sightings of dugongs (*Dugong dugon*) have been recorded near Barrow Island (Bancroft et al. 2000).		
	Fish	The Montebello/Barrow Islands region hosts exceptionally diverse fish communities, with over 450 species recorded, most of which occur widely across the Indo–West Pacific (Allen 2000; DEC 2007). The region's fauna is closely linked to that of the Dampier Archipelago, benefiting from larval recruitment via the Leeuwin Current, and potentially acting as a recruitment source for areas further south (Hutchins 2004; DEC 2007). Surveys around Barrow Island have documented strong habitat associations: coral reefs support the greatest diversity, dominated by damselfish, parrotfish, snappers, and groupers; macroalgae habitats serve as important nurseries; sand habitats host large transient predators such as mackerel and trevally alongside smaller benthic species; and areas rich in sessile invertebrates are frequented by emperors, threadfin bream, and trevally (Chevron Australia 2012).		
	Mangroves	Restricted areas of stunted *Avicennia marina* occurring in narrow fringing strips in embayments (DEC 2007).	*Avicennia marina* grows in sparse stands only on the east coast of Barrow Island. It is distributed in a narrow band along soft sediment and rock substrates in the upper-littoral and supra-littoral zones of the intertidal area. Mangroves are recorded at Little Bandicoot Bay and Pelican Island, as well as further east at Bandicoot Bay, where a small number of trees extend further down the intertidal zone to the mid-littoral zone. Sparse stands of trees are recorded on the	*Avicennia marina* flowering often occurs between December and January while propagules mature mostly in March (Duke 2006).

Receptor	Receptor	Background	Key locations	Seasonality
			rocky intertidal shoreline from Stokes Point along the coast up to Shark Point. Stands of mangroves are also recorded further north at Mattress Bay, Ant Point, and Square Bay. No mangrove stands are recorded on the west coast of Barrow Island (Chevron Australia 2015)	
	Coral	Surveys around Barrow Island have identified 96 species of hard coral in 48 genera from the order Scleractinia and seven soft coral genera from the suborder Alcyoniina (Chevron 2015).	The most significant coral reefs around Barrow Island are Biggada Reef on the west coast, Dugong Reef and Batman Reef off the south-east coast and along the edge of the Lowendal Shelf on the east side of Barrow Island (DEC 2007).	There are two distinct coral recruitment periods: autumn and spring (Chevron 2015).
	Non-coral benthic macro-invertebrates	The habitats on the east and west coasts of Barrow Island support different benthic macro-invertebrate assemblages. Of the 316 species of molluscs recorded from Barrow Island, less than one third occur on both coasts (Chevron Australia 2005). The muddier habitats on the east coast support a greater proportion of bivalve species, whilst the west coast supports a greater proportion of coral reef gastropod species (Chevron Australia 2005). The gastropod *Amoria macandrewi*, is endemic to sandbars within the Montebello/Barrow Islands region (Chevron Australia 2005).		
	Macroalgae	Macroalgal-dominated limestone reef and subtidal reef platform/sand mosaic are the most extensive habitat types in the Montebello/Barrow Islands region (DEC 2007). The extensive subtidal macroalgae communities are major benthic primary producers, significantly contributing to the productivity of the region, as well as providing refuge areas for fish and invertebrates (DEC2007). The macroalgal assemblages are typically dominated by species of brown algae, particularly of the genera	These communities are most commonly found on shallow limestone pavement in depths of 5 to 10 m (DEC 2007). Green algae from the genera Caulerpa and Cladophora and red algae from the genera Centroceras, Ceramium, Champia, Chondria, Gelidiopsis, and Hypnea are dominant or widespread off the east coast of Barrow Island (Chevron Australia 2005; DEC 2007; RPS Bowman Bishaw Gorham 2007). Some species, such as Avrainvillea sp. and Halimeda macroloba, appear to be	Macroalgal habitats in the Montebello/Barrow Islands region vary seasonally in response to water temperature, day length, reproductive cycles, physical disturbance and regrowth (DEC 2007).

Receptor	Receptor	Background	Key locations	Seasonality
		Sargassum, *Turbinaria* and *Padina* (Chevron Australia 2005; DEC 2007). Other common taxa include *Halimeda*, *Dictyopteris*, *Dictyota*, *Cystoseira*, *Codium* and *Laurencia*.	restricted to the east coast of Barrow Island (Chevron Australia 2005).	
	Seagrass	Seven species have been recorded to date from the Montebello/Barrow Islands region: Cymodocea angustata, *Halophila ovalis*, *H. spinulosa*, *Halodule uninervis*, Thalassia hemprichii, *Thalassodendron ciliatum* and *Syringodium isoetifolium* (DEC 2007). Of these, *Halophila spp*. Are the most common on shallow soft substrates and sand veneers throughout the region (DEC 2007).	Seagrass do not appear to form extensive beds in the area, but rather are sparsely interspersed between macroalgae, extending from the intertidal zone to approximately 15 m water depth (DEC 2007). Ephemeral seagrass are widespread on the east coast of Barrow Island (Chevron Australia 2005). Seagrass, most often *Halophila spp*., are patchily distributed on sandy subtidal habitats, and areas of bare sand devoid of seagrass are also common along the east coast of Barrow Island.	
Carnarvon Canyon AMP	Bethinc habitat	Central Western Transition ecosystems, including broad continental slope habitats with terraces, rises, and canyons. Seasonal and sporadic upwelling shapes these systems, and the area supports benthic slope communities that mix tropical and temperate species. The park contains the Carnarvon Canyon, a single-channel canyon that spans the full depth range. Its ecosystems are influenced by tropical and temperate currents, deep-water conditions, and proximity to the boundary between the continental slope and the shelf. Soft sediments at the canyon floor likely support typical deep seafloor fauna such as holothurians, polychaetes, and sea pens.		
Dampier AMP	Benthic habitat	The Dampier AMP is a hotspot for sponge biodiversity. The marine park includes several coral reefs and shoals (Parks Australia n.d.).	Delambre Reef and Tessa Shoals	

Receptor	Receptor	Background	Key locations	Seasonality
	Birds	Foraging habitat for seabirds (Parks Australia n.d.).		
	Turtles	Important inter-nesting habitat for flatback (*Natator depressus*), hawksbill (*Eretmochelys imbricata*), loggerhead (*Caretta caretta*), and green (*Chelonia mydas*) turtles (Parks Australia n.d.).		October to March
	Marine mammals	Migratory pathway for Humpback whales (*Megaptera novaeangliae*) (Parks Australia n.d.).		June to October
Dampier Region (Northern Pilbara Islands and Shoreline to and Dampier Archipelago)	Marine mammal	Humpback whales (*Megaptera novaeangliae)*: Biologically Important Area Migration for humpback whales. Females occasionally give birth in the waters of the Dampier Archipelago, although the main calving area is further north (CALM 2005)	Adult humpback whales and their young frequent the Archipelago on their southern migrations in early spring, and the Mermaid Sound (area of water between the western coastline of the Burrup Peninsula to the east of the Dampier Port, and Dampier Archipelago to the west) is a significant resting area for females with calves (MMPATF 2021; CALM 2005; CALM 1990).	Humpback whale northern migration past Pilbara occurs June and July while southern migration occurs in early spring.
		Humpback dolphins (*Sousa sahulensis*): The Australian humpback dolphin exhibit relatively small home ranges (<300 km^2) and high site fidelity (Hanf et al. 2016).	Humpback dolphins inhabit shallow, coastal waters; typically, within 20 km of land and in water depths of less than 20 m (Parra and Jedensjö 2013; Hanf et al. 2015; Hanf et al. 2021; Hunt et al. 2017). In the Pilbara, they have been recorded up to 50 km from the mainland, but possibly associated with offshore islands (Hanf et al. 2015; Hanf et al. 2021).	Humpback dolphins may be present throughout the year.
		Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) have been recorded throughout nearshore waters of the region (Hanf et al 2016; Allen et al. 2012; Hanf et al. 2021).		Indo-Pacific bottlenose dolphins may be present throughout the year.
		Current knowledge on the size of the population of the Dampier Archipelago/ Cape Preston area for dugongs (*Dugong dugon*) is limited (MMPATF 2021).	Small numbers of dugongs have been sighted in shallow, warm waters in bays and between islands, including at East Lewis Island, Cape Preston, Regnard Bay, Nickol Bay and west of Keast Island	May be present throughout the year.

Receptor	Receptor	Background	Key locations	Seasonality
			(MMPATF 2021; CALM 2005). Dugongs have a strong association with seagrass habitat. Seagrass beds are found throughout Nickol Bay and around many of the islands (Worley Parsons 2009).	
	Birds	Many of the islands are important seabird nesting sites. The Dampier Archipelago has been recognised to have Biologically Important Areas (BIAs) based on breeding for the wedge-tailed shearwater (*Ardenna pacifica*), roseate tern (*Sterna dougallii*) and Australian fairy tern (*Sternula nereis*). Important feeding and resting area for migratory shorebirds, utilising many beaches and mud flats (CALM 1990).	Angel Island: shorebird sightings: Bar-tailed godwit (*Limosa lapponica*), Ruddy turnstone (*Arenaria interpres*), Whimbrel (*Numenius phaeopus*). Brigadier Island: Shorebird sightings: Whimbrel (*Numenius phaeopus*). Cohen Island: Shorebird sightings: Ruddy turnstone (*Arenaria interpres*), Grey-tailed tattler (*Tringa brevipes*). Seabird nesting: Wedge-tailed shearwater (*Ardenna pacifica*), Caspian tern .(*Hydroprogne caspia*) Collier Rocks: Seabird nesting: Wedge-tailed shearwater (*Ardenna pacifica*). Conzinc Island: shorebird sightings: Grey-tailed tattler (*Tringa brevipes*) Seabird nesting: Wedge-tailed shearwater (*Ardenna pacifica*), Caspian tern (*Hydroprogne caspia*) Delambre Island: Seabird nesting: Wedge-tailed shearwater (*Ardenna pacifica*) Dolphin Island: shorebird sightings: Red-necked stint (*Calidris ruficollis*), Grey plover (*Pluvialis squatarola*), Grey-tailed tattler (*Tringa brevipes*) Elphick Nob: Seabird nesting: Australian fairy tern (*Sternula nereis*), Wedge-tailed shearwater (*Ardenna pacifica*). Egret Island: Seabird nesting: Caspian tern (*Hydroprogne caspia*) Enderby Island: shorebird sightings: Sharp-tailed sandpiper (*Calidris acuminata*), Oriental plover (*Charadrius veredus*), Whimbrel (*Numenius*	Australian fairy tern breeding: August-November (CALM 1990) Wedge-tailed shearwater breeding: October – April (CALM 1990; Nicholson 2002) Caspian tern .(breeding: July – October (CALM 1990) Roseate tern breeding: August – December (Higgins and Davies 1996

Receptor	Receptor	Background	Key locations	Seasonality
			phaeopus), Grey-tailed tattler (*Tringa brevipes*). Seabird nesting: Caspian tern .(*Hydroprogne caspia*) Gidley Island: Shorebird sightings: Whimbrel (*Numenius phaeopus*). Goodwyn Island: Shorebird sightings: Grey-tailed tattler (*Tringa brevipes*) Seabird nesting: Australian fairy tern (*Sternula nereis*), Wedge-tailed shearwater (*Ardenna pacifica*), Roseate tern (*Sterna dougallii*). Hauy Island: Seabird nesting: Wedge-tailed shearwater (*Ardenna pacifica*) Keast Island: Seabird nesting: Caspian tern .(*Hydroprogne caspia*), Australian Peican (*Pelecanus conspicillatus*) Kendrew Island: Seabird nesting: Australian fairy tern (*Sternula nereis*), Wedge-tailed shearwater (*Ardenna pacifica*) Lady Nora Island: Shorebird sightings: Oriental plover (*Charadrius veredus*), Whimbrel (*Numenius phaeopus*) Seabird nesting: Wedge-tailed shearwater (*Ardenna pacifica*), Caspian tern (*Hydroprogne caspia*) Legendre Island: Whimbrel (*Numenius phaeopus*), Grey-tailed tattler (*Tringa brevipes*) Seabird nesting: Wedge-tailed shearwater (*Ardenna pacifica*) Malus Island: Shorebird sightings: Grey-tailed tattler (*Tringa brevipes*) Seabird nesting: Wedge-tailed shearwater (*Ardenna pacifica*) Nelson Rocks: Shorebird sightings: Whimbrel (*Numenius phaeopus*) Roly Rocks: Seabird nesting: Wedge-tailed shearwater (*Ardenna pacifica*)	

Receptor	Receptor	Background	Key locations	Seasonality
			Rosemary Island: Shorebird sightings: Red necked stint (*Calidris ruficollis*) Seabird nesting: Caspian tern (*Hydroprogne caspia*) (CALM 2005; Higgins and Davies 1996)	
	Turtle	The waters of the Dampier Archipelago are used for breeding while the sandy beaches are regularly used for nesting by green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*) and flatback turtles (*Natator depressus*), and occasionally by loggerhead turtles (*Caretta caretta*) (CALM 2005). Leather back turtles have been recorded in waters of the Dampier Archipelago, however, do not nest in this area.	Flatback turtle: There are significant rookeries centred on Dampier Archipelago (DoEE 2017; Limpus 2007). Delambre Island, Enderby Island, Hauy Island, Keast Island and Legendre Island have records of moderate nesting (Pendoley 2019). Delmbre Island has been recognised as the largest flatback turtle rookery in Australia with an estimated 3500 nesting females per year (Pendoley 2019). Green turtle: some the nesting sites have been identified as principal near-coastal rookeries for the species (DoEE 2017; Waayers et al. 2014). Angel Island, Cohen Island, Delambre Island, Dolphin Island, Eaglehawk Island, Enderby Island, Goodwyn Island, Hauy Island, Keast Island, Lady Nora Island, Legendre Island, Malus Island, Rosemary Island, and West Lewis Island have records nesting for this species (Pendoley 2019). Hawksbill nesting in WA is centred on the Pilbara (Dampier Archipelago) (Whiting et al. 2018; Waayers et al. 2014; Limpus 2002). Rosemary Island is considered a significant breeding area, supporting the most significant hawksbill turtle rookery in the Western Australian region and one of the largest in the Indian Ocean; tens to hundreds of animals nest on the island annually, more than any other Western Australian rookery, with ~1000 nesting females nesting per year (Pendoley Environmental 2019; DoEE 2017; DSWEPC 2012d). Angel Island,	The flatback turtle nesting during the summer months (October to March) with peak nesting in November to January (DoEE 2017; CALM 2005; CALM 1990). The green turtle nesting during the summer months (November – March) with peak nesting between December to February (DoEE 2017; CALM 2005; CALM 1990). The hawksbill turtle nesting during the summer months (October – February) with peak nesting in October to January, however, are known to nest all year round in the region (DoEE 2017; DSEWPC 2012b; CALM 2005; Prince 1993; CALM 1990).

Receptor	Receptor	Background	Key locations	Seasonality
			Delambre Island, Dolphin Island, Eaglehawk Island, Enderby Island, Goodwyn Island, Malus Island and Rosemary Island have records of moderate nesting (Pendoley 2019).	
	Coral	Live coral cover can vary greatly from reef to reef, as indicated by contrasting covers of 10–60% on Sailfish Reef and Hammersley Shoal, respectively (CALM 2005).	High coral diversity is found on the seaward slopes of Delambre Island, Hammersley Shoal, Sailfish Reef, Kendrew Island and north-west Enderby Island (CALM 2005).	
	Mangroves	Six species of mangrove are found within the Dampier Archipelago/Cape Preston region: the white mangrove (*Avicennia marina*), red mangrove (*Rhizophora stylosa*), club mangrove (*Aegialitis annulata*), ribbed-fruit orange mangrove (*Brugiera exaristrata*), yellow-leaf spurred mangrove (*Ceriops tagal*) and river mangrove (*Aegiceras cornculatum*) (CALM 2005).	Most mangals occur along the mainland coast on the tidal flats at Regnard Bay, the Maitland River mouth, King Bay and Nickol Bay. Well-developed communities also occur in some of the sheltered bays on the islands, for example at West Intercourse Island, in Searipple Passage and the southern shores of West Lewis and East Lewis islands (CALM 2005). The mangrove communities at the Fortescue River delta, Cape Preston area, West Intercourse Island, Enderby Island, Searipple Passage/Conzinc Bay and Dixon Island have been assessed by Semeniuk (1997) as having international significance from a biodiversity and ecological basis (CALM 2005).	
	Seagrass	Seagrasses occur sparsely, in low diversity and low abundance, on shallow, unconsolidated sediments of sand and muddy sand (Jones 2004).	The most significant areas of seagrass are found between Keast and Legendre islands and between West Intercourse Island and Cape Preston (CALM 2005).	
Exmouth Gulf	Salt flats- extensive and significant.		Flats extend ~1,026 km^2 from Locker Point to Sandalwood Peninsula, and range from the 4.5–13 km wide (Brunskill et al. 2001; D.C. Blandford and Associates Pty Ltd and Oceanica Consulting Pty Ltd 2005).	
	Blue-green algal mats		Extensive blue-green algal mats (cyanobacterial mats) occupy the high intertidal zone along the eastern	

Receptor	Receptor	Background	Key locations	Seasonality
			(~85 km^2) and southern margins (~20 km^2) of Exmouth Gulf (Sutton and Shaw, 2021).	
	Salt marshes		Saltmarshes (namely samphire) occur extensively along the eastern intertidal margin of Exmouth Gulf, and also along the southern and western margins (Fitzpatrick et al. 2019). They also often line tidal creeks along with mangroves (Oceanica 2006).	
	Mangroves		Mangroves are extensive from Bay of Rest and Gales Bay to all along the eastern margin of Exmouth Gulf (Humphreys et al. 2005; Lyne et al. 2006; Oceanica 2006; EPA 2008; Fitzpatrick et al. 2019).	
	Reef flats and oyster beds		Low relief subtidal reef is extensive around Bundegi and North West Cape across to Muiron Islands (Bancroft and Sheridan 2000; Beckley and Lombard 2012; van Keulen and Langdon 2011). It is likely that subtidal reef flats are found around many of the islands, such as Eva and Fly Islands, which have shallow reef flats off the northern edges (Dee et al. 2020). Oyster beds are present on intertidal pavements around Heron Point (Fitzpatrick et al. 2019).	
	Macroalgae and turf algae		Macroalgae beds are a common vegetated habitat across Exmouth Gulf, occurring along the central, eastern, southern, and western margins, as well as around many of the islands to the north of Exmouth Gulf (Cassata and Collins 2004; Lyne et al. 2006; Cassata and Collins 2008; van Keulen and Langdon 2011; McLean et al. 2016; BMT 2020).	
	Seagrass		Seagrass meadows have been known to occur along the eastern, southern and	

Receptor	Receptor	Background	Key locations	Seasonality
			western margins of Exmouth Gulf, and around islands such as Muiron Islands, Burnside Island and Tent Island (Hutchins et al. 1996; RPS Bowman Bishaw Gorham 2004; Lyne et al. 2006; Oceanica 2006; Vanderklift et al. 2016). Coverage estimates for seagrasses are variable across Exmouth Gulf, noting that the extent and abundance of seagrass meadows across the whole Gulf has not been comprehensively mapped (Sutton and Shaw, 2021).	
	Corals		Soft and hard coral communities are spread around the coastal margins of Exmouth Gulf, as well as around islands inside and outside Exmouth Gulf (Lyne et al. 2006; Babcock et al. 2008b; Twiggs and Collins 2010; 360 Environmental 2017). Mainly distributed along the southern and eastern margins of Exmouth Gulf (Irvine and Salgado Kent 2019).	
	Turtles		Mainly distributed along the southern and eastern margins of Exmouth Gulf (Irvine and Salgado Kent 2019).	Observed within the gulf year-round
	Marine mammals	Exmouth Gulf is included in the Ningaloo Reef to Montebello Islands Important Marine Mammal Area, assigned by the IUCN Marine Mammal Protected Areas Task Force (IUCN-MMPATF 2021). The qualifying species include the dugong (*Dugong dugon*), Australian humpback dolphin (*Sousa sahulensis*) and humpback whale (*Megaptera novaeangliae*). Humpback whale (*Megaptera novaeangliae*) resting and nursing area		Humpback whale: June through to the end of October

Receptor	Receptor	Background	Key locations	Seasonality
		Strong evidence of dugong population connectivity between Shark Bay and Exmouth Gulf (Gales et al. 2004).	Dugongs mainly observed in shallow waters (<100m) in Exmouth Gulf and around the North West Cape (Jenner and Jenner 2005, Sleeman et al. 2007; RPS 2010)	Dugongs were reported to be more frequent in Exmouth Gulf in August (RPS 2010).
	Birds	Identified as an internationally important shorebird area (Weller et al. 2020).	Exmouth Gulf Mangroves is an Important Bird Area (IBA) and a Key Biodiversity Area (Dutson et al. 2009; Key Biodiversity Areas Partnership 2020). It extends 70 km from Giralia Bay to Turbridgi Point. The three bird species triggering the KBA criteria include the dusky gerygone (*Gerygone tenebrosa*), pied oystercatcher (*Haematopus longirostris*) and grey-tailed tattler (*Tringa brevipes*) (Key Biodiversity Areas Partnership 2020). The entire Exmouth Gulf coastline, islands (in particular Sunday Island and Muiron Islands), and the coastline from North West Cape to Point Billie are identified as an internationally important shorebird area (Weller et al. 2020). Exmouth Gulf and islands meet the 'species criteria' for International Significance (supporting >1% of the flyway population) for grey-tailed tattler, eastern curlew (*Numenius madagascariensis*) and ruddy turnstone (*Arenaria interpres*) (Onton et al. 2013; Weller et al. 2020).	Juvenile shorebirds can be found year-round. Adults usually between August and April.
Gascoyne AMP	Birds	Biologically important breeding habitat for seabirds (Parks Australia n.d.).		
	Turtle	Biologically important internesting habitat for turtles (Parks Australia n.d.).		
	Marine mammals	A migratory pathway for humpback whales (*Megaptera novaeangliae*) (Parks Australia n.d.).		June to October
		Biologically important foraging habitat and migratory pathway for pygmy blue		April to December

Receptor	Receptor	Background	Key locations	Seasonality
		whales (*Balaenoptera musculus brevicauda*) (Parks Australia n.d.).		
Glomar Shoals	Fish	The Glomar Shoals are recognised as an important habitat for several commercially and recreationally targeted fish species, including Rankin cod (*Epinephelus multinotatus*), brown-striped snapper (*Lutjanus vitta*), red emperor (*Lutjanus sebae*), crimson snapper (*Lutjanus erythropterus*), bream (*Lethrinus spp.*) and yellow-spotted triggerfish (*Pseudobalistes fuscus*) (Falkner et al. 2009; Fletcher and Santoro 2009). High catch rates of these species recorded from the Glomar Shoals suggest that the area supports high levels of productivity.		
	Turtle	According to the NESP Marine Biodiversity Hub (2017), Glomar Shoal is an important turtle foraging area: green turtles (*Chelonia mydas*) primarily feed on macroalgae, while flatback turtles (*Natator depressus*) feed on benthic filter feeders.		
	Sea snake	According to the NESP Marine Biodiversity Hub (2017), branching corals, macroalgae, and filter-feeding communities on the Glomar Shoal create habitat and supply key food resources that are critical for demersal fish assemblages and also support sea snake populations.		
Karratha to Port Hedland	Birds		The Port Hedland Saltworks is a regular non-breeding destination for both northern hemisphere and a limited range of local Australian shorebirds (Johnstone et al. 2013).	Migrating shorebirds arrive in northern Australia between late August and early November.
	Turtle	Flatback turtles (*Natator depressus*) found at Cemetery Beach and Mundabullangana are a part of the same genetic management unit as flatbacks		

Receptor	Receptor	Background	Key locations	Seasonality
		found at Thevenard Island and Barrow Island (Whittock et al. 2014)		
	Marine mammals	This area is within the known distribution of humpback dolphins (*Sousa chinensis*) (Parra et al. 2017) and Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) (Braulik et al 2019).		
Lowendal Islands	Birds	Nesting and foraging area for seabirds.	Abutilon, Beacon, Bridled, Parakeelya, and Varanus islands	Seabird nesting all year, peak Oct–Jan. Pied cormorant (*Phalacrocorax varius*) nests in winter (Nicholson 2002). Wedge-tailed shearwater (*Ardenna pacifica*) and Bridled tern (*Onychoprion anaethetus*) nest in Summer (Nicholson 2002). Silver gull (*Larus novaehollandiae*) nests in summer and Autumn (Nicholson 2002). Crested tern (*Thalasseus bergii*), Lesser crested tern (*Thalasseus bengalensis*) and Roseate tern (*Sterna dougallii*) nest in Autumn (Nicholson 2002).
	Turtle	Green (*Chelonia mydas*), flatback (*Natator depressus*) and hawksbill (*Eretmochelys imbricata*) (DEC 2007).	All beaches on Beacon, Bridled, Varanus, Abutilon, Parakeelya Islands Significant hawksbill nesting on Varanus Island (DSEWPC 2012a). Hawksbill foraging around the Lowendal Island group (DSEWPC 2012a).	Hawksbill nesting in spring and early summer (peak October) with a 20 km internesting buffer. Flatback nesting peak late December – early January with a 20 km internesting buffer (DSEWPC 2012a).
	Marine mammals	Whale species that may occasionally visit include the humpback whale (*Megaptera novaeangliae*), short-finned pilot whale (*Globicephala macrorhynchus)*, false killer whale (*Pseudorca crassidens*), killer whale (*Orcinus orca*), minke whale (*Balaenoptera acutorostrata*), Bryde's whale (*Balaenoptera edeni*), sei whale (*Balaenoptera borealis*), pygmy blue whale (*Balaenoptera musculus brevicauda*), fin whale (*Balaenoptera physalus*), melon-headed whale		

Receptor	Receptor	Background	Key locations	Seasonality
		(*Peponocephala electra*), sperm whale (*Physeter macrocephalus*) and the blue whale (*Balaenoptera musculus musculus*). Of these, only the humpback whale is a regular visitor to the area (DEC 2007).		
		The seagrass beds around the Lowendal Islands are thought to provide a valuable food source for dugong (*Dugong dugon*) (DEC 2007).		
	Mangroves	Mangroves occupy less than 0.1% of the coastline (DEC 2007).		
Montebello AMP	Benthic habitat	A key ecological feature of the Marine Park is the ancient coastline at the 125-m depth contour where rocky escarpments are thought to provide biologically important habitat in areas otherwise dominated by soft sediments (Parks Australia n.d.)	A prominent seafloor feature in the Marine Park is Trial Rocks consisting of two close coral reefs. The reefs are emergent at low tide (Parks Australia n.d.)	
	Birds	Biologically important breeding habitat for seabirds (Parks Australia n.d.).		
	Turtle	Biologically important internesting, foraging, mating, and nesting habitat for turtles (Parks Australia n.d.).		Green turtle- major nesting Nov – Mar (peak: Dec-May) Flatback- minor nesting occurs Oct-Mar (peak: Nov-Jan) Hawksbill- major nesting occurs all year (peak Oct-Jan)
	Whale shark	Biologically important habitat for whale shark (*Rhincodon typus*) (Parks Australia n.d.).		
	Marine mammals	Migratory pathway for humpback whales (*Megaptera novaeangliae*)		
Montebello Islands	Birds	According to Datazone by Birdlife the Montebello Islands were last surveyed		Wedge-tailed shearwater and bridled tern nest in summer (Nicholson 2002).

Receptor	Receptor	Background	Key locations	Seasonality
		and assessed in 2008 and 2009 by Birldife Australia, respectively, with three species meeting IBA/KBA criteria: sooty oystercatcher (*Haematopus fuliginosus*), roseate tern (*Sterna dougallii*) and fairy tern (*Sternula nereis*). Historical surveys undertaken in the late 1980s and 1990s documented that the Montebello Islands support a diverse range of breeding seabirds (Burbidge & Fuller 1998), although the size, distribution, and breeding activity of these populations may have changed considerably since that time. Wedge-tailed Shearwaters (*Puffinus pacificus*) were recorded breeding extensively across many islands, including Ah Chong, Alpha, 'Beaufortia', Brooke, Gardenia, 'Gossypium', Kingcup, Flag, Pansy, and South East, with colonies ranging from small groups to very large aggregations. Pied Cormorants (*Phalacrocorax varius*) maintained small nesting colonies on islands such as the 'Karri Islands', while Eastern Reef Egrets (*Egretta sacra*) nested sporadically on 'Bloodwood' and Buttercup. The Beach Stone-curlew (*Esacus neglectus*) appeared resident on several islands, including the 'Marri Islands', with occasional nesting observed. Both Pied (*Haematopus longirostris*) and Sooty Oystercatchers (*H. fuliginosus*) bred on multiple islands, including Alpha, 'Renewal', Hollyhock, Bluebell, and Flag. Silver Gulls (*Larus novaehollandiae*) formed large colonies on Brooke, 'Birthday', Gardenia, 'Renewal', and South East. Terns were well-represented, with Caspian Terns (*Sterna caspia*) breeding on numerous islands, including Ah Chong, Alpha, Bluebell, Dandelion, Flag, Foxglove, Gardenia, an islet south of Hermite, Ivy, 'Kunzea',		Silver gull nest in summer and Autumn (Nicholson 2002). Caspian tern nest in autumn and winter (Nicholson 2002). Crested tern, lesser crested tern, roseate tern and sooty tern nest in Autumn (Nicholson 2002). Fairy tern nest in winter and spring (Nicholson 2002).

Receptor	Receptor	Background	Key locations	Seasonality
		Marri Islands, Primrose, 'Renewal', and Trimouille. Crested Terns (S. bergii) formed very large colonies in some years on Daisy, Epsilon, 'Birthday', and Bluebell Islet, while Roseate Terns (*S. dougallii*) bred on Dahlia, Dandelion, 'Pimelia', 'Myoporum', Gannet, an islet north of Gannet, 'Fig Islands', and 'Bloodwood'. Fairy Terns (*S. nereis*) were common breeders on 'Fairy Tern Island' and 'Hibbertia', and Bridled Terns (*S. anaethetus*) were presumed summer breeders based on evidence from Dahlia, 'Gossypium', and South East. Lesser Crested Terns (*S. bengalensis*) may also have bred among Crested Tern colonies on Daisy and Epsilon, although this was not confirmed (Burbidge & Fuller 1998).		
	Turtle	The Montebello Islands support nesting by green (*Chelonia mydas*), flatback (*Natator depressus*), and hawksbill (*Eretmochelys imbricata*) turtles. The islands are recognised as critical habitat for flatback turtles and for hawksbill turtles, with key sites for the latter including Ah Chong Island, South East Island, and Trimouille Island. Within the recovery plan's classification framework, the Montebello Islands are identified as a major important nesting area for green turtles, a minor important nesting area for flatback turtles, and a major important nesting area for hawksbill turtles (Commonwealth of Australia 2017).	Hawksbill- Ah Chong Island, South East Island, Trimouille and elsewhere.	Green turtle- major nesting Nov – Mar (peak: Dec-May) on locations with sandy beaches (recovery plan) Flatback- minor nesting occurs Oct-Mar (peak: Nov-Jan) Hawksbill- major nesting occurs all year (peak Oct-Jan)

Receptor	Receptor	Background	Key locations	Seasonality
	Marine mammals	Humpback whales (*Megaptera novaeangliae*) are regular visitors to the region during their annual migration. Several whale species are known to occasionally visit the Montebello/Barrow Islands region, including the short-finned pilot whale (*Globicephala macrorhynchus*), false killer whale (*Pseudorca crassidens*), killer whale (*Orcinus orca*), minke whale (*Balaenoptera acutorostrata*), Bryde's whale (*Balaenoptera edeni*), sei whale (*Balaenoptera borealis*), pygmy blue whale (*Balaenoptera musculus brevicauda*), fin whale (*Balaenoptera physalus*), melon-headed whale (*Peponocephala electra*), sperm whale (*Physeter macrocephalus*), and the blue whale (*Balaenoptera musculus musculus*) (DEC, 2007).	Anecdotal reports suggest that sheltered waters to the west of Trimouille Island in the Montebello group may be used as a resting area for female humpbacks with calves, although the importance of this site remains uncertain (DEC, 2007).	June to end of October
		Australian humpback dolphins (*Sousa sahulensis*) were first recorded in the Montebello Islands Marine Protected Area (MPA) in June 2015 and were subsequently sighted in summer, autumn, and winter of 2017, with repeated observations in nearshore waters suggesting a year-round presence. In 2017, a five-day vessel-based photo-identification survey of fringing coral reefs and shallow, sheltered sandy lagoons (generally <10 m deep, maximum <20 m) identified 28 individuals, including six calves (one a neonate). Despite the limited survey effort, this represents a relatively high number of individuals compared with other Pilbara sites where more intensive monitoring has occurred. No matches were found between Montebello dolphins and those from mainland Pilbara waters (Exmouth, Onslow, Dampier) or nearshore islands in the Western		

Receptor	Receptor	Background	Key locations	Seasonality
		Australian Humpback Dolphin Catalogue, suggesting possible population separation. While nearshore habitat is clearly important to the species, it is unknown whether the open waters between the Montebello Islands and the mainland act as a barrier to movement. The authors note that increased survey effort in favourable conditions would likely identify more individuals and improve understanding of abundance, range, and connectivity (Raudino et al. 2018).		
		Dugong (*Dugong dugon*) are frequently recorded in the shallow, warm waters around the Montebello Islands, Lowendal Islands, and Barrow Shoals (DEC, 2007).		
	Fish	Historic surveys of the Montebello Islands have recorded 456 fish species across 75 families, a composition representative of reef communities on the mid-continental shelf of north-western Australia (Allen 2000). Most species are associated with coral reef habitats, with the ten most species-rich families: Gobiidae, Labridae, Pomacentridae, Blenniidae, Apogonidae, Serranidae, Chaetodontidae, Carangidae, Lutjanidae, and Acanthuridae comprising 54 % of the total assemblage. These families are widely distributed and typically abundant throughout the tropical Indo-Pacific. The Montebello Islands support a slightly higher species richness than the more inshore Dampier Archipelago.		
	Mangroves	Six species of mangroves occur in the Montebello Islands: white mangrove (*Avicennia marina*), ribbed-fruit orange mangrove (*Bruguiera exaristata*), yellow-leaf spurred mangrove (*Ceriops tagal*),	Stephenson Channel on Hermite Island.	

Receptor	Receptor	Background	Key locations	Seasonality
		red mangrove (*Rhizophora stylosa*), club mangrove (*Aegialitis annulata*), and river mangrove (*Aegiceras corniculatum*). The occurrence of lagoonal mangrove assemblages in an oceanic island setting is unusual and of high scientific value, with the Montebello Islands' mangrove communities regarded as globally unique (Semeniuk 1997). The largest stand, covering approximately 15 ha, is located in Stephenson Channel on Hermite Island, where individual trees reach heights of up to 5 m (DEC 2007).		
	Coral	There is a high diversity of hard coral present and they are generally in an undisturbed condition (DEC 2007).	The best developed coral reef communities are in the relatively clear water and high energy conditions of the fringing reefs to the west and south-west of the Montebello Islands, and bommies and patch reefs in the more turbid and lower energy waters along the eastern edge of the Montebello Islands (DEC 2007).	
	Macroalgae	Macroalgal-dominated limestone reef and subtidal reef platform/sand mosaic are the most extensive habitat types in the Montebello/Barrow Islands region (DEC 2007). The macroalgal assemblage is typically dominated by species of brown algae, particularly of the genera *Sargassum*, *Turbinaria* and *Pandina*. Green algae from the genera *Caulerpa*, *Cladophora* and *Rhodophyta* are also quite common.	These communities are most commonly found on shallow limestone pavement in depths of 5 to 10 m (DEC 2007).	Macroalgal habitats in the Montebello/Barrow Islands region vary seasonally in response to water temperature, day length, reproductive cycles, physical disturbance and regrowth (DEC 2007).
	Seagrass	Seven species have been recorded to date from the Montebello/Barrow Islands region: *Cymodocea angustata*, *Halophila ovalis*, *H. spinulosa*, *Halodule uninervis*, Thalassia hemprichii, *Thalassodendron ciliatum* and *Syringodium isoetifolium* (DEC 2007). Of these, *Halophila spp*. Are the most common on shallow soft	Seagrass do not appear to form extensive beds in the area, but rather are sparsely interspersed between macroalgae, extending from the intertidal zone to approximately 15 m water depth (DEC 2007).	

Receptor	Receptor	Background	Key locations	Seasonality
		substrates and sand veneers throughout the region (DEC 2007).		
Muiron Islands	Birds	Nesting area for seabirds Wedge-tailed shearwater (*Ardenna pacifica*) nesting colony, birds forage at sea in large aggregations. Crested tern (*Thalasseus bergii*) nesting colony (Department of Parks and Wildlife, 2014) Identified as an internationally important shorebird area (Weller et al. 2020).		Wedge-tailed shearwater are believed to stay in the area year-round, but undertake significant flights away from the islands around May.Returning around June, they nest in burrows on both islands spending several months preparing and re-excavating the burrows. At about 1 m long and not very deep, the burrows are subject to collapse by foot traffic. A single egg is laid around October and the chicks hatch in January (DpaW 2015).
	Turtle	Major loggerhead turtle (*Caretta caretta*) nesting site, significant green turtle (*Chelonia mydas*) nesting site, low density hawksbill turtle (*Eretmochelys imbricata*) nesting site, occasional flatback turtle (*Natator depressus*) presence		Loggerhead turtle peak nesting: November to January (Waayers 2010). Green turtle peak nesting December to January (Waayers 2010).
Ningaloo Coast World Heritage Area	Mangroves	Mangroves are not extensive.	On the east side of the Cape Range peninsula, a fringing mangal of Avicennia marina occurs to the south of Cape Murat, between Bundegi Reef and Exmouth. On the west side of the Peninsula, mangals occur at Mangrove Bay (*A. marina*, *Rhizophora stylosa* and *Bruguiera exaristata*), Low Point (*Avicennia marina*) and Yardie Creek (*A. marina* and *R. stylosa*)	
	Manta rays			Ningaloo Reef is considered an important area for Manta Rays in autumn and winter (Preen et al. 1997).
	Whale sharks	Whale Sharks aggregate in the waters of the Ningaloo Marine Park, frequently close to the Ningaloo Reef front. The aggregations coincides with the period when the Leeuwin Current is strongest. (Sleeman et al. 2010).		Peak visibility April to July (noting that whale sharks may be present throughout the year)

Receptor	Receptor	Background	Key locations	Seasonality
		The whale sharks that visit Ningaloo are mostly immature males (Sequerira et al. 2016).		
	Turtle	Four species of turtle nest in Ningaloo: Green turtle (*Chelonia mydas*), Flatback turtle (*Natator depressus*), Hawksbill turtle (*Eretmochelys imbricata*), Loggerhead turtle (*Caretta caretta*)	The most concentrated area of green turtle nesting is along the northern beaches and Muiron Islands, while loggerhead nesting is concentrated along beaches further south (Bungelup, Jane's Bay, Gnaraloo) and on South Muiron Island (Whiting 2016)	Main nesting: Hawksbill July-Mar Green Sept-Mar Flatback Sept-Mar Loggerhead Sept-Mar
	Marine mammals	Two species of dolphins are resident at Ningaloo, the Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) and the Australian humpback dolphin (*Sousa sahulensis*) (Allen et al. 2012, Jefferson & Rosenbaum 2014). Humpback whales (*Megaptera novaeangliae*) and pygmy blue whales (*Balaenoptera musculus brevicauda*) migrate past Ningaloo each year on their way to breeding grounds further north, and back again (Jenner et al. 2001; Double et al. 2014). (Note: an increasing number of humpback calves are being born at or near Ningaloo each year (Irvine et al. 2018). The waters off Ningaloo are a possible foraging BIA for pygmy blue whales (Thums et al. 2022). Killer whales (*Orcinus orca*) prey on humpback whale calves and are regularly present during the southern migration of humpback whales each year (Pitman et al. 2014).	Indo-Pacific bottlenose dolphins have been found to be primarily associated with the 20 m contour and the Muiron Islands (Hanf, 2015). A relatively dense population of have been observed around the North West Cape, suggesting that this region is of high importance to this species (Haughey et al. 2020) Humpback dolphins tend to be associated with intertidal and shallow coastal waters, as well as offshore islands (Hanf, 2015). Dugong mostly inhabit the shallow waters fringing the coast and offshore islands, occurring in close conjunction with the seagrass and algae beds on which they feed.	Humpback whales: June through to the end of October Pygmy blue whales: April to June
	Birds	Identified as an internationally important shorebird area (Weller et al. 2020). Approximately 30 bird species listed under (JAMBA), China–Australia Migratory Bird Agreement (CAMBA) and/or Republic of Korea- Australia	Significant seabird rookeries include Cape Farquhar, Pelican Point, Point Maud and Winderabandi Point (Shore of Exmouth et al. 1999).	Juvenile shorebirds can be found year-round. Adults shorebirds usually between August and April.

Receptor	Receptor	Background	Key locations	Seasonality
		Migratory Bird Agreement (ROKAMBA) have been recorded in the Cape Range National Park (DEC 2010). Habitats including the shallow sandy intertidal beaches and rocky shorelines of the Ningaloo coast are important for seabirds and waders to breed, rest and feed (Shire of Exmouth et al. 1999).		
Ningaloo AMP	Benthic habitat	The marine park acts as an ecological corridor, linking deep offshore waters at the shelf break with the coastal waters of the adjoining Ningaloo Marine Park. It contains some of Australia’s most diverse continental slope habitats, particularly along the stretch from North West Cape to the Montebello Trough. Submarine canyons within the park enhance nutrient supply, helping to sustain the exceptional biodiversity of Ningaloo Reef (Parks Australia n.d.).		
	Turtle	Biologically important internesting habitat for turtles (Parks Australia n.d.).		
	Whale shark	Biologically important foraging habitat for whale sharks (*Rhincodon typus*) (Parks Australia n.d.).		March to July each year; in some years they persist into August-October.
	Marine mammals	A migratory pathway for humpback whales (*Megaptera novaeangliae*) (Parks Australia n.d.).		June to October
		Biologically important foraging habitat and migratory pathway for pygmy blue whales (*Balaenoptera musculus brevicauda*) (Parks Australia n.d.).		April to December
		Biologically important, breeding, calving, foraging and nursing habitat for dugong (Parks Australia n.d.).		Present year-round
Rankin Bank	Benthic habitat	Across both submerged reefs, benthic communities were distinct: Rankin Bank had consistently higher cover (up to ~3×) of benthic taxa than Glomar Shoal, with phototrophs (macroalgae and hard		

Receptor	Receptor	Background	Key locations	Seasonality
		corals) up to ~22× higher and dominant to ~80 m (vs ~60 m at Glomar), consistent with greater light penetration and lower sand cover at depth around Rankin. Mean hard-coral cover at Rankin reached ~20%, comparable to shallow reefs. Depth, rugosity and location were the strongest predictors of benthic community structure (Abdul Wahab et al. 2018).		
	Fish	According to Abdul Wahab et al. (2018), fish communities at Rankin were roughly twice as abundant and ~1.6× more diverse than at Glomar Shoal, with higher abundance and diversity associated with shallow hard-coral habitats. Seafloor cover (sand, hard corals, sponges) strongly influenced fish assemblages.		
Shark Bay AMP	Benthic habitat	Central Western Transition is characterised by large areas of continental slope, a range of topographic features such as terraces, rises and canyons, seasonal and sporadic upwelling, and benthic slope communities comprising tropical and temperate species (Parks Australia n.d.).		
	Birds	Biologically important habitat for seabirds (Parks Australia n.d.).		
	Turtles	Biologically important internesting habitat for turtles (Parks Australia n.d.).		
	Marine mammals	Migratory pathway for humpback whales (*Megaptera novaeangliae*) (Parks Australia n.d.).		June to October
Southern Pilbara Islands and Shoreline	Sediment	The Department of Environment and Conservaton (DEC) investigated background contaminants in Sediments of the Pilbara in 2005 (DEC 2007). Sediment samples were collected from coastal waters at Port Hedland, Dampier Archipelago, Onslow, Ashburton River		

Receptor	Receptor	Background	Key locations	Seasonality
		Mouth and Exmouth Gulf. Samples were analysed for TBT, PAHs, TPH, BTEXN, organochlorin pesticides, PCBs, total metals and metalloids. Background sediment quality was found to be high. Total arsenic were found in high concentrations in one site off Onslow (considered natural and likely to be related to geology of the region.		
	Mangroves	Mangroves in the area form small but sometimes complex communities in embayments and on the sheltered shores of many offshore islands.	Juvenile green turtles are known to forage on mangroves and have been recorded in both Urala Creek North and Urala Creek South (AECOM 2022).	
	Turtle	Recovery Plan for Marine Turtles in Australia 2017-2027 (Commonwealth of Australia 2017) has listed critical nesting habitat in this area for Green turtle (*Chelonia mydas*), Flatback turtle (*Natator depressus*), Hawksbill turtle (*Eretmochelys imbricata*) and Loggerhead turtle (*Caretta caretta*). Flatback BIA for nesting and internesting (DCCEEW 2023). Internesting BIA for green and loggerhead turtle (DCCEEW 2023).	Thevenard Island is an important nesting area (Commonwealth of Australia 2017).	Nesting and hatching takes place between October and April. Flatback turtle nesting in the Ashburton area occurs between October and February, with peak nesting activity in December (Imbricata 2013).
	Marine mammals	Key species (O_2 Marine, 2021) : humpback whale (*Megaptera novaeangliae*), dugong (*Dugong dugon*), Australian humpback dolphin (*Sousa sahulensis*), Indo-Pacific bottlenose dolphin (*Tursiops aduncus*). Dugongs are resident in coastal waters of the Pilbara coast and are sighted year-round, having a strong association with seagrass habitat. BIAs (DCCEEW 2023): Humpback whale: migration and resting. Pygmy blue whale: distribution.		Humpback whales June to October
	Birds	Key species (O_2 Marine, 2021): Australian fairy tern (*Sternula nereis*),		Juvenile shorebirds can be found year-round.

Receptor	Receptor	Background	Key locations	Seasonality
		bar-tailed godwit- critically endangered (L*imosa lapponica menzbieri*), curlew sandpiper – critically endangered (*Calidris ferruginea*), eastern curlew- critically endangered (*Numenius madagascariensis*) Breeding and foraging BIA of Wedge-tailed shearwater (DCCEEW 2023).		Adults shorebirds usually between August and April.

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APPENDIX C BASELINE DATA SOURCES

Table C-1: Baseline data sources

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
Water quality	Chevron (2019) Wheatstone Effluent Quality Validation Report, Rev 0-20200909 (ABU200900381)	Chevron	Onslow area
	Chevron (2022) MEQMP Compliance report and data (ABU221200858)	Chevron	Barrow Island
	Chevron (2022) Wheatstone Platform Environmental Monitoring Program – draft report. 60672341 Wheatstone 5 Yearly Monitoring Technical Report-Rev A	Chevron	Wheatstone Platform
	Chevron (2018) Wheatstone Platform Waste Water Discharges Model Verification Report (ABU190601699)	Chevron	Wheatstone Platform
	Chevron (2022) Gorgon Backfill Fields Benthic Survey 2022 (ABU230100068)	Chevron	Gorgon Backfill Fields
	Pilbara Ports Authority (2019) Marine Environmental Quality Program	Pilbara Ports Authority	Dampier Dampier Archipelago Port Hedland
	O_2 Marine (2020) Mardie Project- Marine Water Quality. Prepared for Mardie Minerals Pty Ltd. Report Number R190056	O_2 Marine	Mardie
Sediment quality	Chevron (2019) Wheatstone LNG Project Mangrove Monitoring Program 2019 (ABU200800053)	Chevron	Onslow
	Chevron (2022) MEQMP 2022 Compliance report and data (ABU221200858)	Chevron	Barrow Island
	Chevron (2022) Wheatstone Platform Environmental Monitoring Program – DRAFT REPORT 60672341, Wheatstone Platform 5-Yearly Monitoring Technical Report-Rev A	Chevron	Wheatstone Platform
	Chevron (2022) Gorgon Backfill Fields Benthic Survey 2022 (ABU230100068)	Chevron	Gorgon Backfill Fields
	Pilbara Ports Authority (2019) Marine Environmental Quality Program	Pilbara Ports Authority	Dampier Dampier Archipelago Port Hedland
	O_2 Marine (2019). Mardie project- Sediment Sampling and Analysis Plan Results. Prepared for Mardie Minerals Pty Ltd. Report Number R190033	O_2 Marine	Mardie

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	O_2 Marine and Teal Solutions (2019). Port Hedland Spoilbank Marina Sediment Sampling and Analysis Plan Implementation Report. Prepared for the Department of Transport. Report Number R190209	O_2 Marine	Port Hedland
	Jones R, Wakeford M, Currey-Randall L, Miller K, Tonin H (2021) Drill cuttings and drilling fluids (muds) transport, fate and effects near a coral reef mesophotic zone. Marine Pollution Bulletin 172, 112717	AIMS	Glomar Shoal Rankin Bank
	O_2 Marine (2021) Ashburton Infrastructure Project Sediment Sampling and Analysis Plan, Fremantle, WA. Prepared for Mineral Resource Limited	O_2 Marine	Ashburton Onslow area
	Advisian (2019) Scarborough Sediment Sampling and Analysis Plan Implementation Report. Prepared for Woodside	Woodside	Dampier
	Woodside (ongoing unpublished data) Chemical and Ecological Monitoring of Mermaid Sound	Woodside	Burrup Peninsula Dampier
Intertidal and coastal habitats	Chevron (2019) Wheatstone LNG Project Mangrove Monitoring Program 2019 (ABU200800053)	Chevron	Onslow
	DBCA (long term-monitoring) Ningaloo Reef Program	DBCA	Ningaloo
	360 Environmental (2017) Learmonth Habitat Surveys. Prepared for Subsea 7	Subsea 7	Exmouth Gulf
	Woodside (ongoing unpublished data) Chemical and Ecological Monitoring of Mermaid Sound	Woodside	Burrup Peninsula Dampier
	AECOM (2022) Assessment of Benthic Communities and Habitats Ashburton Salt Project. Prepared for K + S Australian Pty Ltd. Doc No. 60692048_4.	K + S Australian Pty Ltd	Ashburton Onslow area
	Reef R and Lovelock C (2019). Characteristics of landward expansion of mangrove forests with sea level rise. Geophysical Research Abstracts 21(1), 1.	Monash University	Exmouth Gulf
	DBCA (2019) Ecological monitoring in the Shark Bay marine reserves, DBCA, Australia.	DBCA	Shark Bay
	Sutton AL and Shaw LL (2020) A snapshot of Marine Research in Shark Bay (Gathaagudu): Literature Review and Metadata Collection (1949-2020). West Australian Marine Science Institution, 180.	WAMSI	Shark Bay
	Sutton AL and Shaw JL (2021) Cumulative Pressures on the Distinctive Values of Exmouth Gulf. First draft report to the Department of Water and Environmental Regulation by the Western Australian Marine Science Institution, Australia, Western Australia. 272 pages.	WAMSI	Exmouth Gulf

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	DBCA (2023) DBCA Annual Report 2022–23, Department of Biodiversity, Conservation and Attractions, Australia. Primary productivity and energy transfer between marine ecosystems (SP 2020-002)	DBCA	Dampier Archipelago
	Astron Environmental Services (2021) Varanus and Bridled Islands Mangrove Monitoring – Annual Report 2020, unpublished report to Santos WA Energy Limited	Santos Limited	Varanus Island Bridled Island
	Ground-truthing satellite imagery that is utilised to monitor mangrove extent/density at Montebello Islands	DBCA	Montebello Islands
	Mardie Project – Off Set Plan	WAMSI	Pilbara Coast Gnoorea Yammadery Onslow Area Mainland Coast Giralia Bay
Benthic habitat	Chevron (2019) Jansz-Io Subsea Compression Benthic Video Footage Review (G7-NT-REPX0000239)	Chevron	Jannsz-lo Field
	Chevron (2022) WHS Platform Environmental Monitoring Program – DRAFT REPORT 60672341, Wheatstone Platform 5-Yearly Monitoring Technical Report-RevA	Chevron	Wheatstone Platform
	Chevron (2022) Gorgon Backfill Fields Benthic Survey (ABU230100068)	Chevron	Gorgon Backfill Fields
	Chevron (2023) Thevenard Island Retirement Project Heavy Lift Vessel Anchor Spread Benthic Habitat Mapping- Survey Report	Chevron	Thevenard Island
	DBCA (long term-monitoring) Ningaloo Reef Program	DBCA	Ningaloo
	Wahab MA, Radford B, Cappo M, Colquhoun J, Stowar M, Depczynski M, Miller K, Heyward A (2018) Biodiversity and spatial patterns of benthic habitat and associated demersal fish communities at two tropical submerged reef ecosystems. Coral Reefs, 37, 327-343, 10.1007/s00338-017-1655-9	AIMS	Glomar Shoal Rankin Bank
	O_2 Marine (2019). Mardie project- Sediment Sampling and Analysis Plan Results. Prepared for Mardie Minerals Pty Ltd. Report Number R190033	O_2 Marine	Mardie
	O_2 Marine (2019). Mardie Project – Subtidal Benthic Communities and Habitat Baseline Assessment. Prepared for Mardie Minerals Pty Ltd. Report Number R190045.	O_2 Marine	Mardie
	Jones R, Wakeford M, Currey-Randall L, Miller K, Tonin H (2021) Drill cuttings and drilling fluids (muds) transport, fate and effects near a coral reef mesophotic zone. Marine Pollution Bulletin 172, 112717	AIMS	Glomar Shoal Rankin Bank

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	O_2 Marine (2021) Benthic Communities and Habitat Ashburton Infrastructure Project, Fremantle, WA. Prepared for Mineral Resources Limited	O_2 Marine	Ashburton Onslow area
	O_2 Marine (2021). Onslow Seawater Desalination Plant. Benthic Communities and Habitat. Report No. R200065. Prepared for the Water Corporation.	O_2 Marine	Onslow area
	360 Environmental (2017) Learmonth Habitat Surveys. Prepared for Subsea 7	Subsea 7	Exmouth Gulf
	Advisian (2019) Dampier Archipelago Commonwealth Waters Marine Benthic Habitat Survey. Prepared for Woodside Energy Ltd	Woodside	Dampier Archipelago
	Mscience (2019) Scarborough Trunkline Marine Environmental Studies- Pre-dredging Coral Habitat Assessment. Report to Advisian	Advisian	Dampier Archipelago Dampier Angle Island Burrup Peninsula Conzinc Island Gidley Island Intercourse Island Malus Island Middle Island
	Woodside (ongoing unpublished data) Chemical and Ecological Monitoring of Mermaid Sound	Woodside	Burrup Peninsula Dampier
	AECOM (2022) Assessment of Benthic Communities and Habitats Ashburton Salt Project. Prepared for K + S Australian Pty Ltd. Doc No. 60692048_4.	K + S Australian Pty Ltd	Ashburton Onslow area
	O_2 Marine and Teal Solutions (2019) Port Hedland Spoilbank Marina Sediment Sampling and Analysis Plan Implementation Report. Prepared for the Department of Transport. Report Number R190209	O_2 Marine	Port Hedland
	BMT (2020) Technical Note. Learmonth Benthic Habitat Survey. Prepared for MBS Environmental	BMT	Exmouth Gulf
	Advisian (2019) Scarborough Offshore Benthic Marine Habitat Assessment. Prepared for Woodside	Woodside	Scarborough permit area WA-1-R
	Advisian (2019) Montebello Marine Park Benthic Habitat Survey ROV Analysis of the Scarborough Pipeline Route. Prepared for Woodside	Woodside	Montebello Australian Marine Park
	Moustaka M, Mohring M, Holmes T, Evans R , Thomson D, Nutt C, Stoddart J, Wilson S (2019) Cross-shelf Heterogeneity of Coral Assemblages in Northwest Australia, Diversity, vol. 11, 15pp.	DBCA Marine Science	Dampier Archipelago Regnard Island Eaglehawk Island

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Dockrell Reef Enderby Island Goodwyn Island Malus Island Conzinc Island Gidley Island Hammersley Shoal Legendre Island Delambre Island
	Thompson DP, Babcock RC, Evans RD, Feng M, Moustaka M, Orr M, Slawinski D, Wilson S, Hoey A (2021) Coral larval recruitment in north-western Australia predicted by regional and local conditions. Marine Environmental Research 168: 105318	CSIRO	Dampier Archipelago Regnard Island Eaglehawk Island Dockrell Reef Enderby Island Goodwyn Island Malus Island Conzinc Island Gidley Island Hammersley Shoal Legendre Island Delambre Island
	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	Ashmore Reef Lalang-garram Marine Park Reefs Beagle Reef Adele Island Clerke Reef Mermaid Reef Imperieuse Reef Ningaloo Station Gnaraloo Quobba
	Doropoulos C, Gomez-Lemos LA, Salee K, McLaughlin MJ, Tebben J, Van Koningsveld M, Feng M, Babock R (2021). Limitations to coral recovery along an environmental stress gradient. Ecological Applications. 2022; 32:e2558.	CSIRO	Exmouth Gulf Exmouth

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Ningaloo Coral Bay
	Edgeloe JM, Severn-Ellis AA, Bayer PE, Mehravi S, Breed MF, Krauss SL, Batley J, Kendrick GA, Sinclair EA. 2022 Extensive polyploid clonality was a successful strategy for seagrass to expand into a newly submerged environment. Proc. R. Soc. B20220538. https://doi.org/10.1098/rspb.2022.0538	UWA	Shark Bay
	McLean D and Birt M. (2021) Enhanced ROV survey of tropical fish and benthic communities associated with shallow oil and gas platforms. Research Square	AIMS	Varanus Island
	Sutton AL and Shaw LL (2020) A snapshot of Marine Research in Shark Bay (Gathaagudu): Literature Review and Metadata Collection (1949-2020). West Australian Marine Science Institution, 180.	WAMSI	Shark Bay
	Sutton AL and Shaw JL (2021) Cumulative Pressures on the Distinctive Values of Exmouth Gulf. First draft report to the Department of Water and Environmental Regulation by the Western Australian Marine Science Institution, Australia, Western Australia. 272 pages.	WAMSI	Exmouth Gulf
	DBCA (2023), Biodiversity and Conservation Science Annual Report 2022–23, DBCA, Australia. Primary productivity and energy transfer between marine ecosystems (SP 2020-002)	DBCA	Dampier Archipelago
	DBCA (2023), Biodiversity and Conservation Science Annual Report 2022–23, DBCA, Australia. Understanding the key ecosystem services provided by the seagrass meadows of Western Australia (SP 2018-136)	DBCA	Shark Bay
	National Reef Monitoring Network	The IMOS National Reef Monitoring Network sub-Facility	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

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Geographe Bay
	Ningaloo Outlook	CSIRO	Ningaloo World Heritage Area
	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	Western Australia Cocos Keeling Islands Ashmore Reef Scott Reef Rowley Shoals Montebello Islands Group Barrow Island Ningaloo Reef Shark Bay
	Evans RD, Wilson SK, Fisher R, Ryan NM, Babcock R, Blakeway D, Bond T, Dorji P, Dufois F, Fearns P, Lowe RJ, Stoddart J, Thomson DP (2020) Early recovery dynamics of turbid coral reefs after recurring bleeching events. Journal of Environmental Management 268 110666	DBCA	West Pilbara
	Helmholz P, Bassett T, Boyle L, Browne N, Parnum I, Moustaka M, Evans R (2024) Evaluating Linear Coral Growth Estimation Using Photogrammetry and Alternative Point Cloud Comparison Method. The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume XLVIII-2-2024 ISPRS TC II Mid-term Symposium "The Role of Photogrammetry for a Sustainable World", 11–14 June 2024, Las Vegas, Nevada, USA	Curtin University	Enderby Island, Dampier Archipelago
	Moustaka M, Evans RD, Kendrick GA, Hyndes GA, Cuttler MVW, Bassett TJ, O'Leary MJ, Wilson SK (2024) Local habitat composition and complexity outweigh seascape effects on fish distribution across a tropical seascape. Landsc Ecol 39:28 https://doi.org/10.1007/s10980-024-01814-2	DBCA	Dampier Archipelago
	Travaglione N, Evans R, Moustaka M, Cuttler M, Thompson DP, Tweedy J, Wilson (2023) Scleractininan corals rely on heterotrophy in highly turbid environments. Coral Reefs https://doi.org/10.1007/s00338-023-02407-2	AIMS	Dampier Archipelago
Marine fish and elasmobranchs	Chevron (2019) Jansz-Io Subsea Compression Benthic Video Footage Review (G7-NT-REPX0000239)	Chevron	Jansz-Io field
	Chevron (2021) Wheatstone Sawfish Progress Report	Chevron	Onslow area
	Chevron (2022) Gorgon Backfill Fields Benthic Survey 2022 (ABU230100068)	Chevron	Gorgon Backfill Fields
	DBCA (long term-monitoring) Ningaloo Reef Program	DBCA	Ningaloo

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Wahab MAA, Radford B, Cappo M, Colquhoun J, Stowar M, Depczynski M, Miller K, Heyward A (2018) Biodiversity and spatial patterns of benthic habitat and associated demersal fish communities at two tropical submerged reef ecosystems Coral Reefs, 37, 327-343, 10.1007/s00338-017-1655-9	AIMS	Glomar Shoal Rankin Bank
	Jones R, Wakeford M, Currey-Randall L, Miller K, Tonin H (2021) Drill cuttings and drilling fluids (muds) transport, fate and effects near a coral reef mesophotic zone. Marine Pollution Bulletin 172, 112717	AIMS	Glomar Shoal Rankin Bank
	Morgan D, Lear K, Norman B (2020) Sawfish surveys Urala Creek, Exmouth Gulf, February 2019. Report to AECOM. Centre for Sustainable Aquatic Ecosystems, Harry Butler Institute, Murdoch University, Australia, Western Australia	Murdoch University	Ashburton Exmouth Gulf
	Schramm KD, Marnane MJ, Elsdon TS, Jones CM, Saunders BJ, Newman SJ, Harvey ES (2021) Fish associations with shallow water subsea pipelines compared to surrounding reef and soft sediment habitats. Sci Rep 11, 6238 . https://doi.org/10.1038/s41598-021-85396-y	Curtin University	Thevenard Island
	Galaiduk R, Radford B, Case M, Bond T, Taylor M, Cooper T, Smith L and McLean D (2022) Regional patterns in demersal fish assemblages among subsea pipelines and natural habitats across north-west Australia. Front. Mar. Sci. 9:979987. Doi: 10.3389/fmars.2022.979987	AIMS	Rankin Bank Glomar Shoal Thevenard Island
	Currey-Randall LM, Galaiduk R, Stowar M, Vaughan BI, Miller KJ (2021) Mesophotic fish communities of the ancient coastline in Western Australia. PloS ONE 16(4): e0250427. https://doi. Org/10.1371/journal.pone.0250427	AIMS	Locations associated with the ancient coastline KEF at depths greater than 125 m
	McLean D and Birt M. (2021) Enhanced ROV survey of tropical fish and benthic communities associated with shallow oil and gas platforms. Research Square	AIMS	Varanus Island
	McLean DL, Vaughan BI, Malseed BE, Taylor MD (2020) Fish-habitat associations on a subsea pipeline within an Australian Marine Park, Marine Environmental Research 123, 104813	AIMS	Montebello Australian Marine Park
	Sutton AL and Shaw LL (2020) A snapshot of Marine Research in Shark Bay (Gathaagudu): Literature Review and Metadata Collection (1949-2020). West Australian Marine Science Institution, 180.	WAMSI	Shark Bay
	Sutton AL and Shaw JL (2021) Cumulative Pressures on the Distinctive Values of Exmouth Gulf. First draft report to the Department of Water and Environmental Regulation by the Western Australian Marine Science Institution, Australia, Western Australia. 272 pages.	WAMSI	Exmouth Gulf

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	DBCA (2023), Biodiversity and Conservation Science Annual Report 2022–23, Department of Biodiversity, Conservation and Attractions, Australia. Benefits of marine parks for marine fishes in a changing climate (SP 2021-040)	DBCA	WA State Marine Parks
	DBCA (2023), Biodiversity and Conservation Science Annual Report 2022–23, Department of Biodiversity, Conservation and Attractions, Australia. Do marine reserves adequately represent high diversity cryptobenthic fish assemblages in a changing climate? (SP 2019-031)	DBCA	Ningaloo
	National Reef Monitoring Network	The IMOS National Reef Monitoring Network sub-Facility	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
	Ningaloo Outlook	CSIRO	Ningaloo Coast World Heritage Area
	Lear KO, Ebner BC, Fazeldean T, Bateman RL, Morgan DL (2024) Effects of coastal development on sawfish movements and the need for marine animal crossing solutions. Conservation Biology, e14263. https://doi.org/10.1111/cobi.14263	Murdoch University	Onslow Area
	Heupel M, Simpfendorfer C, Chin A, Appleyard S, Barton D, Green M, Johnson G, McAuley R and White W (2020) Examination of connectivity of hammerhead sharks in northern Australia. Report to the National Environmental Science Program, Marine Biodiversity Hub. Australian Institute of Marine Science.	AIMS	Emouth Gulf Broome
	Moustaka M, Evans RD, Kendrick GA, Hyndes GA, Cuttler MVW, Bassett TJ, O'Leary MJ, Wilson SK (2024) Local habitat composition and complexity outweigh seascape effects on fish distribution across a tropical seascape. Landsc Ecol 39:28 https://doi.org/10.1007/s10980-024-01814-2	DBCA	Dampier Archipelago

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Tebbett SB, Bellwood DR, Bassett T, Cuttler MVW, Moustaka M, Wilson SK, Yan HF, Evans RD (2023) The limited role of herbivorous fishes and turf-based trophic pathways in the functioning of turbid coral reefs. Rev Fish Biol Fisheries https://doi.org/10.1007/s11160-023-09823-1	Curtin University	Dampier Archipelago
Fisheries	State of the Fisheries Report (Western Australia)	DPIRD	WA's major commercial and recreational fisheries
	DPIRD (2020). Western Australian Marine Stewardship Council Report Series No. 16: Ecological Risk Assessment of the Shark Bay Invertebrate Fisheries. DPIRD, Western Australia.	DPIRD	Shark Bay
	Bartes S and Braccini JM (2021) Potential expansion in the spatial distribution of subtropical and temperate west Australian sharks. Journal of Fish Biology. Doi:10.1111/jfb.14822	DPIRD	Fisheries included: Bigeye sixgill (*Hexanchus nakamurai*) Tiger shark (*Galeocerdo cuvier*) Spinner shark (*Carcarhinus brevipinna*) Scalloped hammerhead (*Sphyrna lewini*) Broadnose sevengill sharks (*Notorhyncus cepedianus*) Southern sawsharks (*Pristiophorus nudipinnis*)
	Langlois TJ, Wakefield CB, Harvey ES, Boddington DK and Newman SJ (2021). Does the benthic biota or fish assemblage within a large targeted fisheries closure differ to surrounding areas after 12 years of protection in tropical northwestern Australia? Marine Environmental Research 170: 105403.	DPIRD	Fishery: Pilbara demersal scalefish fisheries
	Yeoh D, Johnston D and Harris D (2021) Squid and cuttlefish resources of Western Australia. Fisheries Research Report No. 314 Department of Primary Industries and Regional Development, Western Australia. 101pp	DPIRD	Squid and cuttlefish
	DPIRD (2020) Western Australian Marine Stewardship Council Report Series No. 17: Ecological Risk Assessment of the Exmouth Gulf Prawn Managed Fishery. DPIRD, Western Australia.	DPIRD	Exmouth Gulf
	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	

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Sutton AL and Shaw LL (2020) A snapshot of Marine Research in Shark Bay (Gathaagudu): Literature Review and Metadata Collection (1949-2020). West Australian Marine Science Institution, 180.	WAMSI	Shark Bay
Reptiles	Chevron (2022) Gorgon Gas Development – Marine Turtle Monitoring Program 2021/22: Barrow Island and Mundabullangana ABU220800133	Chevron	Barrow Island Mundabullangana
	Wilson P, Thums M, Pattiaratchi C, Whiting S, Pendoley K, Ferreira L, Meekan M (2019) High predation of marine turtle hatchlings near a coastal jetty. Biological Conservation, 236	UWA/DBCA	Thevenard Island
	Rob D, Barnes P, Whiting S, Fossette S, Tucker T and Mongan T (2019) Turtle activity and nesting on the Muiron Islands and Ningaloo Coast: Final Report 2018, Ningaloo Turtle Program. Report prepared for Woodside Energy Limited. Department of Biodiversity, Conservation and Attractions, Exmouth, pp.51.	DBCA	Cape Range National Park North West Cape Muiron Islands North Murion Island South Murion Island Sunday Island Bungelup
	Tucker T, Whiting S, Fossette S, Rob D, Barnes P (2020). Inter-nesting and migrations by marine turtles of the Muiron Islands and Ningaloo Coast. Final Report. Prepared for Woodside Energy Limited. Department of Biodiversity, Conservation and Attractions, Australia. Pp. 1-93	DBCA	Muiron Islands North Murion Island South Murion Island North West Cape Cape Range National Park Bungelup
	Ferreira LC, Thums M, Fossette S, Wilson P, Shimada T, Tucker A, Pendoley K, Waayers D. Guinea ML, Loewenthal G, King J, Speirs M, Rob D, Whiting SD (2020) Multiple satellite tracking datasets inform green turtle conservation at a regional scale. Diversity and Distribution 27: 249-266	AIMS	Rosemary Island Legendre Island Middle Passage Island Barrow Island Muiron Islands Ningaloo Coast World Heritage Area Montebello Islands Group Lacepede Islands Maret Island Scott Reef
	Fossette S, Loewenthal G, Peel LR, Vitenbergs A, Hamel MA, Douglas C, Tucker AD, Mayer F, Whiting SD (2021) Using Aerial Photogrammetry to	DBCA	Y Island Locker Island

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Assess Stock-Wide Marine Turtle Nesting Distribution, Abundance and Cumulative Exposure to Industrial Activity. Remote Sensing, 13, 1116.		Onslow Area Mainland Coast Ashburton Island Thevenard Island Barrow Island Long Island Dampier Mainland Coast Rosemary Island West Mid Intercourse Island East Lewis Island Legendre Island Hauy Island Delambre Island Karratha Downes Island Bedout Island Port Hedland Mainland Coast Mundabullangana Cape Lambert Exmouth Gulf
	Pendoley Environmental (2018). Marine turtle survey of Mardie Salt Project Area – December 2017. January 2018. Prepared for Phoenix Environmental	Pendoley Environmental	Mardie
	Pendoley Environmental (2019). Mardie Salt Project: Marine turtle monitoring program 2018/2019. April 2019. Prepared for BCI Minerals Ltd.	Pendoley Environmental	Mardie Angle Island Long Island Middle Island Round Island Sholl Island
	Ningaloo Turtle Program	DBCA	North West Cape Cape Range National Park Bungelup
	Rosemary Island Turtle Monitoring Program	DBCA	Rosemary Island
	West Pilbara Turtle Program	DBCA	Karratha Cleaverville

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Wickham
	North West Shelf Flatback Turtle Monitoring Program	DBCA	Thevenard Island Delambre Island Karratha Port Hedland Mainland Coast Eighty Mile Beach Echo Beach Cable Beach Cape Domett
	Care for Headland Turtle Program	Care for Hedland	Port Hedland area
	Dirk Hartog Island Loggerhead Monitoring	DBCA	Dirk Hartog Island
	AECOM (2022) Marine Fauna Impact Assessment Ashburton Salt Project. Doc No. 60597242_3	AECOM	Ashburton Locker Island
	Keesing, J.K. (Ed.) (2019). Benthic habitats and biodiversity of the Dampier and Montebello Australian Marine Parks. Report for the Director of National Parks. CSIRO, Australia	CSIRO	Dampier Marine Park Montebello Australian Marine Park
	Gammon M, Whiting S, Fossette S (2023) Vulnerability of sea turtle nesting sites to erosion and inundation: A decision support framework to maximize conservation. Ecosphere, 14(6), e4529. https://doi.org/10.1002/ecs2.4529	UWA/DBCA	Y Island Locker Island Onslow Area Mainland Coast Ashburton Island Thevenard Island Barrow Island Long Island Dampier Mainland Coast Rosemary Island West Mid Intercourse Island East Lewis Island Legendre Island Hauy Island Delambre Island Karratha Downes Island Bedout Island

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Port Hedland Mainland Coast Mundabullangana Cape Lambert
	FitzSimmons N N, Pittard SD, McIntyre N, Jensen MP, Guinea M, Hamann M, Kennett R, et al. (2020). Phylogeography, Genetic Stocks, and Conservation Implications for an Australian Endemic Marine Turtle. Aquatic Conservation 30 (3): 440–60. https://doi.org/10.1002/aqc.3270.	Griffith University/DBCA	Barrow Island Delambre Island Mundabullangana Port Hedland Mainland Coast Eighty Mile Beach Echo Beach Cape Domett
	Thums M, Udyawer V, Galaiduk R, Ferreira L, Streten C, Radford B (2021) Using Marine Turtles to Identify Habitat and Assess Connectivity of the North and North-West Marine Park Networks and Sea Country: Exploration Study of Data and Partnerships. Report prepared for Parks Australia. Australian Institute of Marine Science, Australia. 48pp.	AIMS	Miaboolya Beach Quobba Shark Bay Ningaloo Coast World Heritage Area Muiron Islands Barrow Island Great Sandy Island Eighty Mile Beach Scott Reef Kimberley Roebuck Bay Joseph Bonaparte Gulf Lalang-garram Marine Park Reefs Oceanic Shoals Thevenard Island Echo Beach Montebello Islands Group Camden Sound Horizontal Falls
	Sutton AL and Shaw LL (2020) A snapshot of Marine Research in Shark Bay (Gathaagudu): Literature Review and Metadata Collection (1949-2020). West Australian Marine Science Institution, 180.	WAMSI	Shark Bay
	Sutton AL and Shaw JL (2021) Cumulative Pressures on the Distinctive Values of Exmouth Gulf. First draft report to the Department of Water and	WAMSI	Exmouth Gulf

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Environmental Regulation by the Western Australian Marine Science Institution, Australia, Western Australia. 272 pages.		
	Fossette S, Ferreira L C, Whiting SD, King J, Pendoley K, Shimada T, Speirs M, Tucker A D, Wilson P, Thums M (2021) Movements and distribution of hawksbill turtles in the Eastern Indian Ocean. Global Ecology and Conservation, 29, e01713. https://doi.org/10.1016/j.gecco.2021.e01713	DBCA	Beacon Island Delambre Island Rosemary Island Varanus Island Montebello Islands Group
	Pillans RD, Whiting S, Tucker T, Vanderklift MA (2022) Fine-scale movement and habitat use of juvenile, subadult, and adult green turtles (*Chelonia mydas*) in a foraging ground at Ningaloo Reef, Australia. Aquatic Conservation: Marine and Freshwater Ecosystems 32 1323-1340	CSIRO	Ningaloo
	Ferreira LC, Thums M, Whiting S, Meekan M, Andrews-Goff V, Attard CRM, Bilgmann K, Davenport A, Double M, Falchi F, Guinea M, Hickey SM, Jenner C, Jenner M, Loewenthal G, McFarlane G, Möller LM, Norman B, Peel L, Pendoley K, Radford B, Reynolds S, Rossendell J, Tucker A, Waayers D, Whittock P, Wilson P and Fossette S (2023) Exposure of marine megafauna to cumulative anthropogenic threats in north-west Australia. Front. Ecol. Evol. 11:1229803. Doi: 10.3389/fevo.2023.1229803	AIMS	Pilbara Coast Kimberley Northern Territory coastline
	Ningaloo Outlook	CSIRO	Ningaloo Coast World Heritage Area
	Lambourne RN (2019) Classifying the diving behaviour of flatback turtles (Natator depressus) from multi-sensor tags. Honours thesis, Murdoch University	Murdoch University	Thevenard Island
	Udyawer V, D'Anastasi B, McAuley R, Heupel M (2016) Exploring the status of Western Australia's sea snakes. National Environmental Science Programme	AIMS	Shark Bay Ningaloo Coast World Heritage Area Port Hedland Rowley Shoals Oceanic Shoals
	Santos Vanranus Islant Turtle Monitoring Program	Santos Limited	Varanus Island
	Bayliss P, Raudino H, Hutton M, Murray K, Waples K and Strydom S (2019) Modelling the spatial relationship between dugon (Dugong dugon) and their seagrass habitat in Shark Bay Marine Park before and after the marine heatwave of 2010/11. Department of Agriculture, Water and the Environment Final Report 2.	CSIRO DBCA	Shark Bay Ningaloo Coast World Heritage Area Exmouth Gulf
	Thums Michele, Rossendell Jason, Fisher Rebecca, Guinea Michael L. (2020) Nesting ecology of flatback sea turtles Natator depressus from	AIMS	Delambre Island

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Delambre Island, Western Australia. Marine and Freshwater Research 71, 443-451.		
	Schneider L, Tucker AD, Vincent K, Fossette S, Young EJ and Whiting SD (2022) First Assessment of Mercury (Hg) Concentrations in Skin and Carapace of Flatback Turtles (Natator depressus) (Garman) From Western Australia. Front. Environ. Sci. 10:843855. Doi: 10.3389/fenvs.2022.843855	DBCA	Thevenard Island Eighty Mile Beach
	Gammon M, Whiting S, Fossette S (2023) Vulnerability of sea turtle nesting sites to erosion and inundation: a decision support framework to maximize conservation. Ecosphere 14: e4529	UWA DBCA	Pilbara southern islands Pilbara northern islands Onslow area Thevenard Island Barrow Island Montebello Islands Dampier Archipelago Karratha Mundabullangana Cemetery Beach
Megafauna (whale shark, dugong and cetaceans)	Chevron (2019) Soundscape monitoring at JIC site (G1-NT-REPX0000361)	Chevron	Barrow Island
	Chevron (2023) Soundscape Monitoring at the JIC Site 2021–2023	Chevron	Barrow Island
	Raudino HC, Hunt TN, Waples KA (2018) Records of Australian humpback dolphins (*Sousa sahulensis*) from an offshore island group in Western Australia. Marine Biodiversity Records 11:14	DBCA	Montebello Islands
	Raudino HC, Douglas CR, Waples KA (2018) How many dolphins live near a coastal development? Regional Studies in Marine Science 19: 25-32	DBCA	Onslow Area Thevenard Island
	Sprogis K and Parra G (2022) Coastal dolphin and marine megafauna in Exmouth Gulf, Western Australia: informing conservation management actions in an area under increasing human pressure. Wildlife Research, 50(6): 435-450	UWA	Exmouth Gulf
	Wild S, Krutzen M, Rankin M, Hoppitt W, Gerber L, Allen S (2019) Long-term decline in survival and reproduction of dolphins following a marine heatwave. Current Biology 29, R225-R240	University of Leeds	Shark Bay
	Thums M, Ferreira LC, Jenner C, Jenner M, Harris D, Davenport A, Andrews-Goff V, Double M, Moller L, Attard CRM, Bilgmann K, Thomson PG, McCauley R (2022) Pygmy blue whale movement, distribution and important areas in the Eastern Indian Ocean. Global Ecology and Conservation 35 e02054	AIMS	Western Australia

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	ECOCEAN Whale Shark Photo-Identification Library	Ecocean	Ningaloo
	AIMS (2021) Individual haplotyping of whale sharks from seawater environmental DNA.	AIMS	Ningaloo
	Lester E, Meekan MG, Barnes P, Raudino H, Rob D, Waples K, Speed CW (2020) Multi-year patterns in scarring, survival and residency of whale sharks in Ningaloo Marine Park, Western Australia. Mar Ecol Prog Ser 634:115-125.	UWA	Ningaloo
	Irvine L and Salgado Kent C (2018) The distribution and relative abundance of marine mega-fauna, with a focus on humpback whales (*Megaptera novaeangliae*), in Exmouth Gulf, Western Australia.	Oceans Blueprint	Exmouth Gulf
	NESP MaC Project 3.10 – A partnership approach to filling key knowledge gaps on dugongs in northern Australia using novel technologies, 2023–2026 (JCU, CDU, DBCA)	AIMS	Exmouth Gulf Ningaloo Shark Bay
	AIMS research on whale sharks	AIMS	Ningaloo
	Sprogis KR, Sutton AL, Jenner MN, McCauley RD, Jenner KCS (2022) Occurrence of cetaceans and seabirds along the Indian Ocean 110 E meridian from temperate to tropcial waters. Deep-Sea Research II 205. 105184	Centre for Whale Research/UWA	Indian Ocean 110 E meridian from temperate to tropcial waters
	Haughey R, Hunt TN, Hanf D, Passadore C, Baring R and Parra GJ (2021) Distribution and Habitat Preferences of Indo-Pacific Bottlenose Dolphins (*Tursiops aduncus*) Inhabiting Coastal Waters With Mixed Levels of Protection. Front. Mar. Sci. 8:617518. doi: 10.3389/fmars.2021.617518	Flinders University	North West Cape Exmouth Gulf Ningaloo
	Cleguer C, Kelly N, Tyne J, Wieser M, Peel D and Hodgson A (2021) A Novel Method for Using Small Unoccupied Aerial Vehicles to Survey Wildlife Species and Model Their Density Distribution. Front. Mar. Sci. 8:640338. doi: 10.3389/fmars.2021.640338	Murdoch University	Exmouth Gulf
	Sutton AL and Shaw LL (2020) A snapshot of Marine Research in Shark Bay (Gathaagudu): Literature Review and Metadata Collection (1949-2020). West Australian Marine Science Institution, 180.	WAMSI	Shark Bay
	Sutton AL and Shaw JL (2021) Cumulative Pressures on the Distinctive Values of Exmouth Gulf. First draft report to the Department of Water and Environmental Regulation by the Western Australian Marine Science Institution, Perth, Western Australia. 272 pages.	WAMSI	Exmouth Gulf
	Raudino HC, Bouchet PJ, Douglas C, Douglas R, Waples K (2023) Aerial abundance estimates for two sympatric dolphin species at a regional scale using distance sampling and density surface modelling Front. Ecol. Evol. 10:1086686. doi: 10.3389/fevo.2022.1086686	DBCA	Exmouth Gulf Onslow Area Ashburton

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Dampier Area Dampier Archipelago Karratha Porth Hedland Area Eighty Mile Beach Southern Pilbara Islands Northern Pilbara Islands Great Sandy Island
	Lester E, Canon T, Arujo G (2023) Whale sharks (*Rhincodon typus*) feed on baitfish with other predators at Ningaloo Reef. Pacific Conservation Biology 29 86-87	DBCA	Coral Bay Ningaloo
	Palmer C, Martien KK, Raudino H, Robertson KM, Withers A, Withers E, Risk R, Cooper D, D'Cruz E, Jungine E, Barrow D, Cuff N, Lane A, Keynes D, Waples K, Malpartida A and Banks S (2023) Evidence of resident coastal population(s) of false killer whales (*Pseudorca crassidens*) in northern Australian waters. Front. Mar. Sci. 9:1067660. doi: 10.3389/fmars.2022.1067660	Charles Darwin University	Exmouth Gulf Pilbara Coast Islands Southern Pilbara Islands and Coast Eighty Mile Beach Broome Lalang-garram Marine Park Reefs Darwin Harbour Tiwi Islands Groote Archipelago
	Ferreira LC, Thums M, Whiting S, Meekan M, Andrews-Goff V, Attard CRM, Bilgmann K, Davenport A, Double M, Falchi F, Guinea M, Hickey SM, Jenner C, Jenner M, Loewenthal G, McFarlane G, Möller LM, Norman B, Peel L, Pendoley K, Radford B, Reynolds S, Rossendell J, Tucker A, Waayers D, Whittock P, Wilson P and Fossette S (2023) Exposure of marine megafauna to cumulative anthropogenic threats in north-west Australia. Front. Ecol. Evol. 11:1229803. doi: 10.3389/fevo.2023.1229803	AIMS	Shark Bay Ningaloo Coast World Heritage Area Kimberley
	Ningaloo Outlook (Whale Sharks)	CSIRO	Ningaloo Coast World Heritage Area
	Mann J, Foroughirad V, McEntee MHF, Miketa ML, Evans TC, Karniski C, Krzyszczyk E, Patterson EM, Strohman JC and Wallen MM (2021) Elevated Calf Mortality and Long-Term Responses of Wild Bottlenose Dolphins to Extreme Climate	Georgetown University	Shark Bay
	Jarolimek CV, King J J, Apte SC., Hall J, Gautam A, Gillmore M, Doyle C (2023) A review of inorganic contaminants in Australian marine mammals, birds and turtles. Environmental Chemistry 20, 147-170. https://doi.org/10.1071/EN23057	CSIRO	Australia wide

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Bayliss P, Raudino H, Hutton M, Murray K, Waples K and Strydom S (2019) Modelling the spatial relationship between dugong (Dugong dugon) and their seagrass habitat in Shark Bay Marine Park before and after the marine heatwave of 2010/11. Department of Agriculture, Water and the Environment Final Report 2.	CSIRO DBCA	Shark Bay Ningaloo Reef Exmouth Gulf
	Brown AM, Allen SJ, Kelly N, Hodgson A (2022) Using Unoccupied Aerial Vehicles to estimate availability and group size error for aerial surveys of coastal dolphins. Remote Sensing in Ecology and Conservation. doi: 10.1002/rse2.313	Murdoch University	Dampier Archipelago North West Cape
Seabirds and shorebirds	Chevron Env-Gor-Seabird Monitoring Report 2021/22 J01209 (ABU220500068)	Chevron	Ah Chong Island (Montebello group) Double Island North Double Island South Parakeelya Island Barrow Island Group
	Dunlop JN. and Greenwell C (2021) Seasonal movements and metapopulation structure of the Australian fairy tern in Western Australia. Pacific Conservation Biology, 27, 47-60	Conservation Council of Western Australia	Stewart Island Fortescue Island Mardie Island Regnard Island Scholl Island Shark Bay Exmouth Gulf Somerville Island Tent Island Hope Point Houtman Abrolhos Islands Ningaloo Coast
	Weller D, Kidd L, Lee C, Klose S, Jaensch R, Driessen J (2020) Directory of Important Habitat for Migratory Shorebirds in Australia. Prepared for Australian Government Department of Agriculture, Water and the Environment by BirdLife Australia, Melbourne	Birdlife Australia	Barrow Island Carnarvon Coral Bay Exmouth Gulf Houtman Abrolhos Islands Karratha Ningaloo Onslow Area Port Hedland

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Adele Island Lacepede Islands Dampier Peninsula
	Australia's National Shorebird Monitoring Program https://awsg.org.au/about-us/shorebirds-2020/	Birdlife Australia	Dampier Port Hedland Shark Bay Eighty Mile Beach Barrow Island Exmouth Gulf Ningaloo Reef Ningaloo Roebuck Bay
	Birdata: https://birdata.birdlife.org.au/	Birdlife Australia	Western Australia
	eBird: https://ebird.org/hotspots?hs=L5713406&yr=all&m=	eBird	Western Australia
	Astron (2020) Thevenard Island Retirement Project Terrestrial Ecological Monitoring Report June 2020. Prepared for Chevron	Chevron	Thevenard Island
	Biota (2022) Ashburton Salt Project Migratory Shorebird Assessment. Prepared for K + S Salt Australia	for K + S Salt Australia	Ashburton Exmouth Gulf
	Cannell B, Hamilton S, Driessen J (2019) Wedge- tailed shearwater foraging behaviour in the Exmouth region. Report for Woodside Energy Ltd. University of Western Australia and Birdlife Australia.	UWA	Muiron Islands
	Sutton AL and Shaw LL (2020) A snapshot of Marine Research in Shark Bay (Gathaagudu): Literature Review and Metadata Collection (1949-2020). West Australian Marine Science Institution, 180.	WAMSI	Shark Bay
	Sutton AL and Shaw JL (2021) Cumulative Pressures on the Distinctive Values of Exmouth Gulf. First draft report to the Department of Water and Environmental Regulation by the Western Australian Marine Science Institution, Perth, Western Australia. 272 pages.	WAMSI	Exmouth Gulf
	Woodside Case Study: Ningaloo Region Migratory Shorebirds of Exmouth Gulf (Birdlife)	Birdlife Australia Woodside	Exmouth Gulf
	Pendoley Environmental Pty Ltd (2022) Dampier Archipelago Seabird and Shorebird Rapid Assessment. Prepared for Woodside Energy Group Limited	Woodside	Dampier Archipelago

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	DBCA shorebird surveys of Montebello Islands and Bedout Island in 2017 and 2018 mentioned in: Australian National Report to the 19th JAMBA, 13th CAMBA and 6th ROKAMBA Consultative Meetings, Commonwealth of Australia 2018	DBCA	Bedout Island Montebello Islands
	Pendoley Environmental Pty Ltd (2021) Varanus and Airlie Islands Shearwater Monitoring Annual Report. Prepared for Santos Limited	Santos	Varanus Island Airlie Island
	Bancroft W and Bamford M (2018) ANSIA Stage 2 Fauna Assessment	MJ and AR Bramford Consulting Ecologists	Pilbara- Southern Pilbara Islands and Coast
	Phoenix Environmental Sciences (2023) Long-term migratory shorebird monitoring program for the Optimised Mardie Project. Prepared for Mardie Minerals Pty Ltd	Phoenix Consultants	Mardie
	Lavers JL, Humphreys-Williams E, Crameri NJ, Bond AL (2020) Trace ekement concentrations feathers from three seabird species breeding in the Timor Sea. Marine Pollution Bulletin 151. 110876	University of Tasmania	Bedout Island

APPENDIX D OSM SERVICES PROVIDER CALL OFF ORDER FORM

OSRL

Operational and Scientific Monitoring (OSM) Services Call-Off 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	

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OSRL

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		
Others (*To be Agreed)		

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		
Others (*To be Agreed)		

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.

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