

Learmonth Pipeline Fabrication Facility

**Marine Operational Environmental Monitoring
Plan**

APFAC017-HSE-00007

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REVISION RECORD SHEET

Revision	Issue Date	Purpose	Description of Updated/Modified Sections (if any)
Draft 1	09.09.2019	Internal Review	NA
Final Draft	11.09.2019	External Review	Minor revisions to proposed monitoring
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Final v2	26.05.2020	External Review	Minor revisions to address EPA comments

EXECUTIVE SUMMARY

Table 1 provides a summary of the Proposal and the purpose of the Marine Operational Environmental Monitoring Plan (MOEMP) (this document).

Summary of Proposal	
Proposal Title	Learmonth Pipeline Fabrication Facility
Proponent Name	Subsea 7 Australia Contracting (Subsea 7)
Short Description	Construction and operation of an onshore Bundle fabrication facility at Heron Point
Purpose of MOEMP (this document)	Document the monitoring measures to be undertaken to evaluate impacts on benthic communities and habitats (BCH) during Bundle launch
Key environmental factor and objective	<p>Benthic Communities and Habitats (BCH)</p> <p>EPA Objective: To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained</p>
Key monitoring programmes in the plan	<ul style="list-style-type: none"> • Water quality (turbidity) monitoring. • BCH monitoring (towed video transects)

Table 1: Proposal Summary

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1 Context, Scope and Rationale

This Marine Operational Environmental Monitoring Plan (MOEMP) is submitted in support of the Environmental Review Document (ERD) (Assessment Number 2208 / EPBC 2017-8079) developed by Subsea 7 for the Learmonth Pipeline Fabrication Facility (the Proposal) (Subsea 7 2019).

The MOEMP includes the protocols and procedures for monitoring of water quality (turbidity) and impacts to Benthic Communities and Habitat (BCH) to determine whether the operation of the Proposal achieves the outcomes as represented by the Zone of High Impact (ZoHI) and Zone of Influence (Zoi) during the operational phase, as nominated within the ERD (Subsea 7 2019).

1.1 PROPOSAL OVERVIEW

Subsea 7 proposes to construct and operate a new pipeline fabrication facility (the Proposal) adjacent to the western shoreline of Exmouth Gulf, at Learmonth, approximately 35 km south of the Exmouth townsite (Figure 1). The proposed facility will allow the construction and launching of pipeline Bundles for the offshore oil and gas industry.

The Proposal includes the construction of a fabrication shed, where the Bundles will be constructed, a storage area where the Bundle materials will be stored prior to use, and two approximately 10 km long Bundle tracks along which each Bundle will be constructed and then launched. A Bundle launchway, crossing the beach and extending into the shallow subtidal area, will facilitate the launch of each Bundle.



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 Grid: GDA 94 / MGA Zone 50

Notes: Location of proposed Bundle Site.

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Figure 1: Location of Proposal

1.2 BUNDLE LAUNCH AND TOW

1.2.1 Bundle Launch

To launch a Bundle, the towhead on the offshore end of the Bundle is connected to a tug (the 'Leading Tug') via a long towline. The tug then slowly (≤ 2 knots) heads offshore, pulling the Bundle along the track and into the ocean. The onshore end of the Bundle is connected to another line which is slowly unwound from an onshore winch, until the Bundle reaches sufficient water depth for connection to another tug (the 'Trailing Tug'). The Bundle rolls down the track, which extends across the beach and into the shallow subtidal area. As the Bundle towheads (both lead and trailing towheads) enter the water and gain depth, they will become buoyant as the structure and floatation devices enter the water.

Ballast chains are attached at intervals along the length of the Bundle to provide stability control during the launch and lift during the offshore Controlled Depth Tow Method (CDTM) tow out to the production field. Each Bundle is custom designed and built, so chain dimensions may vary. Typically, the ballast chains that hang beneath the Bundle vary between short and long lengths, typically alternating in a short-long-short-long configuration. The typical chain size used is 76 mm diameter chain. Short lengths are typically 10-12 links (3-4 m) and long chain lengths are typically 18-20 links (5-6 m). The long chain lengths are typically spaced at 20 m intervals along the Bundle. The longer Bundle chain lengths will have some contact (4-5 links touching the seabed) along the length of the tow route out to the Bundle Parking area (approximately 30 km).

1.2.2 Off Bottom Tow

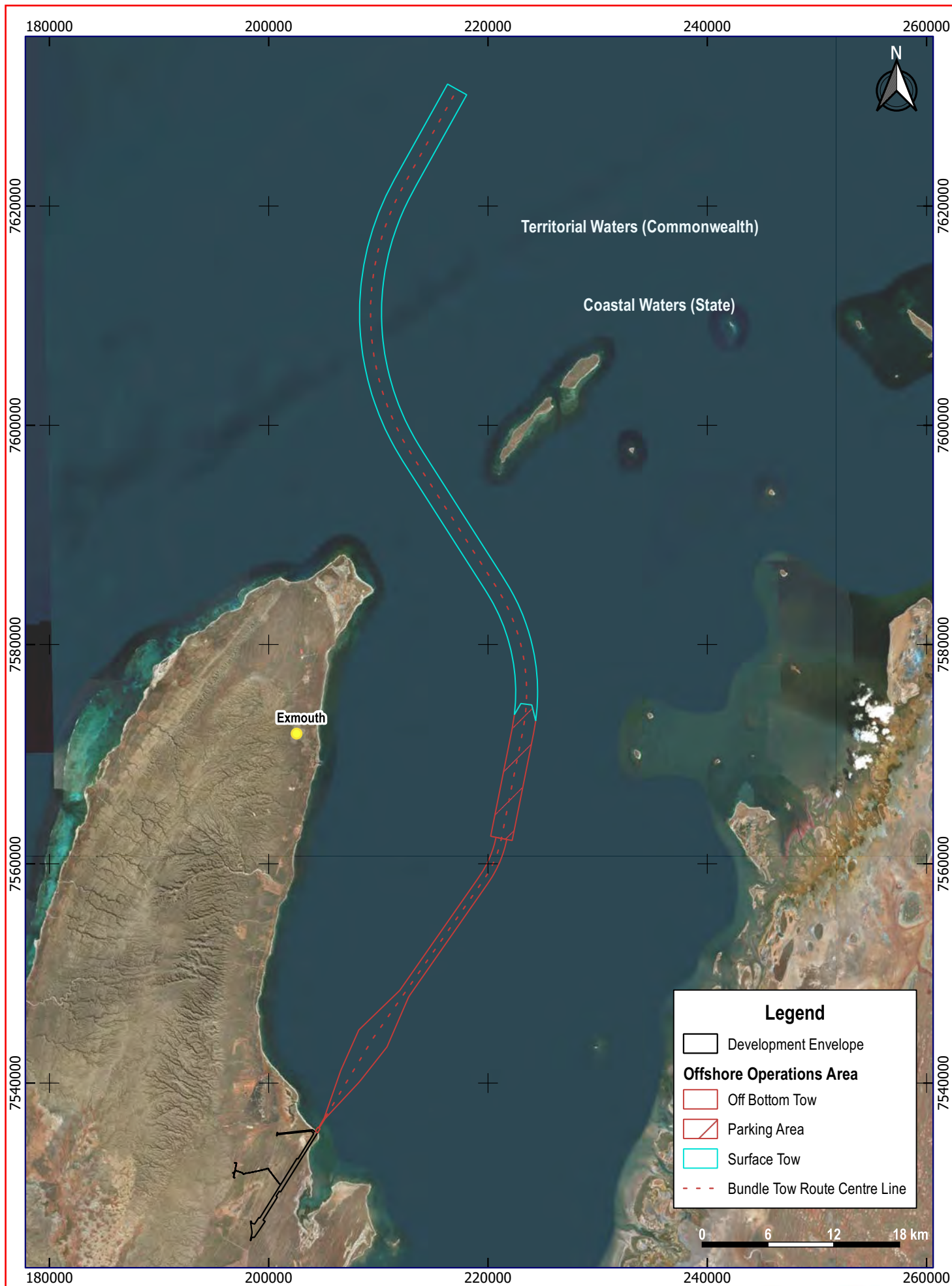
Following launch, the Bundle will be towed slowly (3-4 knots, up to a maximum of 5 knots) offshore along the tow route (Figure 2). The Bundle will be in 'Off bottom tow', meaning that the Bundle (including towheads) will be clear of the seabed. The lower links of the long Bundle chains will be in contact with the seabed in this mode. On arrival at the Bundle Parking area, the Bundle will be stopped and various checks and reconfiguration for the subsequent Surface tow completed. The Bundle may remain within this area for nominally up to 24 hours to allow for all checks and reconfiguration to be completed, and to allow for the Surface tow out of Exmouth Gulf to be aligned with optimal environmental conditions.

1.2.3 Surface Tow

On exit from the Bundle Parking area the tow vessels will increase the tow speed to 5-6 knots (up to a possible maximum of 8 knots). Hydrodynamic forces acting on the ballast chains produce a lift component and the Bundle will rise to the surface in a controlled manner. In this 'Surface tow' configuration the Bundle lies right at the surface, ensuring maximum clearance from the seabed within Ningaloo Marine Park (Figure 2). The trailing tug provides back tension during tow, as required.

1.2.4 Controlled Depth Tow Method

Once the Bundle and tow fleet exit Exmouth Gulf and enter deeper waters, the Bundle tow speed will be reduced slightly (to a maximum of 5 knots), and the tension from the trailing tug reduced, to allow the Bundle to be lowered to sit at mid depth in the water column. The actual depth varies pending the Bundle tow characteristics, and the environmental conditions at the time, but is typically in the region of 50 m water depth. Once this depth is reached, and the Bundle is stable, the tow has entered 'Controlled Depth Tow Method' (CDTM) which will continue until the Bundle reaches the installation location.



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Grid: GDA 94 / MGA Zone 50

Notes: Data sourced from Subsea 7 (2018).

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Figure 2: Offshore Operations Area and Indicative Tow Route

1.3 KEY ENVIRONMENTAL FACTOR: BENTHIC COMMUNITIES AND HABITAT (BCH)

The Environmental Protection Authority (EPA) Objective for Benthic Communities and Habitat (BCH) is *"To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained."*

The potential impacts to BCH during the operation of the Proposal are:

- Direct loss of BCH during Bundle launch and tow.
- Indirect loss or degradation of BCH during Bundle launch and tow.
- Direct loss of BCH during Bundle tow in the event of a loss of control of the Bundle.
- Indirect loss of BCH during Bundle tow in the event of a loss of control of the Bundle or support vessel (e.g. from physical contact or a chemical spill).
- Indirect loss of BCH due to altered water flows and sediment movement as a result of the presence of the launchway.

The MOEMP addresses the direct loss of BCH during Bundle launch and tow, and the potential indirect loss or degradation of BCH during Bundle launch and tow.

Construction phase impacts are addressed within the Marine Construction Monitoring and Management Plan (MCMMP). Impacts associated with changes to sediment transport adjacent to the shoreline, due to altered water flows and sediment movement as a result of the presence of the launchway, will be addressed through monitoring and management as outlined in the ERD (Subsea 7 2019) (to be included in overarching Operations Environmental Management Plan).

1.3.1 **Impact Prediction and Assessment**

The EPA's approach to the prediction of impacts associated with dredging proposals (EPA 2016) was followed in the prediction of impacts associated with the Bundle chains during a launch. The scheme consists of three zones that represent different levels of impact:

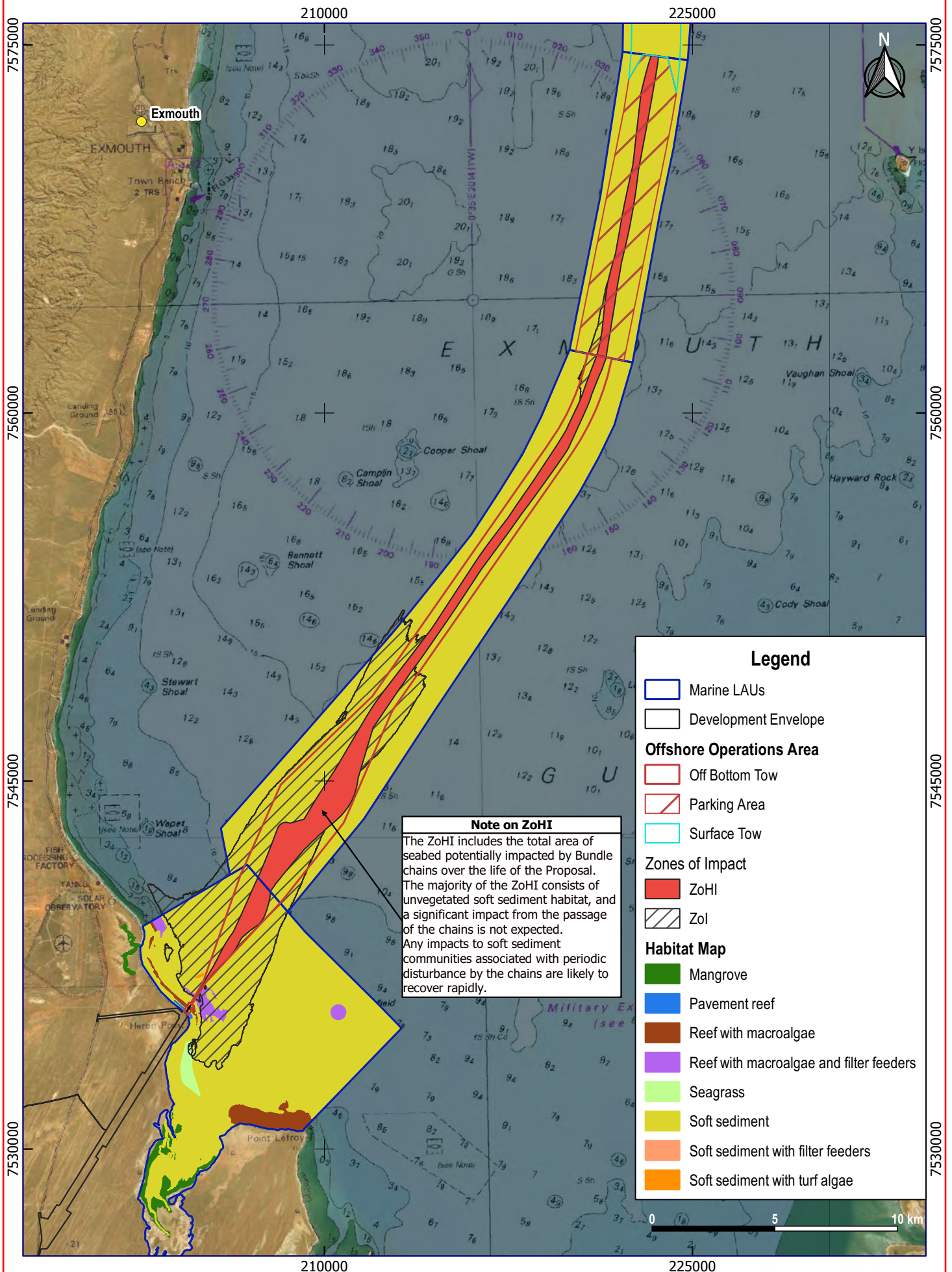
- The Zone of High Impact (ZoHI) is the area where impacts on benthic communities or habitats are predicted to be irreversible. The term irreversible means 'lacking a capacity to return or recover to a state resembling that prior to being impacted within a timeframe of five years or less'.
- The Zone of Moderate Impact (ZoMI) is the area within which predicted impacts on benthic organisms are recoverable within a period of five years.
- The Zone of Influence (ZoI) is the area within which changes in environmental quality are predicted and anticipated at some point, but where these changes would not result in a detectable impact on benthic biota. These areas can be large, but at any point in time impacts to water quality are likely to be restricted to a relatively small portion of the Zone of Influence.

The chains touching the seabed within the Off bottom tow area, which is already disturbed, primarily soft sediment, habitat is not expected to have a significant impact. However, to quantify the potential (but highly unlikely) 'absolute worst case' outcome following multiple Bundle launches, and assuming no recovery of BCH between Bundle launches, calculations were completed based on the total area potentially impacted by Bundle chains over the life of the Proposal. This area has been designated a potential ZoHI (Figure 3).

Hydrodynamic and sediment fate modelling was completed to predict the spatial extent, magnitude and persistence of suspended sediment loads during and following a Bundle

launch. The general pattern of suspended sediment movement predicted by modelling was that the sediment material suspended in the lower layers of the water column during a Bundle launch will drift to one side of the tow route (north during an ebb tide or south during a flood tide), before a proportion of the suspended sediment is deposited on the seabed during the next slack tide period. The remaining suspended sediments will then be transported by subsequent tidal currents back and forth (north-south) across the tow route, with deposition occurring steadily. As the suspended sediments drift back and forth, they gradually resettle onto the seabed, leading to a decrease in the spatial extent of the plume over the following 1-2 days (RPS 2019, Subsea 7 2019).

To identify the area within which short term changes in environmental quality would be expected, but where these changes would not result in a detectable impact on BCH (the ZoI), the following threshold was applied to the modelling predictions: *'the median depth averaged turbidity over 24 hours exceeds the 80th percentile of baseline data'*. The areas predicted to experience turbidity exceeding this threshold were designated as a ZoI (Figure 3). No ZoMI associated with the operational phase of the Proposal has been defined.



1.3.2 Baseline Data

Intertidal and subtidal habitats off Heron Point were surveyed in December 2016 (360 Environmental 2017). A follow up survey, to map all BCH off Heron Point, was completed in May/June 2017 (360 Environmental 2017). Three intertidal BCH types were recorded:

- Fine sand (Fine sand within upper littoral zone).
- Pavement reef (Unvegetated pavement reef within the upper littoral zone).
- Reef with macroalgae:
 - Pavement reef within the mid littoral zone with mud veneer and sparse macroalgae (*Sargassum* sp.).
 - Pavement reef within the lower littoral zone with macroalgae (*Halimeda* sp., *Padina* sp., *Sargassum* sp.) and occasional hard corals (*Turbinaria* spp.) and soft corals (*Lobophytum* spp.)

Six subtidal BCH types were recorded off Heron Point (360 Environmental 2017):

- Soft sediment (Mud and sand dominated habitats with sparse turf algae).
- Soft sediment with turf algae (Mud and sand dominated habitats with turf algae/microphytobenthos (MPB)).
- Seagrass (Mud and sand dominated habitats with sparse *H. uninervis* and *H. ovalis*).
- Soft sediment with filter feeders (Soft sediment veneer overlying low relief reef. Sparse cover of filter feeders (sponges and soft corals)).
- Reef with macroalgae (Low relief reef with macroalgae (brown)).
- Reef with macroalgae and filter feeders (Low relief reef with macroalgae (brown) and filter feeders (sponges, soft corals, hard corals)).

A towed video survey of the original Bundle laydown area (now termed the Parking area) was completed in September 2017 (360 Environmental 2017). This survey was augmented by the completion of 114 towed video transects across the Offshore Operations Area including along the proposed tow route within the Ningaloo Marine Park (MBS Environmental 2018). A further survey within the Offshore Operations Area was completed in February 2020 (BMT 2020). Three BCH types were recorded:

- Soft sediment.
- Pavement Reef with filter feeders.
- Pavement reef with macroalgae and filter feeders.

1.3.3 Key Assumptions and Uncertainties

The key assumption regarding BCH is that Exmouth Gulf currently experiences natural periods of elevated turbidity, associated with storm events or during periods of spring tides and persistent strong wind, which act to re-suspend fine sediments around the margins of Exmouth Gulf (particularly adjacent to the south and eastern shores). This was confirmed following the completion of the baseline current and turbidity monitoring events.

The BCH present are expected to be relatively tolerant of short-term increases in suspended sediment loads, as are predicted during and immediately following a Bundle launch.

1.3.4 Rationale for Choice of Provisions

Management and mitigation measures have been developed based on the following approaches (preferred first):

- Avoidance of potential impact (e.g. avoidance of direct impact to mangroves, seagrass habitat or the filter feeder habitat adjacent to islands and shoals and in deeper water within Ningaloo Marine Park).
- Reduce likelihood of impact occurring (e.g. low number of Bundle launches to minimise the periods of elevated turbidity adjacent to the tow route).
- Reduce magnitude of impact (e.g. Bundle engineering completed to increase buoyancy of towheads and prevent or reduce interaction with the seabed at the end of the launchway).

1.3.5 Environmental Protection Outcomes

The EPOs that apply to BCH during the operational phase of the Proposal are:

- No impact to BCH in the ZoI.
- No impact to BCH beyond the ZoI.

2 Operational Environmental Monitoring Plan Provisions

2.1 OBJECTIVES

The broad objectives of the monitoring program are:

- Qualitatively assesses the spatial extent and persistence of elevated turbidity associated with a Bundle launch.
- Quantitatively assess the duration and magnitude of changes to turbidity adjacent to the tow route during and immediately following a Bundle launch.
- Evaluate impacts on BCH during Bundle launch and relate to those predicted in the ERD (Subsea 7 2019).
- Determine whether any significant changes to BCH (if recorded) are due to natural variation or the result of Proposal activities.
- Compare any significant changes to BCH attributed to the Proposal (i.e. impacts) to the predicted impacts and approved environmental protection outcomes (EPOs).

2.2 MONITORING PROGRAM

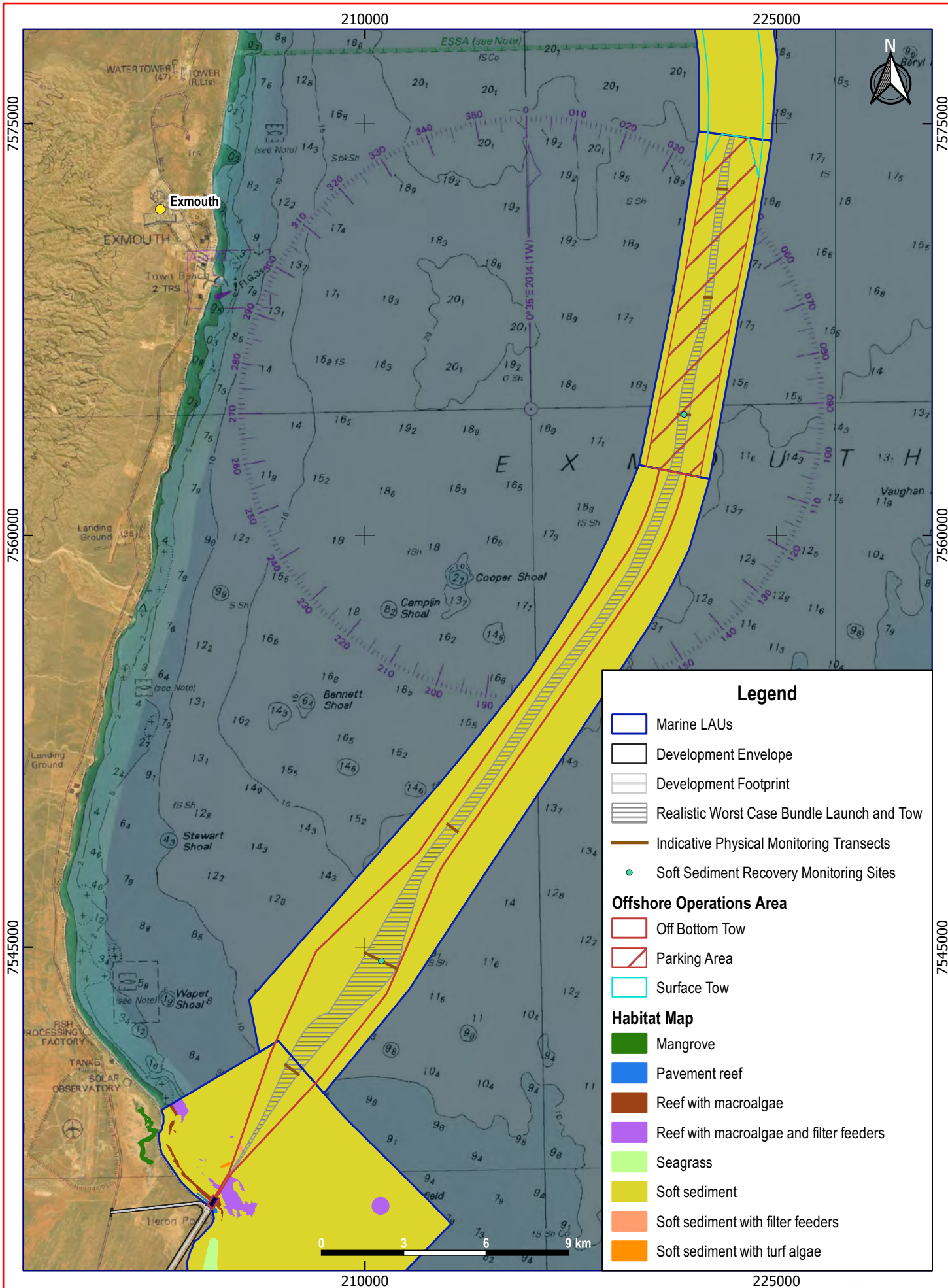
2.2.1 Overview

Monitoring will be undertaken as outlined in Table 2 (refer also Figure 3).

Zone	Predicted Impact(s)	Planned Monitoring
ZoHI	Permanent loss of BCH	<p>Physical: Towed video survey along six transects to confirm the Bundle chain footprint width (Figure 4).</p> <p>Biological (Recovery): Towed video survey at a site within the Off bottom tow area, and a site within the Parking area, to track the recovery of soft sediment habitat impacted by the Bundle chains (Figure 4). An assessment of sediment disturbance, bioturbation and the abundance of visible holes and pits, will be completed during each survey.</p>
ZoI	Short-term changes in environmental quality anticipated, but no detectable impact on BCH	<p>Water Quality (Ecosystem Health): Monitoring of turbidity off Heron Point during and immediately following a Bundle launch to confirm the severity and duration of impacts to water quality (turbidity) in relation to the threshold for potential impact to BCH (Figure 5).</p> <p>Water Quality (Model Validation): Monitoring of maximum water column turbidity adjacent to tow route during and immediately following a Bundle launch for comparison to modelling predictions (Figure 6).</p> <p>Qualitative assessment of the spatial extent of visible surface turbidity along the tow route during Bundle launch through the capture and review of aerial imagery.</p> <p>Biological (Impact): A towed video survey will be undertaken in the two-week period prior to a Bundle launch (Figure 7). Repeat monitoring after a Bundle launch will only be undertaken in the event that one or more sites within the ZoI record elevated turbidity in excess of the impact threshold.</p> <p>Biological (Long-term): Annual towed video survey of BCH in Exmouth Gulf to monitor habitat structure (percentage cover of key groups) during the operational phase of the Proposal (Figure 8).</p>

Zone	Predicted Impact(s)	Planned Monitoring
Beyond Zol	No significant changes in environmental quality or impact on BCH	<p>Water Quality (Ecosystem Health): Monitoring of turbidity off Heron Point during and immediately following a Bundle launch to confirm the severity and duration of impacts to water quality (turbidity) in relation to the threshold for potential impact to BCH (Figure 5).</p> <p>Water Quality (Model Validation): Qualitative assessment of the spatial extent of visible surface turbidity adjacent to the tow route during and immediately following a Bundle launch through the capture and review of aerial imagery (Figure 6).</p> <p>Biological (Impact): A towed video survey will be undertaken at reference sites in the two-week period prior to a Bundle launch (Figure 7). Repeat monitoring after a Bundle launch will only be undertaken in the event that one or more sites within the Zol record elevated turbidity in excess of the impact threshold.</p> <p>Biological (Long-term): Annual quantitative survey of BCH in Exmouth Gulf to monitor habitat structure (percentage cover of key groups) during the operational phase of the Proposal (Figure 8).</p>

Table 2: Monitoring Programme Summary



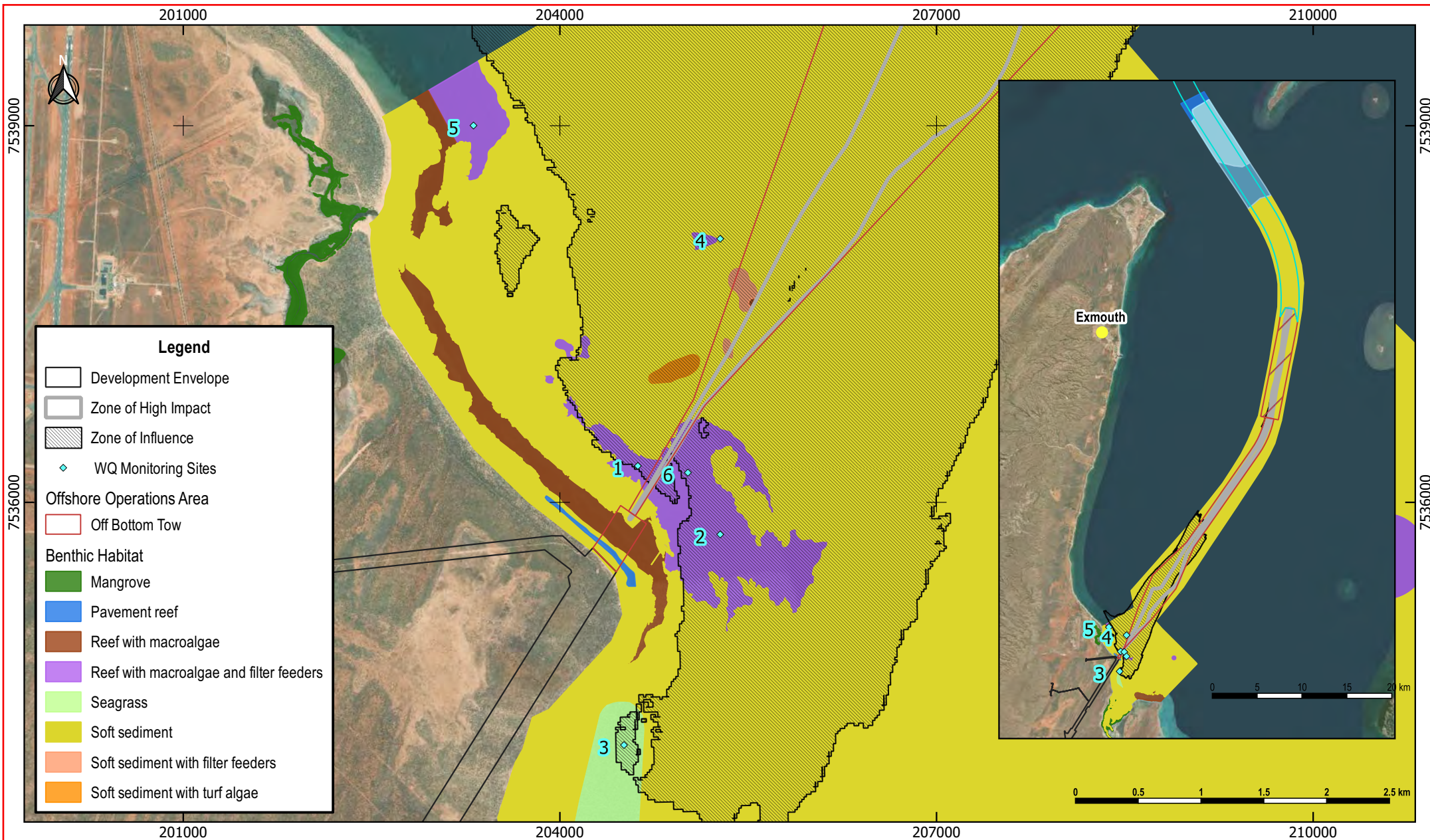
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 Aerial Photo: ESRI Satellite
 Grid: GDA 94 / MGA Zone 50

Notes: Data sourced from Subsea 7 and Commonwealth of Australia (2018).

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Figure 4: Indicative Physical Monitoring Sites

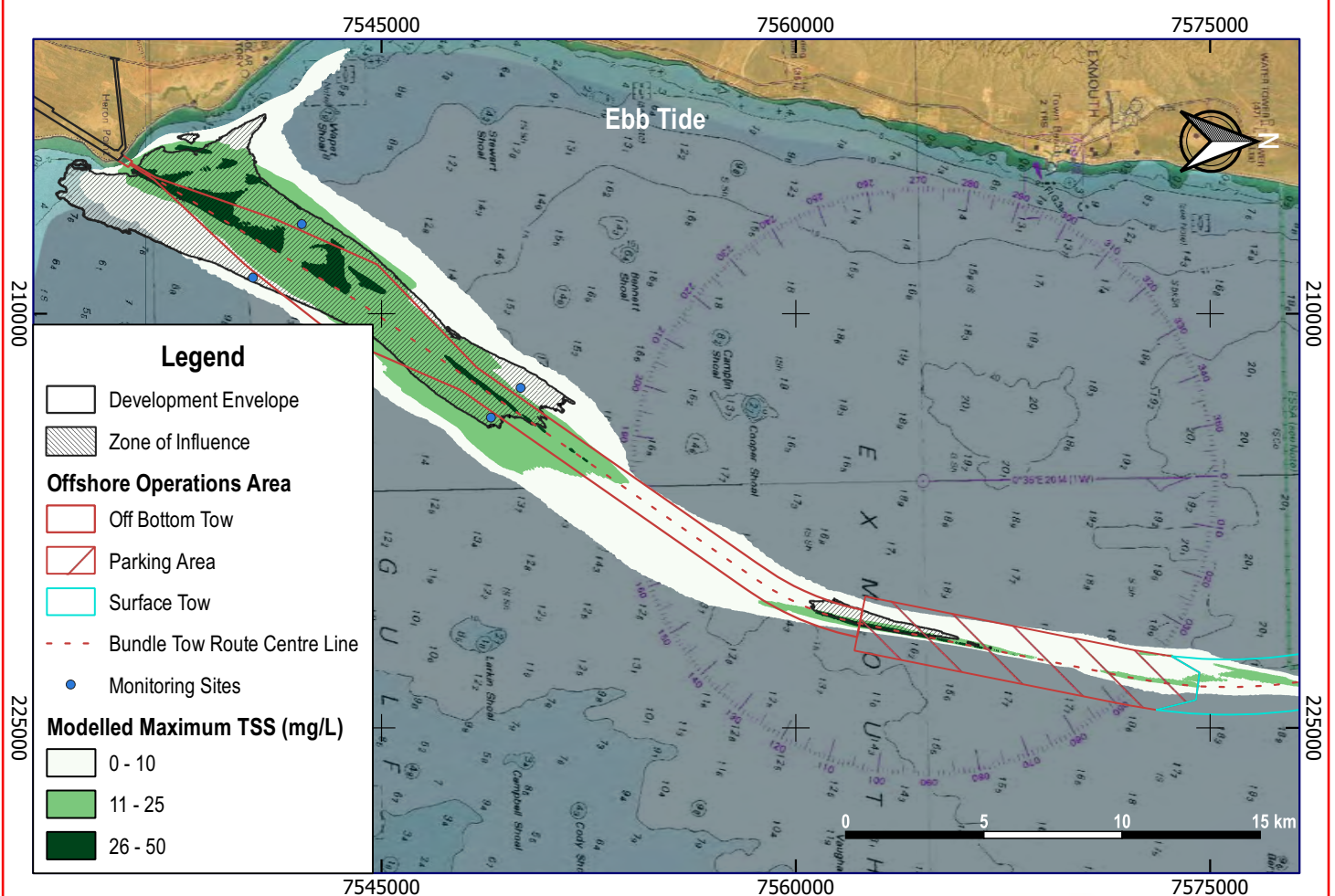
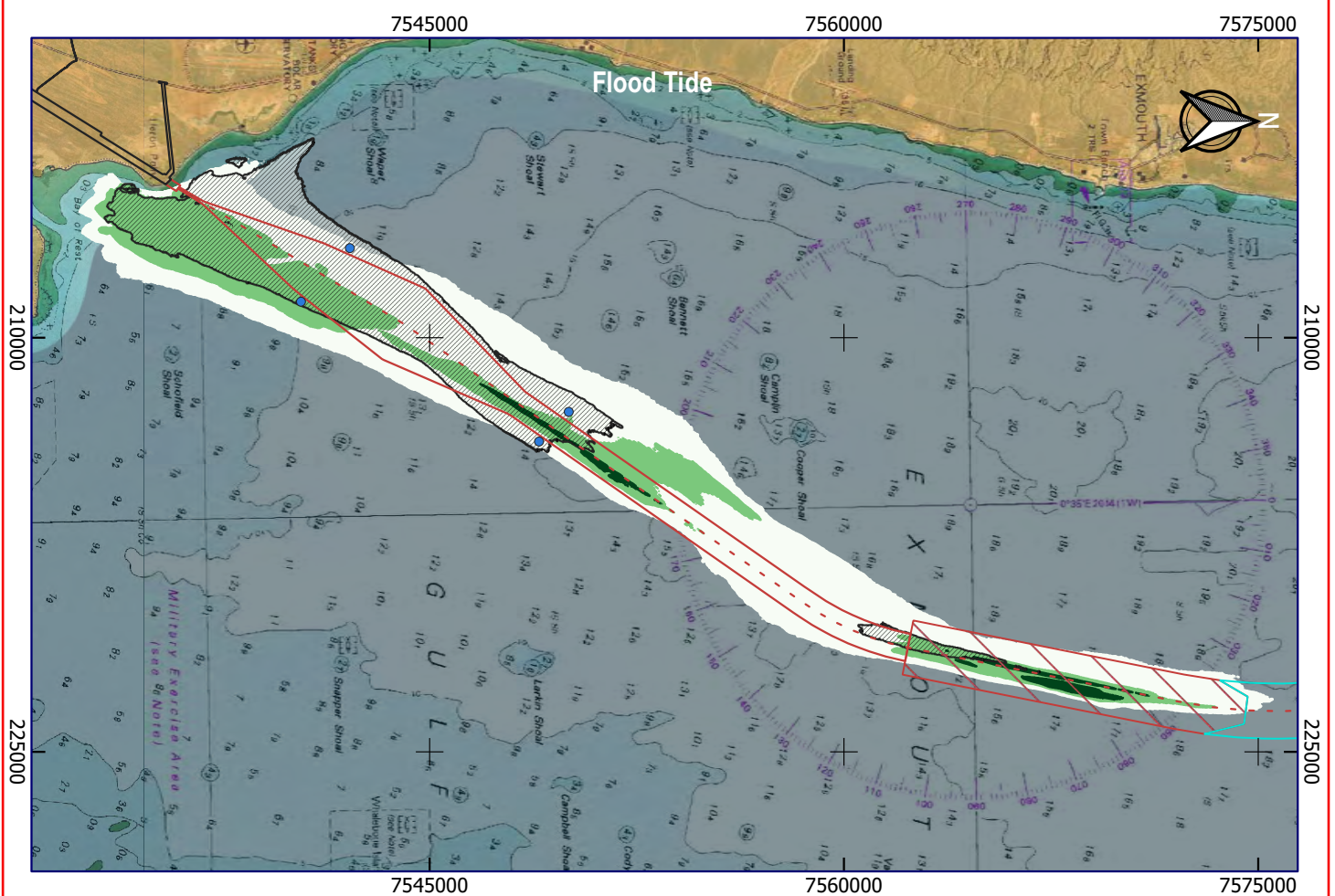


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 Aerial Photo: ESRI Satellite
 Grid: GDA 94 / MGA Zone 50

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Figure 5: Indicative Water Quality (Ecosystem Health) Monitoring Sites



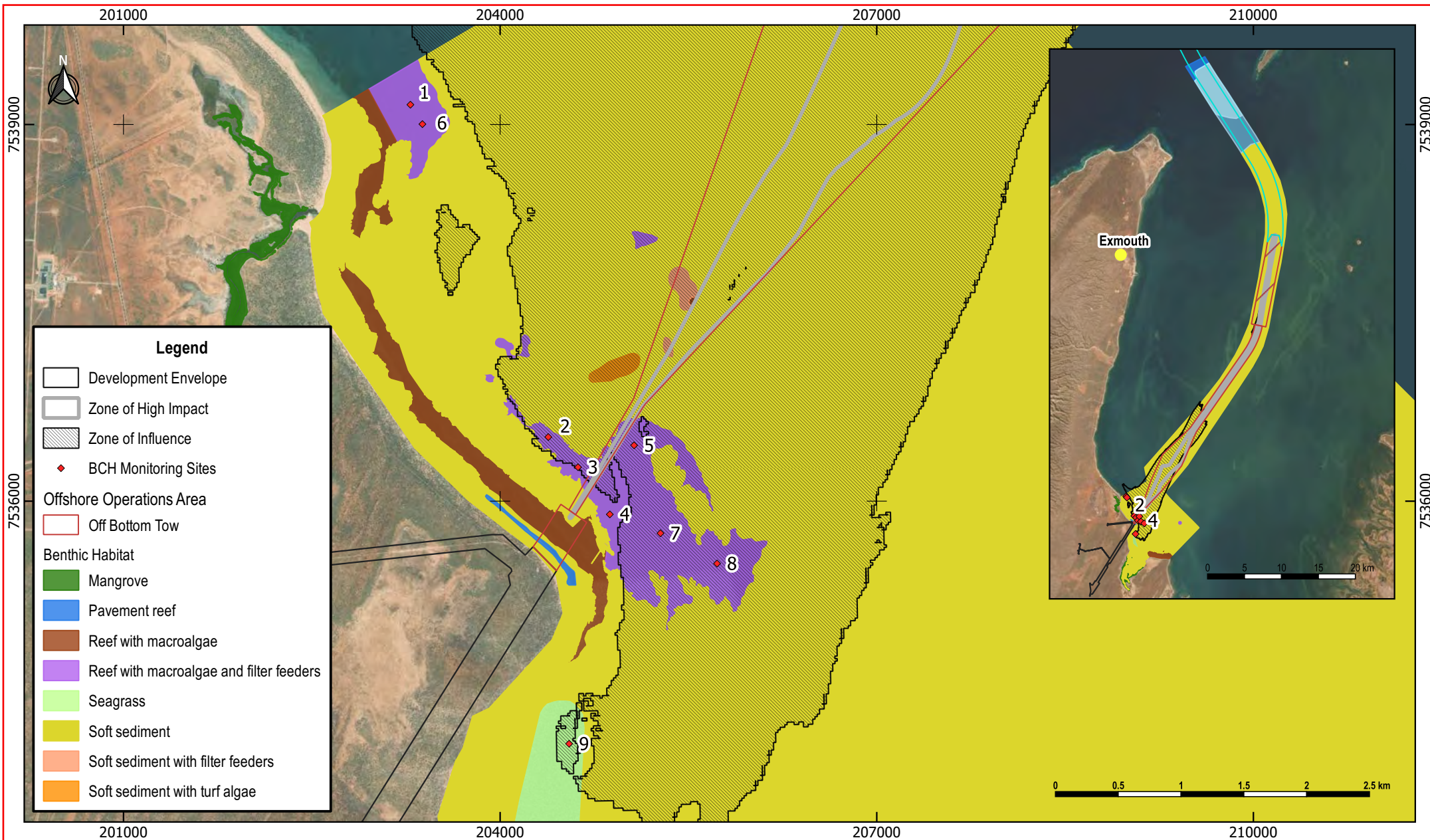
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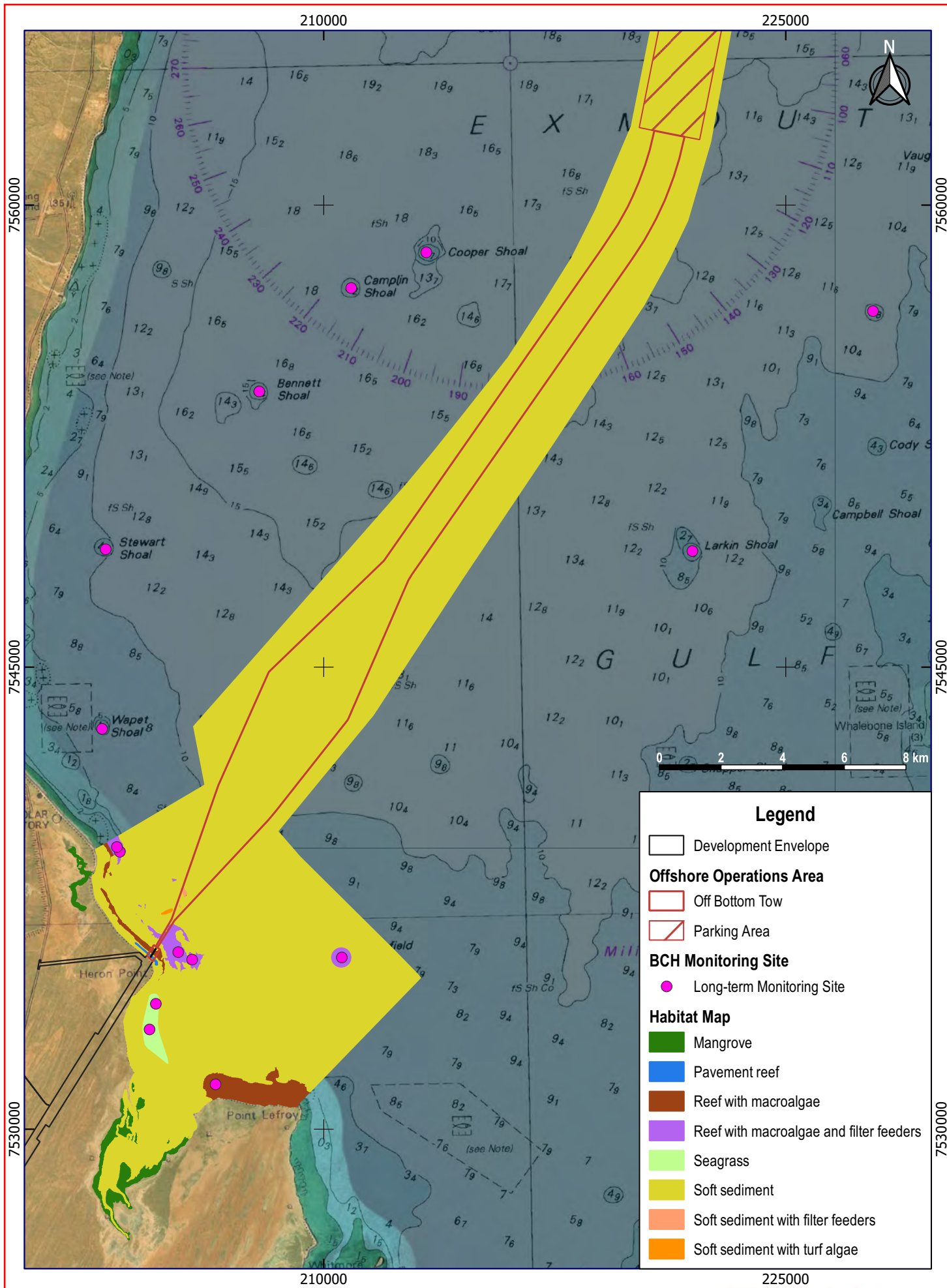
Notes: Data sourced from Commonwealth of Australia (2018) and RPS (2019).

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Figure 6: Indicative Water Quality (Model Validation) Monitoring Sites





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 Aerial Photo: ESRI Satellite
 Grid: GDA 94 / MGA Zone 50

Notes: Data sourced from Commonwealth of Australia (2018) and RPS (2019).

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Figure 8: Indicative Long-term BCH Monitoring Sites

2.2.2 Physical Monitoring

Towed video survey will be undertaken along each 'Physical Monitoring Transect', to confirm the Bundle chain footprint width within the Off bottom tow and Parking area. Three transects will be surveyed within the Off bottom tow area (Figure 4). An additional three transects will be surveyed within the Parking area (Figure 4). Start and end points for each transect will be selected following review of the GPS tracklog from the lead and trail towheads. The survey will be completed within three days of a Bundle launch and tow being completed.

A brief report will be prepared as a component of the Bundle launch report, defining the extent of the chain footprint.

The proposed Soft Sediment Recovery Survey is discussed in Section 2.2.4.2).

2.2.3 Water Quality Monitoring

2.2.3.1 Ecosystem Health

The selection of locations for monitoring (impact and reference) sites was based on a number of considerations including:

- The locations of ZoHI and ZoI boundaries.
- The distribution of BCH in those zones.
- Water depths and the accessibility of locations.
- The likelihood of third-party impacts to monitoring sites.

The indicative monitoring sites are shown in Figure 5.

Monitoring of water quality, specifically turbidity, adjacent to the tow route will be completed within the predicted ZoI from at least 3 days prior to, and for at least 5 days following, a Bundle launch. Calibrated turbidity loggers will be attached to a mooring and positioned approximately 1 m above the seabed to capture the approximate maximum water column turbidity. An additional monitoring site (Site 5 in Figure 5) has been located outside of the ZoI to confirm the suitability of the BCH monitoring sites in this area (Sites 1 and 6 in Figure 7) to be used as unimpacted reference sites.

The results from each site within the ZoI will be compared to the threshold for potential impact to BCH, that being '*the median turbidity exceeds the 80th percentile of baseline site data*'. The baseline data will consist of combined data collected over the preceding month¹ prior to a launch, collected from a minimum of two sites within the ZoI. If this threshold is exceeded during and/or immediately following a Bundle launch at any site, then a BCH 'impact survey' will be completed at the adjacent BCH monitoring site(s) and reference sites.

2.2.3.2 Model Validation

The selection of locations for monitoring sites was based on the location of the ZoI boundary and the predicted maximum water column turbidity (as TSS) (refer Figure 6). Monitoring of water quality, specifically turbidity, adjacent to the tow route will be completed within the predicted ZoI from at least 3 days prior to, and for at least 5 days following, a Bundle launch. Calibrated turbidity loggers will be attached to a mooring and positioned

¹ Baseline monitoring period will be a minimum of 3 weeks, but could extend beyond a month in the event a Bundle launch is delayed due to weather or operational matters.

approximately 1 m above the seabed to capture the approximate maximum water column turbidity.

The results of each round of monitoring will be compared to sediment fate modelling predictions. In the event that the magnitude or duration of turbidity exceeds the predictions as presented within the ERD (Subsea 7 2019), noting that the work for the ERD was based on a 10 km Bundle with long chains spaced at 20 m intervals, the model will be re-configured to represent the correct Bundle design and re-run. In the event that the revised modelling predictions differ significantly from the measured values, the model will be re-calibrated and re-run to provide revised 'realistic worst case' impact predictions for future Bundle launches.

A visual assessment of the spatial extent of turbidity adjacent to the tow route (within and beyond the ZoI) will also be completed during and immediately following each Bundle launch. Aerial imagery will be captured via small plane flights, daily (at approximately noon), until turbidity associated with a Bundle launch and tow is no longer distinguishable from normal, regional, turbidity levels. Imagery will be annotated to highlight the area(s) of visible turbidity and the locations of turbidity loggers quantitatively measuring near-seabed water turbidity. This assessment will assist in confirming the aesthetic impact of a Bundle launch and in assessing the suitability of the water quality monitoring locations.

2.2.4 Biological Monitoring

2.2.4.1 Impact survey

2.2.4.1.1 Sites

Selection of locations for biological monitoring (impact and reference) sites were based on a number of considerations including:

- The locations of ZoHI and ZoI boundaries.
- The distribution of BCH in those zones.
- Water depths and the accessibility of locations.
- The location of previous survey sites.
- The likelihood of third party impacts to monitoring sites.

The indicative monitoring sites are shown in Figure 7. This includes three sites outside of the ZoI and 6 sites within the ZoI.

2.2.4.1.2 Timing

Monitoring will be undertaken in the two-week period prior to a Bundle launch. Monitoring after a launch will only be undertaken in the event that any site records elevated turbidity in excess of the impact threshold. In the event that a post launch impact survey is required, survey will be completed at the BCH monitoring site(s) associated with the water quality monitoring site(s) at which the threshold exceedance occurred (refer Table 3) and at reference sites. A post launch survey would occur within four weeks of completion of a Bundle launch.

BCH Site	Type	Associated Water Quality Monitoring Site (Figure 5)
1	Reference	5
2	Impact (Zol)	1
3	Impact (Zol)	1
4	Impact (beyond Zol)	6
5	Impact (Zol)	
6	Reference	5
7	Impact (Zol)	2
8	Impact (Zol)	2
9	Impact (Zol)	3

Table 3: Summary of BCH Monitoring Sites

Assuming no impacts to BCH beyond the ZoHI are detected following a Bundle launch, BCH monitoring will not be continued until prior to the next Bundle launch. Should impacts beyond the ZoHI be detected, these will be quantified (with details provided in the Compliance Assessment Report) and monitoring of BCH recovery will occur (in consultation with the EPA).

2.2.4.1.3 Methods

A towed video system will be used to record video footage along five replicate 20 m monitoring transects at each monitoring site. The system will be towed at a speed of approximately 1-2 km/h, at a height of approximately 0.5 m from the seabed.

The footage from each transect will be quantitatively assessed using Coral Point Count with Excel extensions (CPCe 4.1) (Kohler and Gill 2006), TransectMeasure (SeaGIS), or similar programme.

A number of habitat descriptors will be recorded from the video footage including:

- Dominant seabed type (e.g. soft sediment, reef).
- The percentage cover of flora (macroalgae, seagrass).
- The percentage cover of key fauna groups (e.g. sponges, soft corals, hard corals).

The mean cover of the dominant group will be compared to the data obtained during the pre-launch survey. The focus on a single group (e.g. macroalgae, hard coral, seagrass) will assist in the completion of a rigorous statistical analysis of changes to the structure of BCH at each site.

2.2.4.1.4 Statistical Analysis

In the event of a statistically significant difference in the cover of the dominant group of greater than 20%, then a full comparison with reference site data will be completed. A Before, After, Control, Impact (BACI) approach will be employed whereby statistical analyses will test for an interaction between the impact and reference sites across the pre-launch and post-launch surveys. The expected statistical power of the survey design to detect the target level of change (a change of >20%) will be confirmed following the

completion of the baseline survey. A suitable reference site within seagrass habitat could not be identified.

2.2.4.2 Soft Sediment Recovery Survey

Towed video survey will be conducted along five replicate 100 m transects adjacent to each 'Soft Sediment Recovery Monitoring Site' (Figure 4), to track the recovery of soft sediment habitat impacted by the Bundle chains. Transects will be located between 50 m and 100 m apart.

Survey will be completed:

- Within a week prior to a Bundle launch.
- Within three days following a Bundle launch.
- Approximately four months following a Bundle launch.

An assessment of sediment disturbance, bioturbation and the abundance of visible holes and pits, will be completed during each survey. A brief report will be prepared as a component of the Bundle launch report, defining the extent of the chain footprint and describing the nature of the seabed impacts recorded.

2.2.4.3 Long-term monitoring

Annual monitoring² will be undertaken in December/January (prior to the peak of the cyclone season) of a range of BCH types across the region (Figure 8).

A towed video system will be used to record video footage along five replicate 20 m monitoring transects at each monitoring location. The system will be towed at a speed of approximately 1-2 km/h, at a height of approximately 0.5 m from the seabed.

The footage from each transect will be quantitatively assessed using Coral Point Count with Excel extensions (CPCe 4.1) (Kohler and Gill 2006), TransectMeasure (SeaGIS), or similar programme.

A number of habitat descriptors will be recorded from the video footage including:

- Dominant seabed type (e.g. soft sediment, reef).
- The percentage cover of flora (macroalgae, seagrass).
- The percentage cover of key fauna groups (e.g. sponges, soft corals, hard corals). Assessment will be limited to specimens visually estimated to be greater than 4 cm in diameter, as specimens smaller than this are difficult to classify accurately.
- The degree of visible bioturbation of Soft sediment (number of visible pits/burrows).

The objective of this monitoring is to track any long-term changes in BCH structure, both within areas potentially impacted by Bundle launch operations and at non-impact sites.

² Annual monitoring will not be undertaken if a Bundle launch has not occurred during the preceding 12 months.

3 Reporting Provisions

3.1 COMPLIANCE ASSESSMENT REPORTING

Evidence of implementation of the MOEMP will be provided within each Compliance Assessment Report (CAR) required under the Ministerial Statement for the Proposal. The format of these reports will be consistent with the approved Compliance Assessment Plan (CAP).

3.2 SUSPECTED NON-ACHIEVEMENT OF AN ENVIRONMENTAL PROTECTION OUTCOME

If at any time during the course of marine operations, a suspected non-achievement of an environmental protection outcome (EPO) is identified as a result of the Proposal, the CEO of DWER will be notified, in writing, within 24 hours of the identification of the suspected non-achievement. Within 48 hours, Subsea 7 will report to the CEO of DWER:

- The results of the monitoring that led to the suspected non-achievement of the EPO.
- The findings of investigations into the causes of the non-achievement of the EPO.

In the event of a non-achievement or exceedance of an EPO, additional management measures, to address that non-compliance or exceedance, will be included within a revised plan prior to the next launch.

3.3 BUNDLE LAUNCH REPORTING

At the completion of each Bundle launch and associated monitoring program, a completion report (Bundle Launch report) will be prepared summarising the outcomes of the launch including the results of operational and environmental monitoring, outcomes in relation to the approved environmental performance outcomes and any issues or incidents.

This report will be provided to DWER, and made publicly available, within three months of the completion of each Bundle launch.

4 Stakeholder Consultation

A number of meetings and briefings on the Proposal have been held with the local community, local, State and Federal government agencies, other industry participants including commercial fishers, non-government organisations, Traditional Owner groups and the pastoralist.

A broad cross-section of community and service organisations local to Exmouth, including conservation groups, have also been contacted regarding the Proposal. The subjects of discussion have varied through the range of stakeholders, and valuable input has been gained for development of the environmental investigation programmes and design of the Proposal.

Extensive comments were raised in relation to the Bundle launch, with the majority concerning the impact to BCH and marine fauna.

This plan outlines the monitoring to be undertaken to confirm the extent of impacts to water quality, and BCH, associated with a Bundle launch. The outcomes of the monitoring will be presented within a Bundle Launch Report, which will be made publicly available.

5 Management and Review of MOEMP

Subsea 7 will complete a detailed review of the outcomes of the initial Bundle launch, with findings to inform the revision of the plan (if required), in consultation with DWER.

This plan will be reviewed, amended as required, and the amended plan implemented, in consultation with DWER, at a minimum every two years following the commencement of marine operations (Bundle launch). This review will include consideration of a reduction in monitoring effort if it can be demonstrated that all of the EPOs can be met.

The plan may be reviewed more frequently as appropriate to maintain currency with, for example, possible operational changes, changing standards, or on the basis of monitoring/validation results.

6 References

- 360 Environmental. 2017. Subsea 7 Learmonth Habitat Surveys. Report on behalf of Subsea 7.
- BMT. 2020. Technical Note. Learmonth Benthic Habitat Survey. February 2020.
- Environmental Protection Authority (EPA). 2016. Technical Guidance Environmental Impact Assessment of Marine Dredging. Perth: EPA.
- MBS Environmental. 2018. Exmouth Gulf Benthic Communities and Habitat Survey Report. November 2018.
- RPS. 2019. Learmonth Sediment Dispersion Modelling Report. March 2019.
- Subsea 7. 2019. Learmonth Pipeline Fabrication Facility Environmental Review Document. September 2019.